domestic and industrial automation

«F&F»®

Products catalogue

2017


«F&F»

F&F Filipowski sp. j.
Konstantynowska 79/81
95-200 Pabianice
POLAND

The F&F company was established in 1992 based on a commercial and service company active in the electronic sector. The previous marketing and technical experience (mainly in terms of electronics and electrical engineering) enabled its owners to established a manufacturing company offers a wide range of electronic appliances for both domestic and industrial applications.

Originally, the company's offer were mainly twilight sensors, stair lighting controllers and phase loss sensors.

The company's strategy is based on the continuous expansion of the offer and seizing attractive market niches.

Currently, the offer of the F&F encompasses a wide range of devices for the needs of home and industrial automation.

Cooperation of the research and development department of our company with the scientific community and final customers leads to a dynamic development of the offer and allows you to create devices with an increasing level of technological advancement, as exemplified by the series of programmable controllers PLC MAX and the F&Home smart home system.

Nowadays, the F&F brand has been widely known in Poland. The company delivers its products to customers in Russia, Ukraine, Belarus, Lithuania, Latvia, Slovakia, Romania, Czech Republic, Hungary, Germany, Portugal, Spain, France, Ireland, Sweden, Norway, Finland, Chile and the United States.

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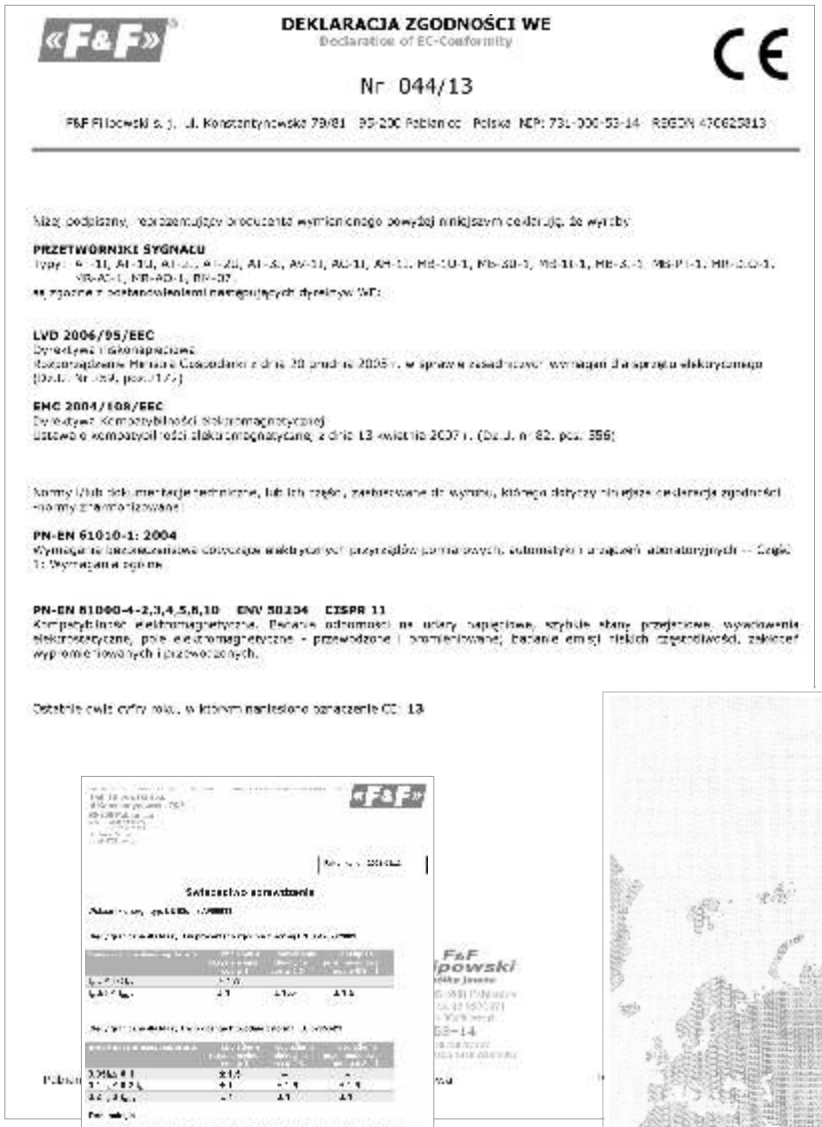


DEKLARACJA ZGODNOŚCI WE
Declaration of EC-Conformity

Nr 044/13

F&F Filipowski s. j. ul. Konstantynowska 79/81 95-200 Pabianice Polska NIP: 731-000-53-14 REGON 470625813

PRZETWORNIKI SYGNAŁU

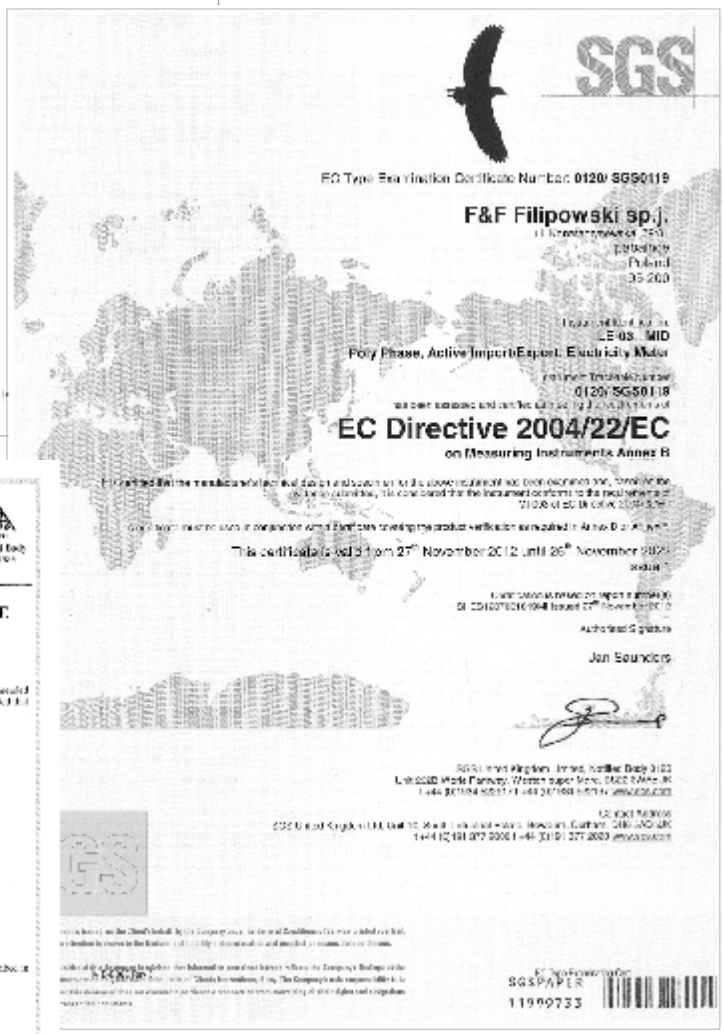
LVD 2006/95/EEC

EMC 2004/108/EEC

PN-EN 61010-1: 2004

PN-EN 61000-4-2,3,4,5,6,10 ENV 50204 CISPR 11

Ostatnie dwie cyfry roku, w którym naniesiono oznaczenie CE: 13



SGS

EC Type Examination Certificate Number: 0120/ SGS0119

F&F Filipowski sp.j.

Poland

LE 03 MID

Poly Phase, Active Import/Export, Electricity Meter

0120/ SGS0118

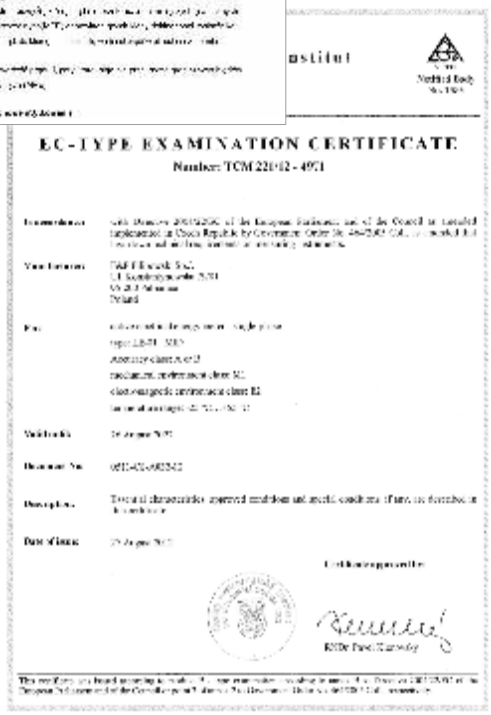
EC Directive 2004/22/EC

on Measuring Instruments Annex B

This certificate is valid from 27th November 2012 until 26th November

Jan Saunders

SGSPAPER 11999733



EC-TYPE EXAMINATION CERTIFICATE

Number: TCM 221/12 - 4971

All concerned parties may receive the copies of conformity certificates CE and others concerning our products via mail or fax. Printable versions of these documents may also be found in our internet site: www.fif.com.pl

NEW PRODUCTS

PRODUCTION OFFER

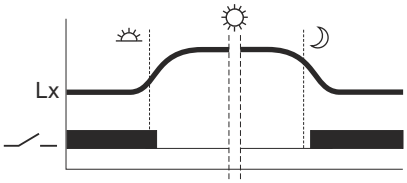
1. LIGHT DEPENDENT RELAYS

PURPOSE

Light dependent relay serves to switch-ON the lighting of streets, squares, shop windows, neon lamps etc., at twilight and to switch-OFF afore mentioned lighting at dawn.

FUNCTIONING

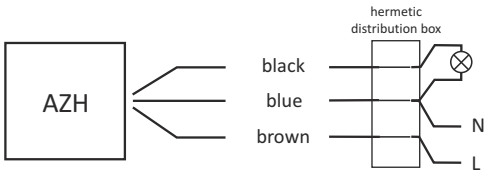
The relay should be situated at place with permanent access to day light, which, due to its changes of intensity, will cause switching ON and OFF the lighting. The exact time of switching the lighting can be set by potentiometer by the user. Turn in the direction of „half moon" will delay switching-ON, turning in the direction of „sun" will advance switching-ON. The relay is equipped with a delay system, which delays switching ON and OFF the lighting, thus eliminating the influence of accidental disturbances like thunder lightings on the relay functioning.



WITH INTERNAL LIGHT DEPENDENT SENSOR

AZH / AZH 12V / AZH 24V

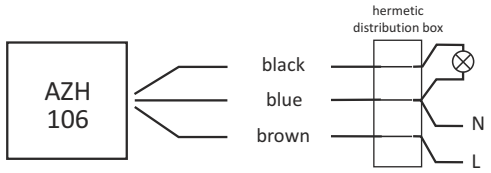
10A. Hermetic.



power supply	
AZH	230V AC
AZH 12V	12V AC/DC
AZH 24V	24V AC/DC
load current	<10A
activation threshold - adjustable	2÷1000Lx
activation threshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	5s
switching OFF delay	10s
power consumption	0.56W
terminal	OMY 3×0,75 mm², l=0,8m
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP65

AZH-106 / AZH-106 12V

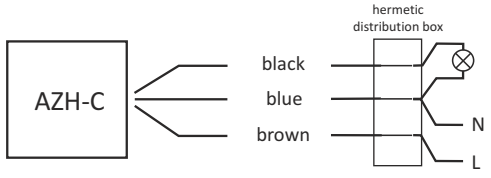
16A. Hermetic.



power supply	
AZH-106	230V AC
AZH-106 12V	12V AC/DC
load current	<16A
activation threshold - adjustable	2÷1000Lx
activation treshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	<5s
switching OFF delay	<5s
power consumption	0.56W
terminal	OMY 3×1mm², l=0,8m
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP65

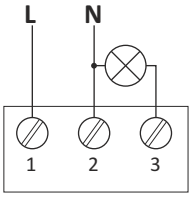
AZH-C / AZH-C 24V

10A. Miniature. Hermetic.



power supply	
AZH-C	230V AC
AZH-C 24V	24V AC/DC
load current	<10A
activation threshold - adjustable	2÷1000Lx
activation treshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	<5s
switching OFF delay	<5s
power consumption	0.56W
terminal	OMY 3×0,75 mm², l=0,5m
working temperature	-25÷50°C
dimensions	81×33×25mm
mounting	two screws to substrate
protection level	IP65

AWZ / AWZ 24V 16A. Hermetic. With internal connection.
AWZ-30 30A. Hermetic. With internal connection.

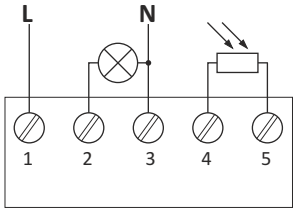



Light dependent relay in box with special sealing flange, fastened to the substrate by two screws, closed by a cover with silicongasket and tightened by 4 screws.

power supply	
AWZ	230V AC
AWZ 24V	24V AC/DC
AWZ-30	230V AC
load current	
AWZ	<16A
AWZ-30	<30A
activation threshold - adjustable	2÷1000Lx
activation threshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	<5sec
switching OFF delay	<5sec
power consumption	0.8W
terminal	
AWZ	2.5mm² screw terminals
AWZ-30	4.0mm² screw terminals
working temperature	-25÷50°C
dimensions	
AWZ	60×85×35mm
AWZ-30	76×85×35mm
mounting	two screws to substrate
protection level	IP65

WITH EXTERNAL HERMETIC PROBE

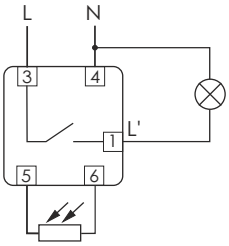
AZH-S / AZH-S 12V / AZH-S 24V / AZH-S PLUS



External hermetic probe Ø10 or PLUS including with automatic twilight sensor.

power supply	
AZH-S	230V AC
AZH-S 12V	12V AC/DC
AZH-S 24V	24V AC/DC
AZH-S PLUS	230V AC
load current	<16A
activation threshold - adjustable	2÷1000Lx
activation threshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	<5sec
switching OFF delay	<5sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

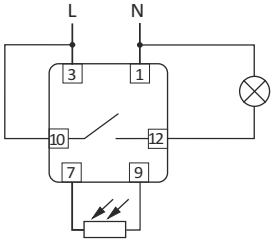
AZ-B / AZ-B 24V / AZ-B PLUS
AZ-B UNI / AZ-B PLUS UNI



External hermetic probe Ø10 or PLUS including with automatic twilight sensor.

power supply	
AZ-B / AZ-B PLUS	230V AC
AZ-B 24V	24V AC/DC
AZ-B UNI / AZ-B PLUS UNI	12÷264V AC/DC
load current	<16A
activation threshold - adjustable	2÷1000Lx
activation threshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

AZ-112 / AZ-112 24V / AZ-112 PLUS



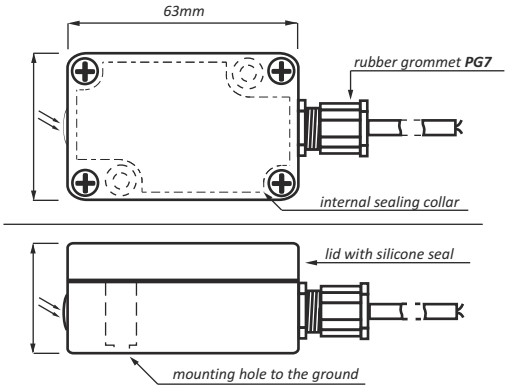
External hermetic probe Ø10 or PLUS including with automatic twilight sensor.

power supply	
AZ-112 / AZ-112 PLUS	230V AC
AZ-112 24V	24V AC/DC
load current	<16A
activation threshold - adjustable	2÷1000Lx
activation threshold - default	approx. 7Lx
hysteresis	approx. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

HERMETIC EXTERNAL PROBES

PLUS

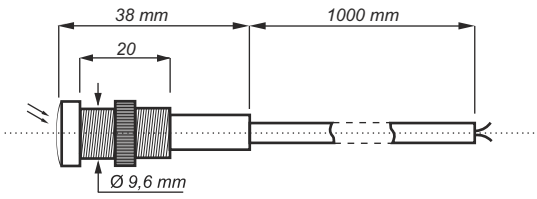
Applied in sets: **AZH-S PLUS, AZ-B PLUS, AZ-B PLUS UNI, AZ-112 PLUS.**
Available separately.



Optical sensor in convenient low dimensioned casing, to be connected by rubber grommet PG7 with round cable max. Ø7 mm, (for ex. 2× 0,5mm²) of length acc to necessity. Box with special sealing flange, fastened to the substrate by two screws, closed by a cover with silicon gasket and tightened by 4 screws.

Ø10

Applied in sets: **AZH-S, AZ-B, AZ-B UNI, AZ-112**.
Available separately.

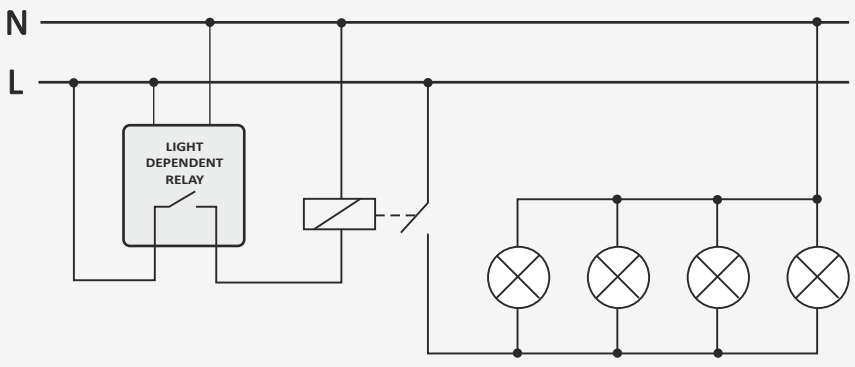


Little, easy to mount light dependent sensor with 1 meter cable with posibility to extend (connection of leads should be made in hermetic distribution box or at a place free from atmospheric influence.

ATTENTION!

The external probe should be situated at place with permanent access to day light, which due to its changes of intensity, will cause switching ON and OFF the lighting.
When length of connecting cable of external probe exceeds 10 m it should not be laid in vicinity of a parallel conductor under mains voltage, or conducting great currents. In any case always connect correctly phase and neutral leads to the light dependent relay.

PRACTICAL SOLUTIONS



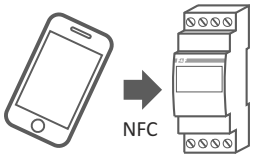
Control system for contactor-actuating receivers of total power consumption exceeding the maximum allowable load of a photo-sensitive switch

ATTENTION!

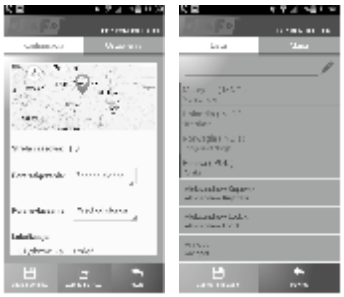
Automatic twilight sensors for other voltages than specified in the technical data table are also available on special request (24V, 48V and 110V AC/DC and other).

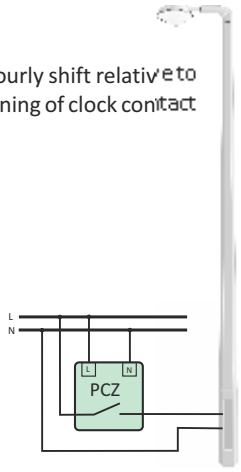
ASTRONOMICAL CLOCK

On the grounds of information about the current date, geographical coordinates of the installation (location) and hourly shift relative to Universal Time (Greenwich UT), the astronomical clock automatically sets daily, temporary points of closing and opening of clock contact in accordance with astronomical times of sunrise and sunset.



NFC WIRELESS COMMUNICATION
- possibility wireless read and write timer configuration from an Android phone equipped with the NFC module.





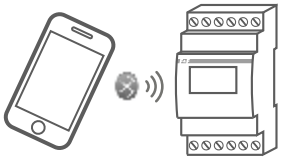
Read more - page 86

SSO - LIGHTING CONTROL SYSTEM

System based on a central astronomical clock PCZ-527 is designed for switching on and off of the lighting or other electrical receivers according to the daily, astronomical points of sunrise and sunset.

PCZ-527

With the additional devices it allows you to:
* monitor network performance and electricity consumption
* register time of operation
* read status and configuration of the timer using SMS commands
* SMS alarm messages
* synchronize time and GPS location
* measure the level of brightness (sunlight)
* preview of status and configuration using tablets and smartphones running Android

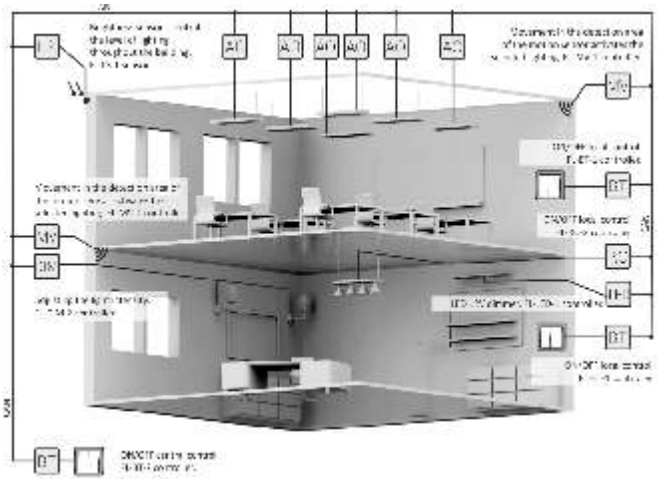


Android system app

Read more - page 88

F&Light LIGHTING CONTROL SYSTEM

System that allows you to build a simple in configuration and at the same time an advanced lighting control system:
* control various sources of light in a single system;
* cooperation with brightness and motion sensors. Ability to use motion sensors from the alarm system;
* grouping devices according to, for example, room or floor (up to 10 different groups);
* central control of all receivers;
* independent brightness correction for each receiver so that with one brightness sensor the lighting can change depending, on the distance from the window (for example);
* synchronizing work of receivers (for example forcing the same level of brightness on multiple dimmers);
* simplicity of configuration - you need only a screwdriver to "program" the system.



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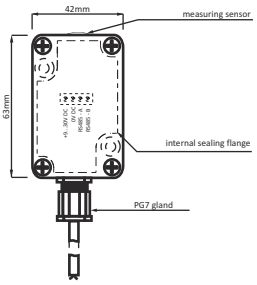
LIGHTING BRIGHTNESS LEVEL SENSOR

MB-LS-1 WITH MODBUS RTU OUTPUT

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.



supply voltage	9÷30V DC
maximum current consumption	40mA
range of measurement	1÷2000Lux
maximum measurement error temp.	±1°C
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	42×63×30mm
mounting	2 fastening screws to the ground
protection level	IP65

The sensor continuously measures the level of brightness (sunlight) in the range of 1÷2000 lux. It allows you to link the moment of switching on/off with the actual level of brightness. Regardless of switching on and off we are presented with the brightness levels in lux and the width of the time zone for switching.

2. STAIRCASE TIMERS

PURPOSE

Staircase timer serves to keep switched-ON lighting of staircase, corridor or any other object for the set time and to switch-OFF this lighting automatically, upon elapse of this set time.

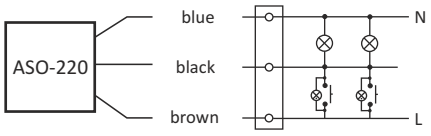
FUNCTIONING

Turned ON staircase timer supports the lighting during set time by potentiometer (from 0.5 min. to 10 min.). After passage of set time timer will switch OFF the lighting automatically. After switching OFF the lighting there is possibility to switch it ON again.

STANDARD TYPE

ASO-220 / ASO-110 / ASO-24 / ASO-42

10A. With cable connection.

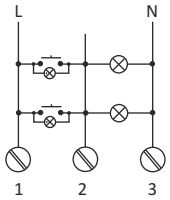


power supply	
ASO-220	230V AC
ASO-110	110V AC
ASO-24	24V AC/DC
ASO-42	42V DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
terminal	OMY 3×0.75mm², l=0.45m
power consumption	0.56W
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP65

ASO-220 is adapted to co-operate with pushbuttons equipped with neon lamp.

ASO-201 / ASO-204

16A. With screw terminals.

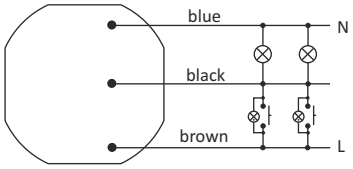


power supply	
ASO-201	230V AC
ASO-204	24V AC/DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
terminal	2.5mm² screw terminals
power consumption	0.56W
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

ASO-201 is adapted to co-operate with pushbuttons equipped with neon lamp.

ASO-205

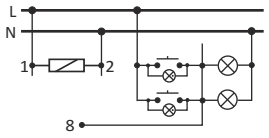
10A. in flush mounted.



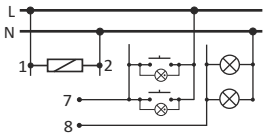
power supply	230V AC
load current	<10A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
terminal	3×DY 1mm², l=10cm
power consumption	0.4W
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

ASO-205 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-B 220 / AS-B 110 / AS-B 42 / AS-B 24



3-wire connection

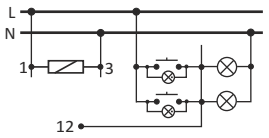


4-wire connection

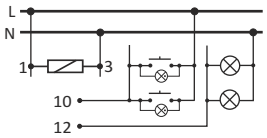
power supply	
AS-B 220	230V AC
AS-B 110	110V AC
AS-B 42	
AS-B 24	24V AC/DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
power consumption	1.2W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

AS-B 220 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-212 / AS-214



3-wire connection



4-wire connection

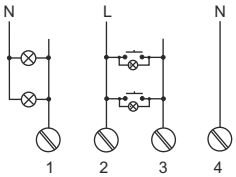
power supply	
AS-212	230V AC
AS-214	24V AC/DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

AS-212 is adapted to co-operate with pushbuttons equipped with neon lamp.

WITH ADDITIONAL FUNCTION OF COUNTER-BLOCKADE

Function of counter blockade does not allow to keep the light-ON in case of staircase switch blocking (after blocking the pushbutton, for example by match, the timer will count the set time and switch OFF the lighting). Next switching ON can be after removing the blockade.

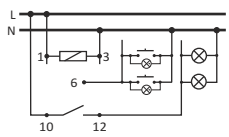
ASO-202 / ASO-203



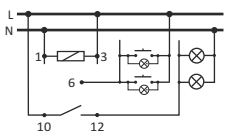
power supply	
ASO-202	230V AC
ASO-203	24V AC/DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

ASO-202 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-223 / AS-224



control pulse: N



control pulse: L

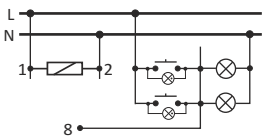
power supply	
AS-223	230V AC
AS-224	24V AC/DC
load current	
AC (AC-1)	<10A
DC	4A
switching OFF delay - adjustable	0.5÷10min.
switching ON delay	<1sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

AS-223 is adapted to co-operate with pushbuttons equipped with neon lamp.

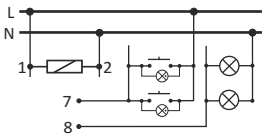
WITH FUNCTION OF SIGNALISATION OF LIGHTING SWITCHING OFF

AS-221T

Turned ON staircase timer supports the lighting during set time by potentiometer (from 0.5 min. to 10 min.) and upon elapse of this set time a reduction by half of lighting brightness follows for about 30 seconds, after that OFF follows (thus an occurrence of a sudden darkness is avoided, enabling safe approach to the switch). After switching OFF the lighting there is possibility to switch it ON again.



3-wire connection



4-wire connection

power supply	230V AC
load current	<10A
switching OFF delay - adjustable	0.5÷10min.
time of reduced brightness	30sec
switching ON delay	<1sec
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

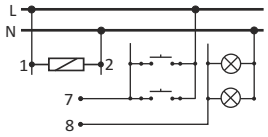
ATTENTION!

The AS-221T is not compatible with LED lamps, glow-discharge tubes, compact fluorescent lamps and other lighting devices including electric starters.

AS-222T

WITH COUNTER BLOCKADE

Turned ON staircase timer supports the lighting during set time by potentiometer (from 0.5 min. to 10 min.) and upon elapse of this set time a reduction by half of lighting brightness follows for about 30 seconds, after that OFF follows (thus an occurrence of a sudden darkness is avoided, enabling safe approach to the switch). After switching OFF the lighting there is possibility to switch it ON again. Function of counter blockade does not allow to keep the light-ON in case of staircase switch blocking (after blocking the pushbutton, for example by match, the timer will count the set time and switch OFF the lighting). Next switching ON can be after removing the blockade.



4-wire connection

power supply	230V AC
load current	<10A
switching OFF delay - adjustable	0.5÷10min.
time of reduced brightness	30sec
switching ON delay	<1sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

ATTENTION!

The AS-222T is not compatible with LED lamps, glow-discharge tubes, compact fluorescent lamps and other lighting devices including electric starters.

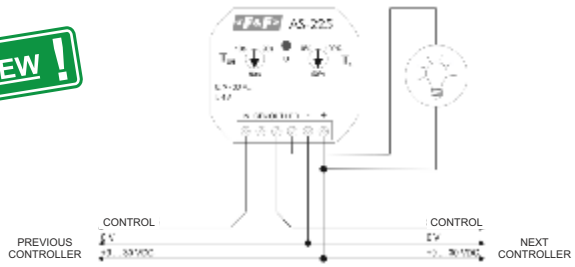
ATTENTION!

Automatic staircase switches for other voltages than specified in the technical data table are also available on special request (12 V, 48 V and 110 V AC/DC and other). The offer does not include the AS-221T and AS-222T models.

GROUP (with the KASKADA sequence switching system)

AS-225

NEW !



power supply	9÷30V DC
output current	<4A
output voltage	9÷30V DC
switching OFF delay Ton - adjustable	10÷90sec
switching ON delay - adjustable TΔ	0÷100%Ton
switching ON delay	<1sec
terminal	2.5mm² screw terminals
power consumption standby/on	0.3W/0.5W
working temperature	-15÷50°C
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

PURPOSE

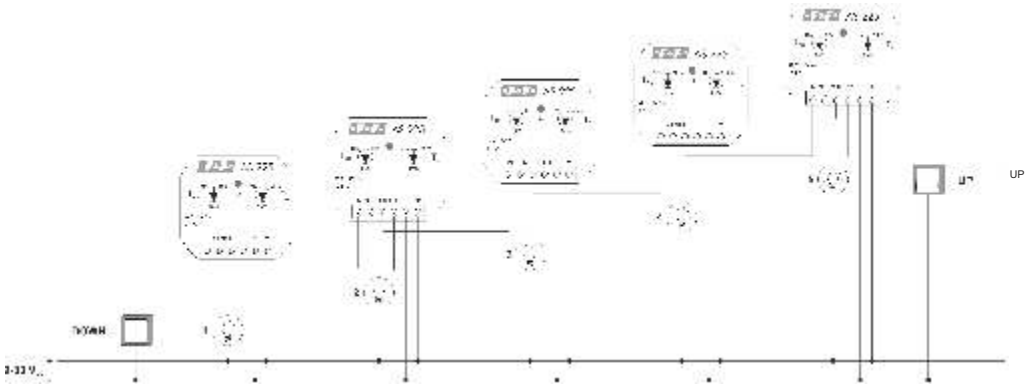
The AS-225 automatic stairs controller is a controller dedicated to building a multipoint system of stairs lighting control. Each relay manages one point of light, and when combined into a group and with connected activators (bell button, motion sensor, pressure sensor, optical barrier), you can get the effect of light moving along the stairs

FUNCTIONS

* control of multipoint lighting system;
* the ability to create groups of any number of controllers;
* any of the controllers allows you to set your own time period of the light switch-on and the moment of switching to another segment;
* switching on the lights using a variety of selectors:
  - bell button
  - motion sensor
  - optical barrier
  - pressure sensor

Issuing of the command is done potential-free by connecting the IN/OUT input with the „-" level of power supply.

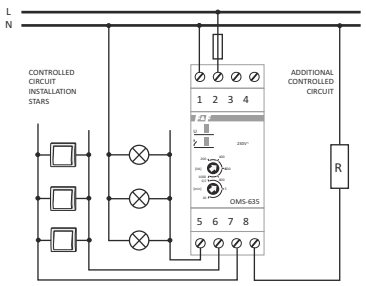
* small enclosure for the installation box - can be mounted directly under the lamp;
* simple installation - only 3 wires from the controller to the controller.



FUNCTIONING

Pressing the DOWN button will switch on lamp number 1. Once the time t_D set on the first controller has elapsed the lamp number 2 will start to gradually switch on. Once the switch-on time t_{ON} of the lamp number 1 has passed the lamp will begin to gradually switch off. Transition from the lamp 2 to the lamp 3, from the lamp 3 to the lamp 4, etc. will be carried out the same way. In case of descending the stairs (pressing the UP button), the sequence is reversed - lamp number 5 will be switched on as the first one, the number 4 etc.

OMS-635 WITH STAIRCASE TIMER



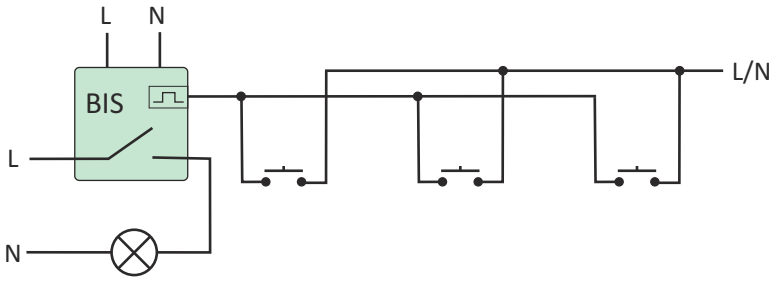
power supply	230V AC
load current	<16A
switch-on time lightning - adjustable	0.5÷10min.
power limit	200÷1000VA
switching ON delay	1.5÷2sec
return supply hysteresis	2%
return supply time	30sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

The OMS-635 power consumption limiter allows the user to maintain lighting in halls, staircases or other places active for a specified time when it will then turn off automatically. The user may also preset the automatic disconnection of power supply to a single-phase wiring system if the rated power input to the receivers in a given circuit is exceeded.

3. ELECTRONIC BISTABLE PULSE RELAYS

PURPOSE

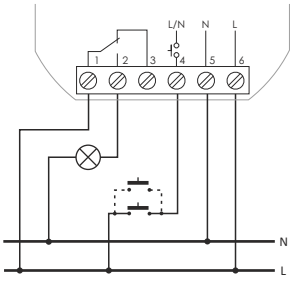
Electronic bistable pulse relays enables the user to actuate lighting or other devices from various locations by means of control buttons in parallel connection.



SWITCH ON - SWITCH OFF TYPE

The receiver is actuated by means of a current pulse triggered by pushing any bell push connected to the relay. The receiver is deactivated by another pulse or after a preset time.
The relay does not „memorize" the position of the relay contact, i.e. in case of supply voltage decay and the subsequent return of supply voltage, the relay contact will be set in the off position. Such a solution prevents the automatic actuation of the receivers controlled that might occur without proper supervision after a long-lasting decay of supply voltage.

BIS-402

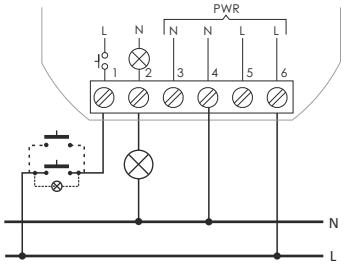


power supply	230V AC
contact / load current (AC-1)	1×NO/NC / <10A
L/N current control pulse	<1mA
switching ON delay	0.1÷0.2sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

ATTENTION!

The BIS-402 is not compatible with bell pushes equipped with fluorescent lamps.

BIS-408 / BIS-408i

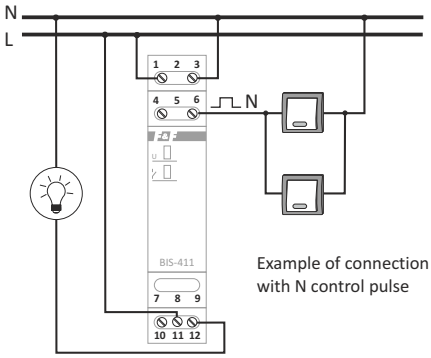


power supply	
BIS-408(i)	100÷265V AC
contact / load current (AC-1)	
BIS-408	1×NO / <16A
BIS-408i	1×NO / <16A (160A/20msec)
L current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
power consumption	
standby	0.15W
on	0.7W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=25mm
mounting	in flush mounted Ø60
protection level	IP20

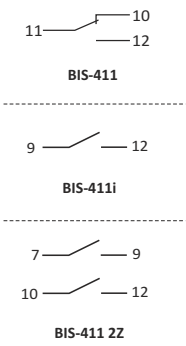
ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.
The BIS-408 and BIS-408i can be used with backlit buttons.

BIS-411 / BIS-411M / BIS-411i / BIS-411iM / BIS-411 2Z



Example of connection with N control pulse



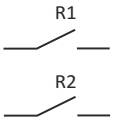
power supply	
BIS-411(i/M/2Z) 230V	100÷265V AC
BIS-411(i/M/2Z) 24V	9÷30V AC/DC
contact / load current (AC-1)	
BIS-411(M)	separated 1×NO/NC / <16A
BIS-411i(M)	separated 1×NO / <16A (160A/20msec)
BIS-411 2Z	separated 2×NO / 2×[<8A]
N current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
signalling activation	red LED
power consumption	
standby	0.15W
on	0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

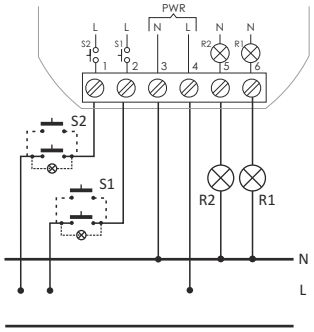
ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.
M - version of the relays with the "memory" of contact position, so when the power is switched on the relay will be restored to a state it was in when the power was switched off.
Power relay 230V versions can work with illuminated buttons.

BIS-416 2 INDEPENDENTLY CONTROLLED CIRCUITS

The relay has two independently controlled channels. Control is carried out by means of two separate signal inputs. Pulse on S1 input controls the R1 output. S2 input and R2 output operate on the same basis.



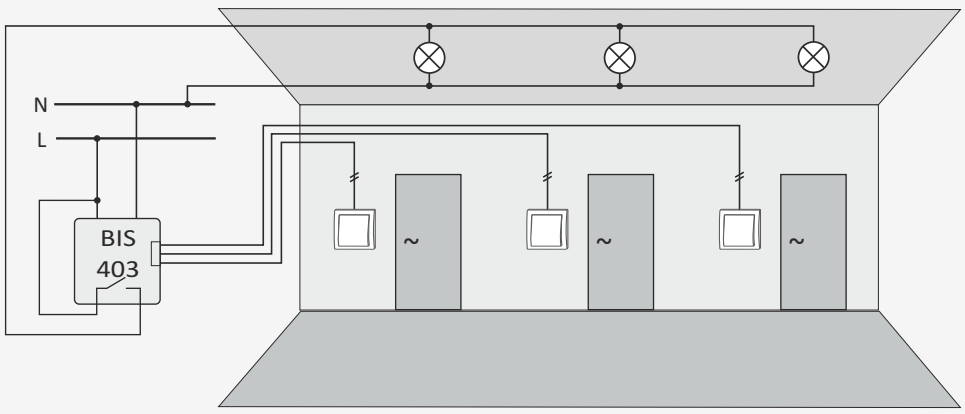


power supply	100÷265V AC
contact / load current (AC-1)	2×[1×NO] / 2×[<8A]
L current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
power consumption	
standby	0.15W
on	0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

ATTENTION!

BIS-416 can work with illuminated buttons.

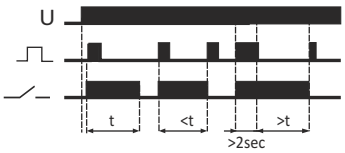
PRACTICAL SOLUTIONS



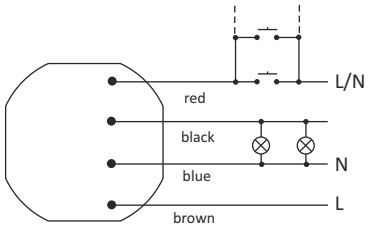
Example of control system for three-point hall lighting

WITH TIMING SWITCH

The receiver is actuated by means of a current pulse triggered by pushing any bell push connected to the relay. The receiver is deactivated by another pulse or after a preset time.
Press and hold the control button longer then 2 sec, that will effect the activate lighting permanently until the next pulse which will turn off the relay.
The relay does not „memorize" the position of the relay contact, i.e. in case of supply voltage decay and the subsequent return of supply voltage, the relay contact will be set in the off position. Such a solution prevents the automatic actuation of the receivers controlled that might occur without proper supervision after a long-lasting decay of supply voltage.



BIS-403

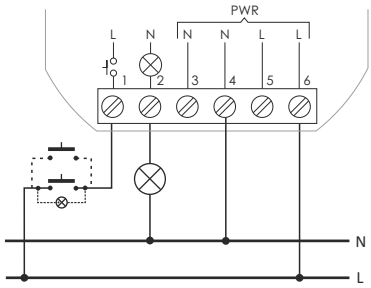


power supply	230V AC
contact / load current (AC-1)	1×NO / <10A
L/N current control pulse	<1mA
switching ON delay	0.1÷0.2sec
switch-off time	1÷12min.
power consumption	0.8W
working temperature	-25÷50°C
terminal	4×DY 1mm², l=10cm
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

ATTENTION!

BIS-403 can't work with illuminated buttons.

BIS-410 / BIS-410i

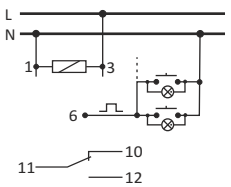


power supply	
BIS-410(i)	100÷265V AC
contact / load current (AC-1)	
BIS-410	1×NO / <16A
BIS-410i	1×NO / <16A (160A/20msec)
L current control pulse	<5mA
switching ON delay	0.1÷0.2sec
switch-off time	1÷15min.
power indication	green LED
power consumption	
standby	0.15W
on	0.7W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=25mm
mounting	in flush mounted Ø60
protection level	IP20

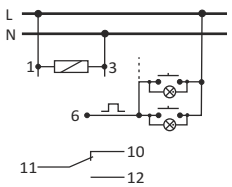
ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.

BIS-413 / BIS-413M / BIS-413i / BIS-413iM



N control pulse



L control pulse

power supply	
BIS-413(i/M) 230V	100÷265V AC
BIS-413(i/M) 24V	9÷30V AC/DC
contact / load current (AC-1)	
BIS-413(M)	1×NO/NC / <16A
BIS-413i(M)	1×NO/NC / <16A (160A/20msec)
L/N current control pulse	<5mA
switching ON delay	0.1÷0.2sec
switch-off time	1÷12min.
power indication	green LED
signalling activation	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

ATTENTION!

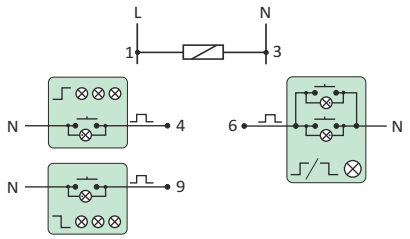
Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.
M - version of the relays with the "memory" of contact position, so when the power is switched on the relay will start to measure the switch-on time from the beginning.
Power relay 230V versions can work with illuminated buttons.

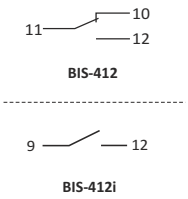
GROUP (HOTEL-TYPE) WITH CONTROLLING INPUTS „ACTIVATE ALL" I „DEACTIVATE ALL"

BIS-412 / BIS-412M / BIS-412i / BIS-412iM

PURPOSE

BIS- 412 electronic bistable pulse relay is designed for operation in a group configuration. A single relay enables the activation and deactivation of the receiver controlled after each current pulse triggered by pushing a local control momentary push-button (bell-push). The group configuration enables the deactivation or activation of all receivers connected to individual relays by means of the central control push-buttons.





power supply	
BIS-412(i/M) 230V	100÷265V AC
BIS-412(i/M) 24V	9÷30V AC/DC
contact / load current (AC-1)	
BIS-412(M)	separated 1×NO/NC / <16
BIS-412i(M)	separated 1×NO / <16 (160A/20msec)
N current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
signalling activation	red LED
power consumption	
standby	0.15W
on	0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONING

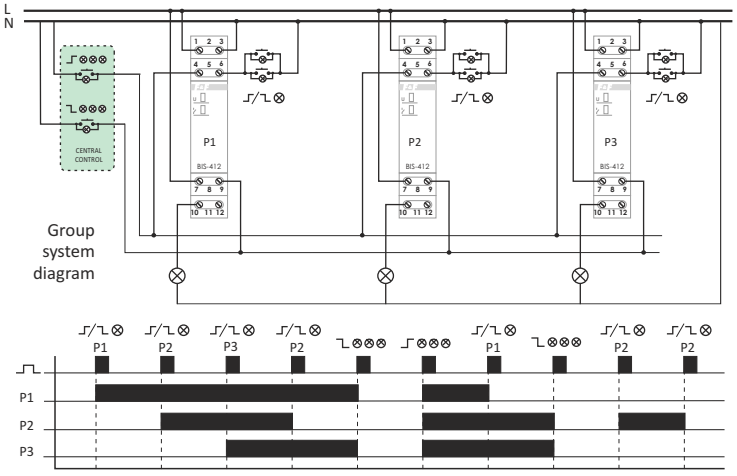
Local control

The receiver is activated after a current pulse that is triggered by pushing one optional momentary push-button ⎍/⏉⊗ belonging to the local control group. The contact of the relay is switched to the 7-10 position. After a next current pulse, the receiver will be deactivated (the contact of the relay returns to the 7-12 position).

Central control

DEACTIVATE ALL - after a current pulse triggered by pushing the momentary push-button ⏉⊗⊗⊗, all receivers will be deactivated (regardless of their status, i.e. deactivation or activation) that are controlled separately by individual relays. The contact in each relay will be switched to the 7-12 position.

ACTIVATE ALL - after a current pulse triggered by pushing the momentary push-button ⎍⊗⊗⊗ , all receivers will be activated (regardless of their status, i.e. deactivation or activation) that are controlled separately by individual relays. The contact in each relay will be switched to the 7-10 position.



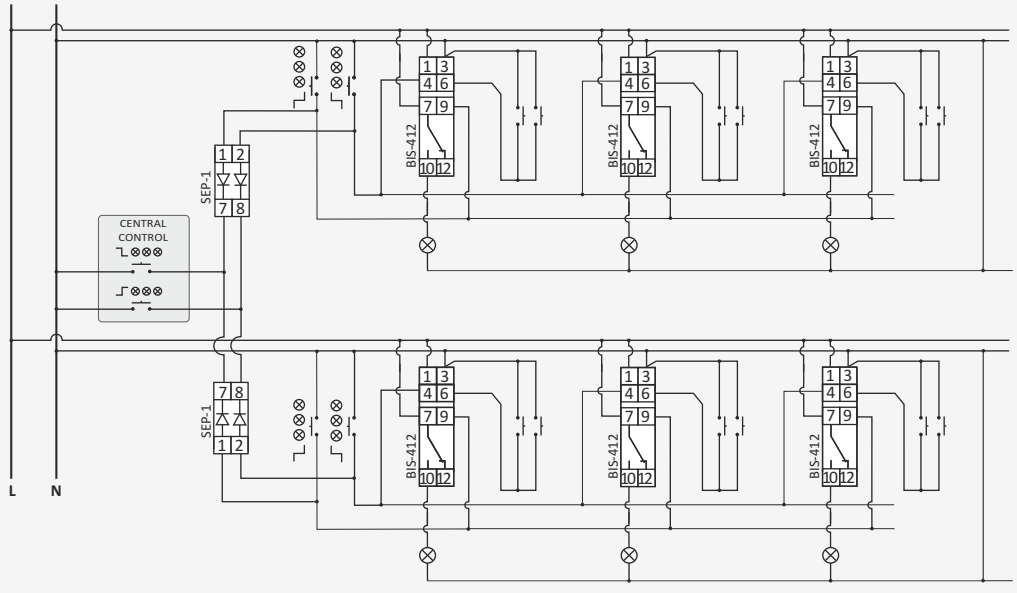
ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.

M - version of the relays with the "memory" of contact position, so when the power is switched on the relay will be restored to a state it was in when the power was switched off.

Power relay 230V versions can work with illuminated buttons.

PRACTICAL SOLUTIONS

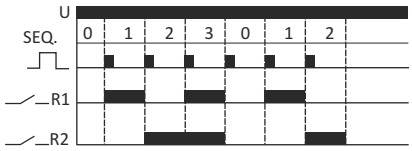


Example of division into subgroups using SEP-01 incoming signal separators (page 178)

SEQUENCE-TYPE

Sequential relay has two separate outputs: R1 and R2. Contact status (closed/open) is forced sequentially in accordance with a predetermined program. Contacts switch to another state after subsequent pulse from control button.

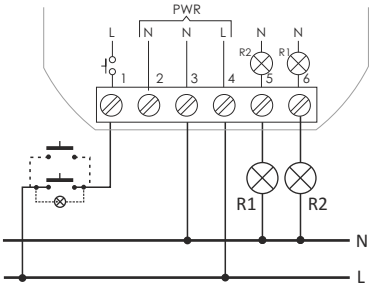
SINGLE FUNCTION



Sequence	Status of the contacts
0	Sections R1 and R2 disabled
1	Only section R1 enabled
2	Only section R2 enabled
3	Sections R1 and R2 enabled

Next pressing the repeat sequence 0-3.

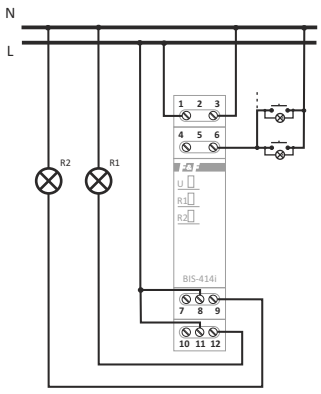
BIS-404

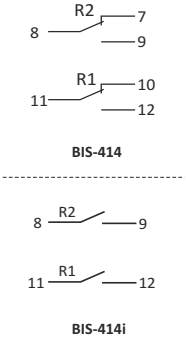


power supply	100÷265V AC
contact / load current (AC-1)	2×[1×NO] / 2×[<8A]
L current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
power consumption	
standby	0.15W
on	0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

BIS-404 can work with illuminated buttons.

BIS-414 / BIS-414i



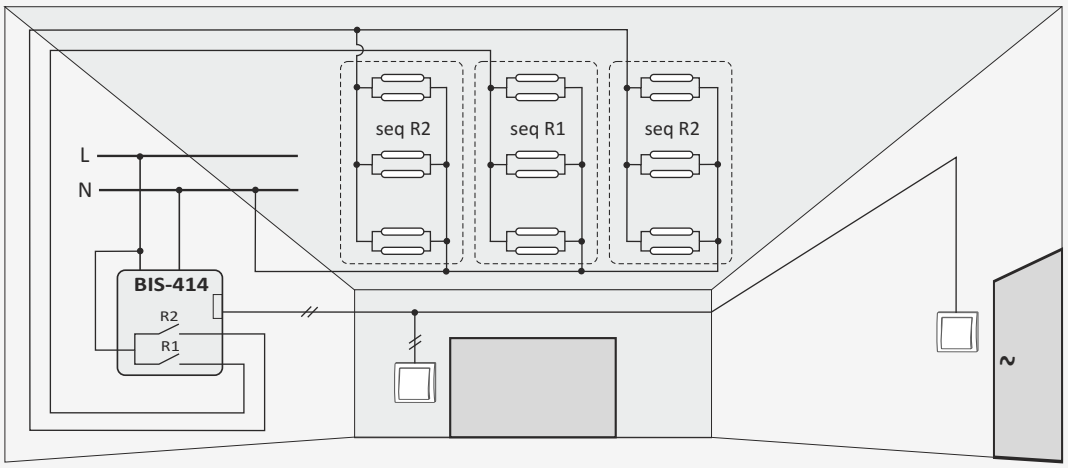


power supply	
BIS-414(i) 230V	100÷265V AC
BIS-414(i) 24V	9÷30V AC/DC
contact / load current (AC-1)	
BIS-414	separated 2×[1×NO/NC] / 2×16A
BIS-414i	separated 2×[1×NO] / 2×16 (160A/20msec)
current control pulse	<5mA
switching ON delay	0,1÷0,2s
power indication	green LED
signalling activation	2× red LED
power consumption	
standby	0.15W
on	0.9W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.
Power relay 230V versions can work with illuminated buttons.

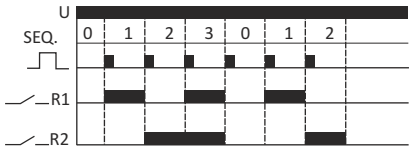
PRACTICAL SOLUTIONS



Example of lighting system, which allows control of light intensity by actuating one of the sections R1 and R2 from any location in the room.

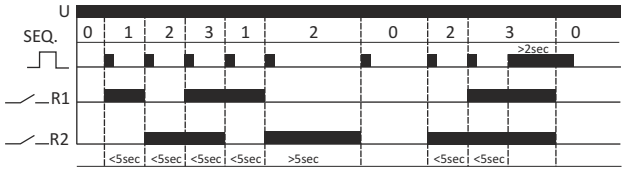
4-FUNCTION

A mode



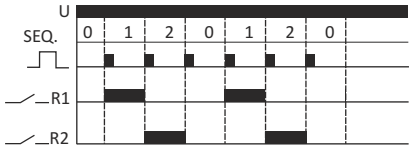
* Next pressing the repeat sequence 0-3.

B mode



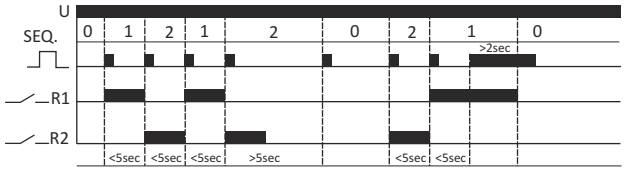
* Pressing in less than 5 seconds, repeating sequences 1-3.
* Pressing after more than 5 seconds, disconnect both contacts (sequence 0).
* Long press - in any sequence - disconnects both contacts (sequence 0).
* If you turn off both relays pressing the button again restores the state before power (memory state). Does not apply to the case of a power failure relay.

C mode



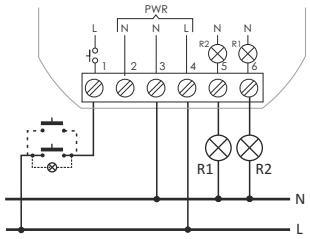
* Next pressing the repeat sequence 0-2.

D mode



* Pressing in less than 5 seconds, repeating sequences 1-2.
* Pressing after more than 5 seconds, disconnect both contacts (sequence 0).
* Long press - in any sequence - disconnects both contacts (sequence 0).
* If you turn off both relays pressing the button again restores the state before power (memory state). Does not apply to the case of a power failure relay.

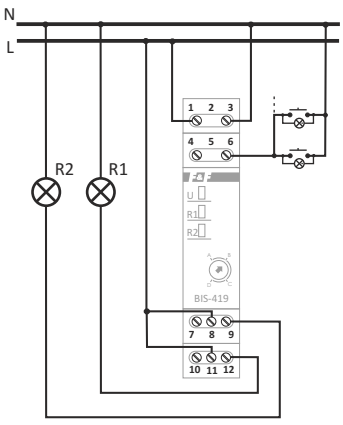
BIS-409

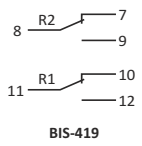


power supply	100÷265V AC
contact / load current (AC-1)	2×[1×NO] / 2×[<8A]
L current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
power consumption	
standby	0.15W
on	0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h= 20mm
mounting	in flush mounted Ø60
protection level	IP20

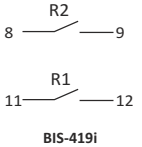
BIS-409 can work with illuminated buttons.

BIS-419 / BIS-419i





BIS-419



BIS-419i

power supply	
BIS-419(i) 230V	100÷265V AC
BIS-419(i) 24V	9÷30V AC/DC
contact / load current (AC-1)	
BIS-419	separated 2×[1×NO/NC] / 2×16
BIS-419i	separated 2×[1×NO] / 2×16 (160A/20msec)
N current control pulse	<5mA
switching ON delay	0.1÷0.2sec
power indication	green LED
signalling activation	2× red LED
power consumption	
standby	0.15W
on	0.9W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

ATTENTION!

Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.
Power relay 230V versions can work with illuminated buttons.

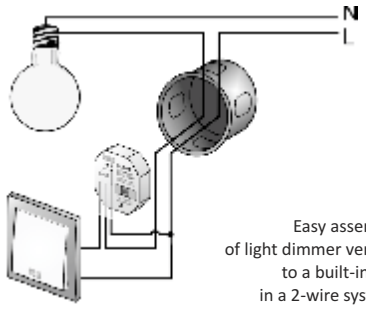
4. LIGHT DIMMERS

PURPOSE

The dimmer is used for switching on and off lighting and offers the option of light intensity adjustment by means of any impulse switch (buzzer).

FUNCTIONING

Lighting is turned on by a current pulse sent after pressing an impulse switch (buzzer) connected to a relay. Another pulse switches the lighting off. Pressing and holding the switch for more than 1 second allows the user to adjust light intensity (continuous loop adjustments in the following sequence: BRIGHTER→DARKER→BRIGHTER).
Light intensity may be controlled by means of numerous switches in a parallel connection, distributed in several locations within a room.
The SCO are adapted to co-operate with pushbuttons equipped with neon lamp.



Easy assembly of light dimmer version to a built-in box in a 2-wire system.

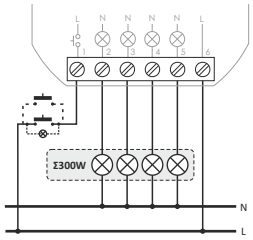
SUITABLE FOR INCANDESCENT AND HALOGEN LAMPS

Group of dimmers designed for incandescent and halogen lamps (also powered by the transformer or electronic power supply, designed to work with dimmers). With some electronic power supplies the dimmers may work incorrectly (e.g. flickering of the lighting). For some types, connect the bulbs or halogen lights with a total power capacity of at least 50% of the nominal power of the power supply. They can work with backlighted buttons.
Before the final installation it is recommended to perform the tests.

NO "STORAGE" OF LIGHT INTENSITY SETTINGS ENABLED

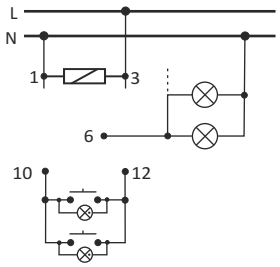
It has a "SOFT START" feature - holding down the button >1 sec when switching lighting causes smooth lighting up from "zero" (DARKER -> BRIGHTER).

SCO-801 300W



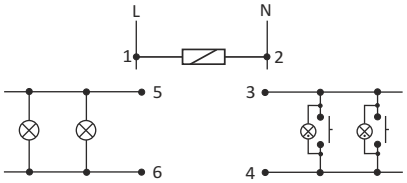
power supply	230V AC
load current	<1.3A
maximum power connected lamps	300W
current pulse	<1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

SCO-811 350W



power supply	230V AC
load current	<1.5A
maximum power connected lamps	350W
current pulse	<1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque	0.4Nm
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

SCO-813 1000W

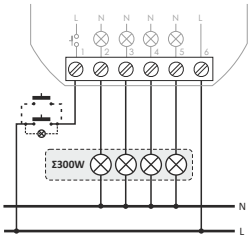


power supply	230V AC
load current	<4.5A
maximum power connected lamps	1000W
current pulse	<1sec
power consumption	0.3W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

A FUNCTION OF LIGHT INTENSITY SETTING „STORAGE" ALLOWED

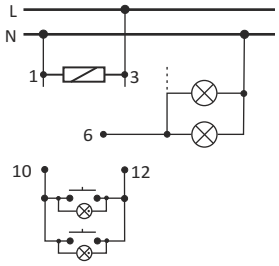
The lighting returns to the preset intensity after each activation.

SCO-802 300W



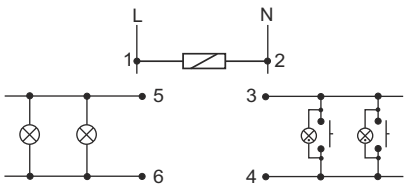
power supply	230V AC
load current	<1.3A
maximum power connected lamps	300W
current pulse	<1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

SCO-812 350W



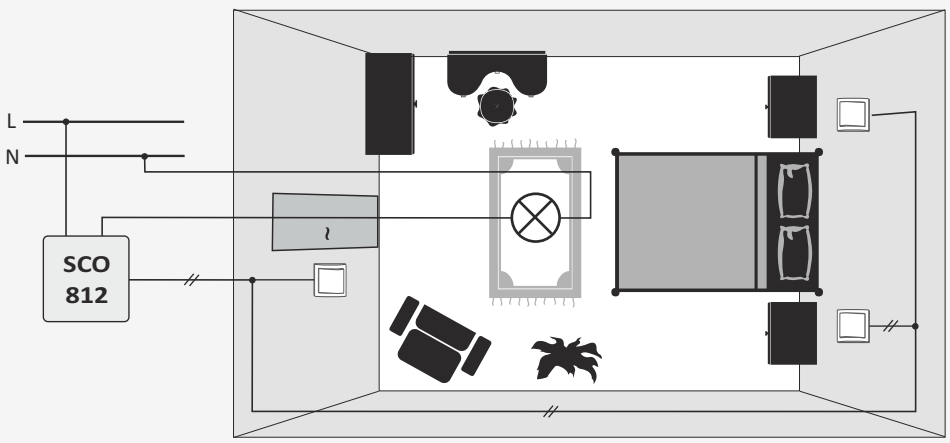
power supply	230V AC
load current	<1.5A
maximum power connected lamps	350W
current pulse	<1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque	0.4Nm
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

SCO-814 1000W



power supply	230V AC
load current	<4.5A
maximum power connected lamps	1000W
current pulse	<1sec
power consumption	0.3W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

PRACTICAL SOLUTIONS



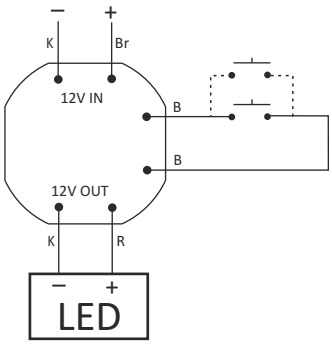
Example of lighting control system from three locations within a room.

LIGHTING DIMMERS LED 12V

WITH „STORAGE" OF LIGHT INTENSITY SETTINGS ENABLED

SCO-803 36W

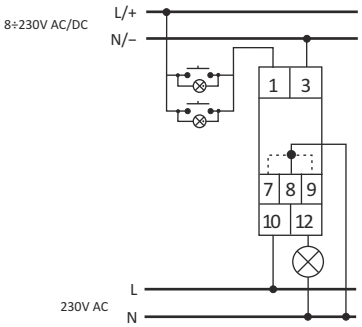
The lighting returns to the preset intensity after each activation.



power supply	12V DC
LED power connected	36W
current pulse	<1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	6×LY 0.75mm², l=10cm
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

USED FOR INCANDESCENT LAMPS, HALOGEN LAMPS, LED LAMPS, COMPACT FLUORESCENT LAMPS WITH THE DIMMING POSSIBILITY

SCO-815



power supply	230V AC
lamp power connected	
(R)	500W
(L)	500W
(C)	500W
(ESL)	100W
(LED)	100W
control voltage	8÷230V AC/DC
current pulse	<1sec
power consumption	0.1W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PURPOSE

Universal lighting dimmer enables to adjusts the brightness of light the following light sources:
- Incandescent lamps and halogen main series (resistive load R)
- Lamps powered by a toroidal supplier (inductive load L)
- Lamps powered by electronic transformer (capacitive load C)
- Energy-saving compact fluorescent lamps (ESL) with dimming function
- LED lamps powered 230V with dimmable function

FUNCTIONING

The inclusion of light followed by a current pulse caused by a momentary push button (bell) connected to the relay. Lighting can be controlled through a number of buttons arranged in parallel at different points in the building. Disabling lighting will be after the next impulse. Holding down the button >1sec enables to set the desired light intensity (continuously adjustable lighting in the loop (Lighter / Darker / Lighter).

FUNCTIONS

- Automatic detection of the nature of the load L+R and R+C. The use of ESL lamps requires manual settings for nature of the load with dimmer knob on the forehead.
- Speed setting for brightness adjustment.
- „Memory" light intensity settings - after each inclusion lighting returns to the desired brightness.
- Function „SOFT START" - holding the button >1sec. at switch on lights causes the smoothly illumination from „zero" (dark / bright).
- Setting a minimum level of light-controlled lamps (particularly important for ESL lamps, requiring a minimum current of ignition and sustain).
- ON mode - switching to the maximum brightness of lighting without dimming.
- Control input galvanically isolated from the network with a wide range of input voltage 8÷230 V AC / DC.
- Continuously adjustable lighting up and down in order to prolong the life of controlled lamp.

FOR HIGH POWER RECEIVERS <3500 W

SCO-816 basic version
SCO-816A with analog input 1÷10 V
SCO-816M with Modbus RTU protocol
SCO-816D with DALI protocol

PURPOSE

The SCO-816 universal dimmer is designed to control the brightness of dimmable high power sources, such as incandescent and halogen lamps, toroidal transformers and adjustable electronic transformers, dimmable LED bulbs and dimmable energy-saving LED lamps.

FUNCTIONING

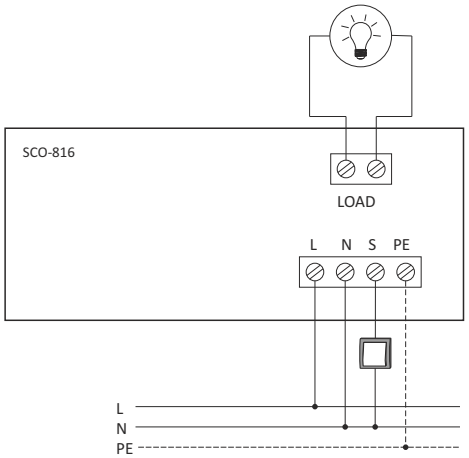
Switching on of the lighting follows the current pulse triggered by a momentary push of a button. Next short press of the button turn the lights off. Long press of the button will brighten/dim the light. The dimmer is equipped with a memory function - another activation by short press of a button will restore the last set brightness level.
Rapid current surge, which is created at the moment of switching on the capacitive loads receivers , is reduced with the feature of switching on at zero power supply voltage. This prevents overloading the installation. Built-in double overcurrent protection (high-speed electronic circuit breaker and fuse) increases the safety of device operation in case of outputs overload. Built-in fan with temperature control system prevents excessive rise of the temperature of the device. In the case of exceeding the alarm temperature the load will automatically shut off.
In the event of activation of the thermal or overload protection the light is automatically switched off. Switching on is possible the cause of failure passes and the button is pressed again.

power supply	230V AC
lamp power connected	
incandescent and halogen	3500W
inductive and capacitive	2500W
control voltage	8÷230V AC/DC
current pulse	<1sec
power consumption	0.1W
working temperature	0÷40°C
cooling	built-in fan
overload protection	electronic circuit breaker and fuse 20A
terminal	2.5mm² screw terminals (cord) / / 4.0mm² (wire)
tightening torque	0,5Nm
dimensions	188S×90W×93G [mm]
mounting	on TH-35 rail
protection level	IP20

LOAD

3500W - resistive load: incandescent lamps and halogen lamps.
2300W - inductive and capacitive load: toroidal transformers, adjustable electronic transformers, dimmable LED bulbs and ESL.

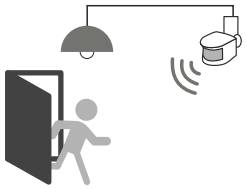
Warning!
The actual threshold value of the load will depend on the ambient temperature.
When the working temperature exceeds the threshold value the acceptable value of the load is reduced.



5. MOTION SENSORS SWITCH

PURPOSE

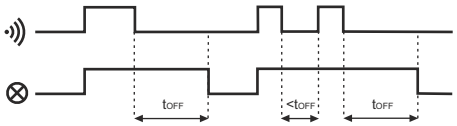
Motion sensors are used for automatic attached temporary lighting in the event of a person or other object in such areas as hallways, courtyards, approach and access roads, garages, etc. The use of motion sensors to automatically accompany the lighting makes use of the lighting is more convenient and cheaper in operation.



INFRARED

FUNCTIONING

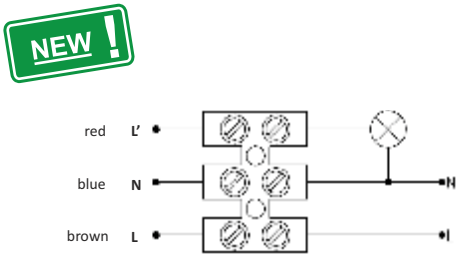
The sensor detects infrared radiation source. It's analysing parameters as the size of the object, the amount of heat emitted, and the speed of movement between the various sectors of detection. Detector head is moving in two dimensions, which allows for precise setting of the matched field detection to the individual requirements of the user. Movement detection in the box will automatically attach to the lighting time set by the user. After that time, the lighting is switched off automatically. Motion sensor is equipped with an automatic control include preventing crepuscular lighting during the day. DR's can work indoors and outdoors in places where it is not exposed to rain or snow, and the possibility of flooding water or other liquid sensor housing and electrical connection points.



DR-04W / DR-04B

WHITE / BLACK

Hermetic. IP65.

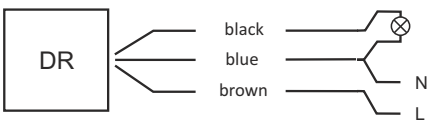


power supply	230V AC
load current (AC-1)	<5A
twilight activation threshold	3÷2000Lx
motion of detection	0.6÷1.5m/sec
switch-off time	10sec±3sec ÷ 15min.±2min.
horizontal detection field	180°
vertical detection field	45°
detection distance (for <24°C)	<12m
range of head rotation - vertical / horizontal	60° / 180°
sensor height installation	1.8÷2.5m
power consumption	0.5W
terminal	1.5mm² screw terminals
working temperature	-20÷40°C
dimensions	
head spread horizontally	S80×W52×G120mm
head folded vertically	S80×W52×G95mm
mounting	two screws to substrate
protection level	IP65

The detector head is movable in two planes, which allows for precise adjustment of the detection field matched to the individual requirements of the user. The sensor cannot work with LED lamps.

DR-05W / DR-05B

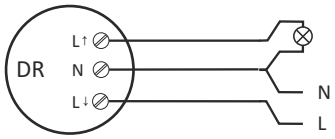
WHITE / BLACK



power supply	230V AC
load current (AC-1)	<5A
twilight activation threshold	3÷2000Lx
motion of detection	0.6÷1.5m/sec
switch-off time	10sec±3sec ÷ 10min.±2min.
horizontal detection field	0°÷180°
vertical detection field	0°÷90°
maximum detection distance (for <24°C)	5÷12m
range of head rotation - vertical / horizontal	180°/90°
sensor height installation	1.8÷2.5m
power consumption	0.5W
terminal	1.5mm² screw terminals
working temperature	-20÷40°C
dimensions	
head spread vertically	95×205×45mm
head spread horizontally	95×140×105mm
mounting	two screws to substrate
protection level	IP44

The detector head is movable in two planes, which allows for precise adjustment of the detection field matched to the individual requirements of the user. The sensor cannot work with LED lamps.

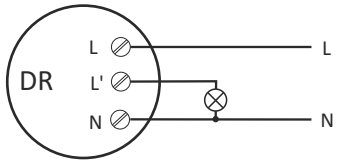
DR-06W / DR-06B WHITE / BLACK

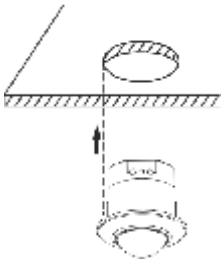


power supply	230V AC
load current (AC-1)	<4A
receiver's power connected	
incandescent lamps	800W
fluorescent lamps	400W
twilight activation threshold	10÷2000Lx
motion of detection	0.6÷1.5m/sec
switch-off time	3sec÷12min.(±3min.)
horizontal detection field	360°
ray detection max (for h=2.3÷3.5m, T<24°C)	r=5m
sensor height installation	h=2.5÷3.5m
power consumption	
standby	0.10W
on	0.45W
terminal	1.0mm² screw terminals
working temperature	-10÷40°C
dimensions	Ø=115mm, h=47mm
mounting	two screws to substrate
protection level	IP40

Sensor can't work with LED lamps.

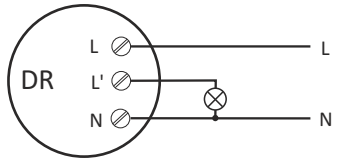
DR-07 CEILING

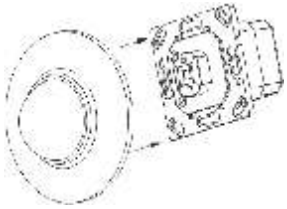




power supply	230V AC
load current (AC-1)	5A
twilight activation threshold	10÷2000Lx
motion of detection	0.6÷1.5m/sec
switch-off time	3sec÷9min.(±2min.)
vertical detection field	360°
ray detection max (for h= 2.3÷3.5m, T<24°C)	r= 4m
sensor height installation	h= 2.5÷3.5m
power consumption	
standby	0.10W
on	0.45W
terminal	1.0mm² screw terminals
working temperature	-10÷40°C
dimensions	
external	Ø=50mm, h=52mm
groove	Ø=39mm, h=35mm
mounting hole	Ø=40mm
screw spacing	33mm
mounting	two screws to substrate
protection level	IP20

DR-08 IN FLUSH MOUNTED





power supply	230V AC
load current (AC-1)	<5A
twilight activation threshold	3÷2000Lx
motion of detection	0.6÷1.5m/sec
switch-off time	3sec÷9min.(±2min.)
vertical detection field	360°
ray detection max (for h= 2.3÷3.0m, T<24°C)	r=2m
sensor height installation	h=2.5÷3.0m
power consumption	
standby	0.10W
on	0.45W
terminal	1.0mm² screw terminals
working temperature	-10÷40°C
dimensions	
external	Ø=105mm, h=71.5mm
groove	Ø=50mm, h=43mm
mounting hole	Ø=51mm
screw spacing	79mm
mounting	two screws to substrate or in flush mounted Ø60
protection level	IP20

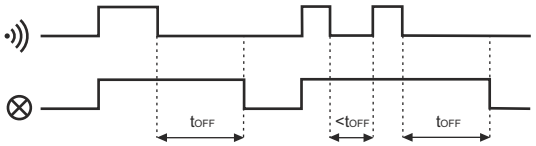
MICROWAVE WITH PRESENCE SENSOR FUNCTION

Microwave sensor allows for motion detection by wooden boards, plasterboard panels, glass and plastics.

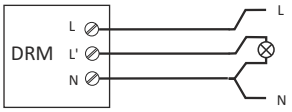
FUNCTIONING

DRM sensor emits and bounces high-frequency 5.8 GHz electromagnetic waves. The sensor detects changes in the reflected waves caused by movement of the object in the area of detection. The sensor detects movement of an object to and from the sensor. Movement in the range of detection will automatically attach the lighting for time set by the user. After this time the lights will be turned off automatically. The motion sensor is equipped with light dependent relay able to attaching lighting during the day. Detection status and standby to attach lights are activated only after dusk. Sensor activation time might be adjust by the user. In addition, there is a possibility of adjustment of the detection area in range and the receiver actuation time. The sensor allows for motion detection by wooden boards, plasterboard panels, glass and plastics. Temperature changes do not affect on motion detection.

The power of microwave radiation is relatively low and is completely safe for humans and animals. Its value is less than 10 mW.
By comparison, microwaves and cell phones radiate about 1000mW of power (100 times harder).



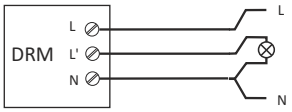
DRM-01 / DRM-01 24V BUILD-IN



Sensor can work with LED lamps.

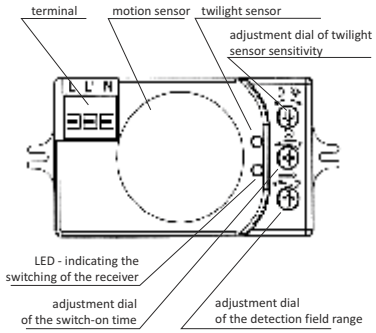
power supply	
DRM-01	180÷253V AC
DRM-01 24V	24V AC
load current (AC-1)	<5A
frequency of the microwaves radiation	5.8GHz
power radiation	<10mW
detection area	360°
detection radius - adjustable (for h=2.5m)	1÷10m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷12min.
switching ON delay	1sec
power consumption	0.9W
terminal	1.0 mm² screw terminals
working temperature	-25÷50°C
dimensions	46×93×42mm
mounting	two screws to substrate
protection level	IP20

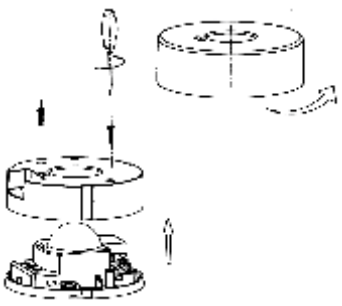
DRM-02 CEILING

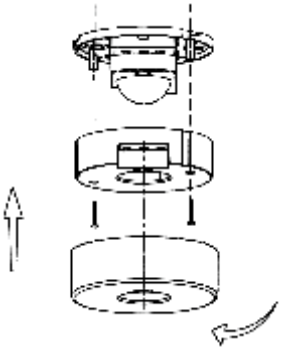


Sensor can work with LED lamps.

power supply	180÷253V AC
load current (AC-1)	<5A
frequency of the microwaves radiation	5.8GHz
power radiation	<10mW
detection area	360°
detection radius - adjustable (for h=2.5m)	1÷10m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷12min.
switching ON delay	1sec
power consumption	0.9W
terminal	1.0 mm² screw terminals
working temperature	-25÷50°C
dimensions	Ø103mm; h=44mm
mounting	two screws to substrate
protection level	IP40







PLAFONS WITH HIDDEN SENSOR

DRM-03 E27 60W
DRM-L WITHOUT SENSOR

power supply	230V AC
type of light bulb/power	E27 / 60W
frequency of the microwaves radiation	5.8GHz
power radiation	<10mW
detection area	360°
detection radius - adjustable	2÷10m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷12min.
switching ON delay	1sec
power consumption	0.9W
terminal	1.5mm² screw terminals
working temperature	-25÷50°C
dimensions	Ø285; h=110mm
mounting	3 screws to substrate
lampshade	glass, white milk
protection level	IP40

DRM-04 LED (×96) 15W

power supply	230V AC
light source	96×LED
light color	6000K
luminous flux	1030Lm
LED electric power	15W
frequency of the microwaves radiation	5.8GHz
power radiation	<10mW
detection area	360°
detection radius - adjustable	1÷8m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷15min.
switching ON delay	<1sec
power consumption	0.9W
terminal	1.5mm² screw terminals
working temperature	-25÷50°C
dimensions	Ø295; h=100mm
mounting	4 screws to substrate
lampshade	HDPE material, white milk
protection level	IP40

DRM-05 E27 25W

power supply	230V AC
type of light bulb/power	E27 / 25W
frequency of the microwaves radiation	5.8GHz
power radiation	<10mW
detection area	360°
detection radius - adjustable	2÷10m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷12min.
switching ON delay	1sec
power consumption	0.9W
terminal	1.5mm² screw terminals
working temperature	-25÷50°C
dimensions	Ø285; h=110mm
mounting	3 screws to substrate
lampshade	HDPE material, white milk
protection level	IP40

DRM-06 LED (×160) 10W

power supply	230V AC
light source	160×LED
light color	6000K
luminous flux	970Lm
LED electric power	10W
frequency of the microwaves radiation	5.8GHz
power radiation	<0.2mW
detection area	360°
detection radius - adjustable	1÷8m
activation threshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷15min.
switching ON delay	<1sec
power consumption	0.9W
terminal	1.5mm² screw terminals
working temperature	-25÷50°C
dimensions	Ø260; h=90mm
mounting	3 screws to substrate
lampshade	HDPE material, white milk
protection level	IP40

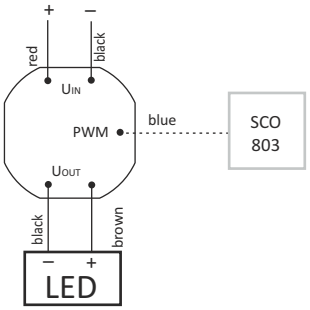
6. LIGHTING CONTROLLERS

DC POWER SUPPLY POWER LED (POWER LED DRIVER)

PLD-01 350 / 750

PURPOSE

LED power supply requires a suitable source of supply. In the case of current exceeding a specified value followed by a deterioration of work performance LED. PLD-01 is used to stabilize the output current of power diodes.



input voltage	5÷40V DC
current output stabilized max	
PLD-01 350 [for LED 1W]	350mA
PLD-01 750 [for LED 3W]	750mA
LED power connected	
PLD-01 350 [for LED 1W]	14W
PLD-01 750 [for LED 3W]	30W
power consumption	0.1W
working temperature	-20÷50°C
terminal	5×LY 0.75mm², l=10cm
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

ATTENTION!
PLD-01 cooperate with LED dimmer SCO-803 (page 22).

„SOFT START" FOR HALOGEN LAMP

PURPOSE

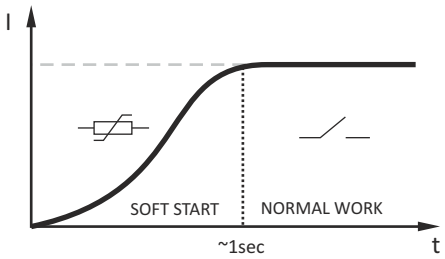
MST is used to reduce the starting current of halogen lamps. This prevents over-connected lamps, in effect extending their service life.

FUNCTIONING

At the time of switching on the controller does not allow for immediate switch ON of light to full power. Initially the lamp system is powered by internal thermistor which limiting current circuit. After a time of 1 sec, system switches to permanent contact, through which passes a full load of receivers.

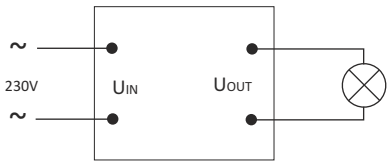
ATTENTION!
No effect gradually illuminating of lamps.

MST-01



input voltage	230V AC
output voltage	230V AC
contact	1×NO
overload	8A
rise time	1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

MST-02



input voltage	230V AC
output voltage	230V AC
contact	1×NO
overload	8A
rise time	1sec
power consumption	0.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

LIGHTING BRIGHTNESS CONTROLLERS WITH WEEKLY TIME PROGRAMMER

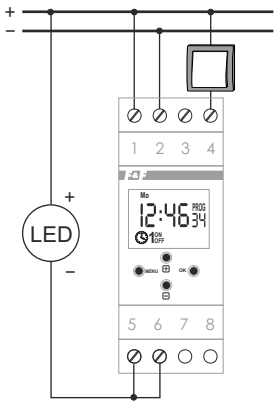
PURPOSE

Brightness controllers with weekly time programmer are designed to programmatically control the brightness level according to an individual time program set by the user.

FUNCTIONS

* Ability to program up to 480 program steps (day/days of week, hour, minute, the level of brightness)
* Operating modes:
  - automatic - according to the commands programmed by the user in the memory of the timer
  - manual - manual control of switching on/off and of brightness level
  - semi-automatic - the ability to manually control the brightness level in automatic mode. The change is effective until the next switching on/off resulting from the operating cycle.
* Local input - the ability to control brightness using an additional button connected to the controller
* Programmable time of fade in/out
* Automatic Daylight Savings Time
* Preview of the date and preview of the current program
* Memory of the output status when operating in manual mode
* Removable battery type 2032

PCZ-531LED with control output LED 9÷30 V



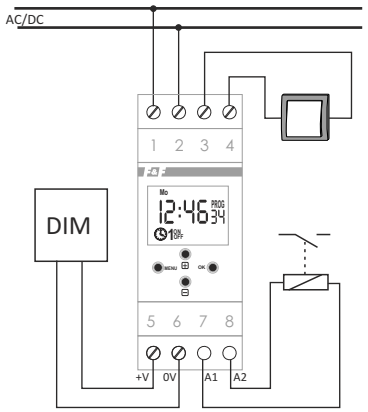
power supply	9÷30V DC
output	OC open collector
load current	<8A 50V DC
input	potential free (0 V triggered)
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
accurate time setting	1min.
number of memory cells	480
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather coditions and frequency of mains failure

FUNCTIONS

* Power supply 9÷30 V DC
* Direct load control up to 8 A
* Programmable brightness characteristic - the ability to adjust to any dimmable lamp or LED strips

PCZ-531A10 with analog output 0÷10 V



power supply	85÷265V DC
analog output	0÷10V/30mA
load current	<8A 50V DC
contact	separated 1×NO / 6A 250V AC
input	potential free (short circuit 3-4)
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
accurate time setting	1min.
number of memory cells	480
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather coditions and frequency of mains failure

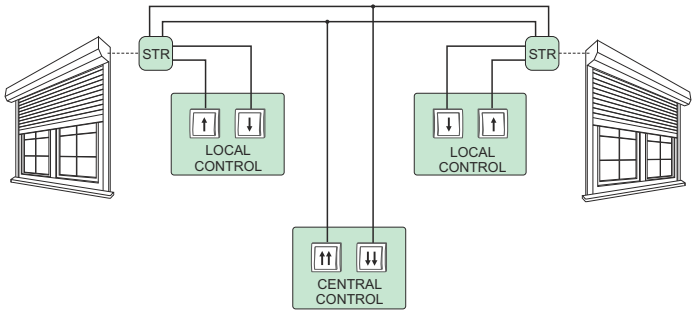
FUNCTIONS

* Power supply 85÷265 V AC / DC
* Analog output voltage 1÷10 V
* Additional output relay 6 A / 250 V AC activated when you switch on the light. To be used for example to control contactor that switches the power supply of the integrated lamps.

7. ROLLER BLIND CONTROLLERS

PURPOSE

The roller blind controllers are designed for controlling roller blinds (up and down movement) or other devices (for example: gates) that are driven by a single-phase AC electric motor and operated by means of momentary switches (for example: bell-pushes). The controller can operate as an independent unit (designated for opening/closing one roller blind) as well as the controllers can be combined into groups that enable the central controlling of many roller blinds.



FUNCTIONING

The roller blind motor is activated by the momentary switching of a current pulse (L or N) to one of the control inputs. The motor is activated at a time programmed previously by the user. The activation time programmed enables the complete lifting or lowering of the roller blind. Also, there is a possibility of stopping the rolled blind activated at a level selected by the user (non-complete opening or closing of the roller blind).

Wireless roller blinds control - F&Wave system (page 50)

Remote control from your smartphone - PROXI system (page 58)

Smart home system - F&Home (page 42)

UNIVERSAL

FUNCTIONS

* local and central control;
* universal single or two-button control;
* lock function - lasting signal at the Central Down input cuts off all control keys until the signal is switched off;
* cooperation with external rain and wind sensors and with alarm central;
* direction memory for local and central control. If the controller executes Central Up command, next pressing of the local key will move the roller blind down;
* asynchronous start - the time of roller blind activation in central control is randomly delayed (up to 1sec) to minimize the current surge in the mains if multiple motors run simultaneously.

FUNCTIONING

LOCAL CONTROL

Depending on how you connect the controller, it can operate in one or two local keys mode.

TWO LOCAL KEYS

Each direction of MOVEMENT has its own local key. Short press (<0.5 sec) switches on the roller blind to move in a given direction for the programmed period of time. Pressing the key when the roller blind is already in motion causes the roller blind to stop.

Long press (>0.5 sec) switches on the roller blind to move in a given direction for as long as the key is pressed (this allows for example to adjust the tilt of slats).

ONE LOCAL KEY

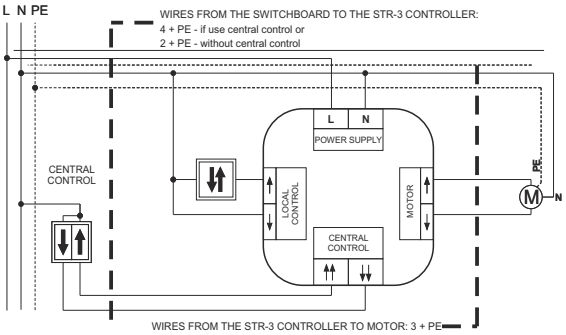
Local control input Down is connected permanently to the N line. Local control input Up is connected to a key that alternately switches the roller blind to move up or down. Short press (<0.5 sec) switches on the blind for a programmed time. Pressing the key when the roller blind is already in motion causes the roller blind to stop. Long press (>0.5 sec) switches on the roller blind for as long as the key is pressed. Each time you press the key the roller blind will move in the direction opposite to the previous one.

CENTRAL CONTROL

The controller always works with two central control inputs. Central control allows the roller blinds to move only in the desired direction. Roller blind will stop only after a preset time or by pressing any of the local control keys.

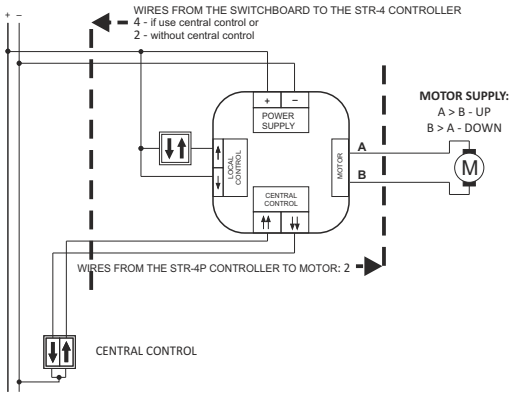
Central key - Down can also close and lock the roller blind in the closed position. If the Central key - Down key is pressed and left in the ON position, the controller will close the roller blind and will not allow for its opening until the Central key - Down is released (other inputs will then be locked). This function allows you to lock the roller blinds e.g. when the alarm is armed or when the rainfall (if the additional STR-R rain sensor is used) or too strong wind (if the additional STR-W wind sensor is used) is detected.

STR-3P for 230V AC engines



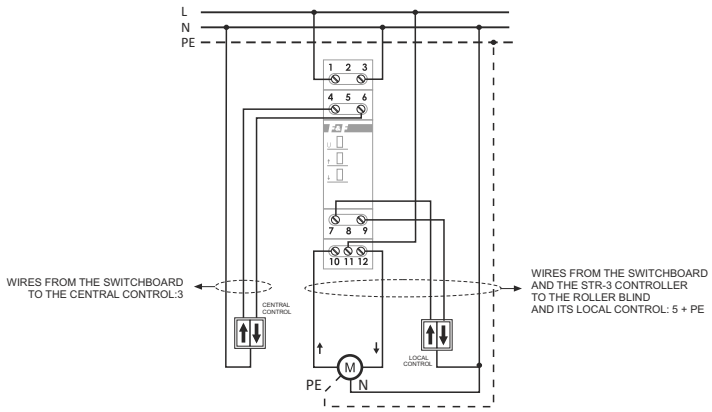
power supply	100÷265V AC
contact overload (AC-1/AC-3)	8A/320W
power consumption	
standby	<0.15W
on	<0.6W
control	
STR-3P	N level triggered
switch-on time (programmable)	from 1sec to 15min.
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
local control terminal	2×DY 1mm² / l=10mm
dimensions	43×48×20mm
mounting	in flush mounted Ø60mm
protection level	IP20

STR-4P for 12/24V DC engines



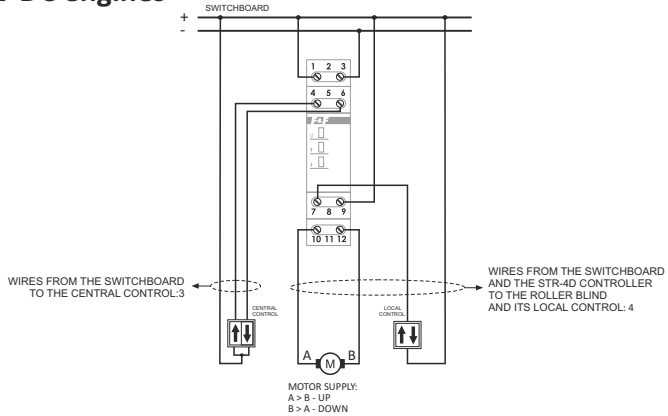
power supply	10÷27V DC
contact overload	6A/max. 24V
power consumption	
standby	<0.15W
on	<0.6W
control	10÷27V DC level triggered
switch-on time (programmable)	from 1sec to 15min.
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
local control terminal	2×DY 1mm² / l=10mm
dimensions	43×48×25mm
mounting	in flush mounted Ø60mm
protection level	IP20

STR-3D for 230V AC engines



power supply	100÷265V AC
contact overload (AC-1/AC-3)	8A/320W
power consumption	
standby	<0.15W
on	<0.6W
control	N level triggered
switch-on time (programmable)	from 1sec to 15min.
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

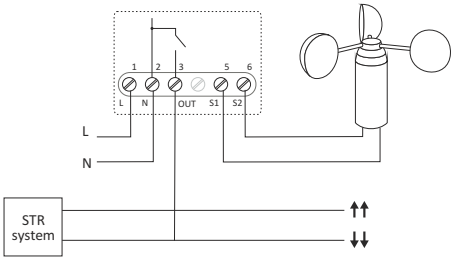
STR-4D for 12/24V DC engines



power supply	10÷27V DC
contact overload	6A/max. 24V
power consumption	
standby	<0.15W
on	<0.6W
control	10÷27V DC level triggered
switch-on time (programmable)	from 1sec to 15min.
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

STR-W WIND SENSOR

The STR-W controller with an external wind sensor monitors the current wind speed. If the wind speed exceeds a predetermined threshold value will be activated for internal relay. The controller operates in two modes: **Continuous -** if the wind speed exceeds a given threshold value, the internal contact relay closes and remains closed for the entire duration of wind gusts. Combined with STR-3 and STR-4 roller blind controllers, the continuous mode ensures closing of roller blinds at a time of strong wind and locks them in closed position until the wind ceases. **Pulse -** if the wind speed exceeds a given threshold value, the internal contact relay closes for approx. 1.5 second, passing to the roller blind controllers a single command of closing. Combined with STR-3 and STR-4 roller blind controllers, the pulse mode ensures closing of roller blinds at the time of strong wind, but then the user has the ability to raise the roller blinds at any time.
Adjustment range the same for two modes: 20÷70km/h.



power supply	100÷265V AC
power consumption standby/on	<0.2W/<0.6W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	67×50×26mm
mounting	two screws to substrate
protection level	IP20

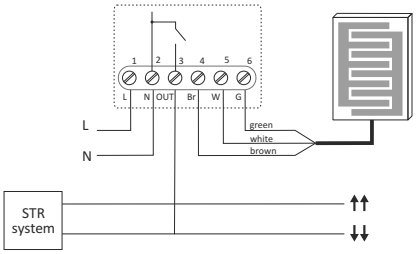
propeller

dimensions	Ø80×85W mm
wire	2×0.25 mm², l=5m
mounting screw	N6
mounting handle	flat steel (L profile) 150×70×3mm
protection level	IP65

STR-R RAIN SENSOR

STR-R controller along with external rainfall sensor is designed to detect rainfall. Combined with STR-3 or STR-4 roller blind controller it allows to build a system that in the case of rain closes window roller blinds or retracts awnings. The controller operates in two modes: **Continuous -** if the wind speed exceeds a given threshold value, the internal contact relay closes and remains closed for the entire duration of wind gusts. Combined with STR-3 and STR-4 roller blind controllers, the continuous mode ensures closing of roller blinds at a time of strong wind and locks them in closed position until the wind ceases. **Pulse -** if the wind speed exceeds a given threshold value, the internal contact relay closes for approx. 1.5 second, passing to the roller blind controllers a single command of closing. Combined with STR-3 and STR-4 roller blind controllers, the pulse mode ensures closing of roller blinds at the time of strong wind, but then the user has the ability to raise the roller blinds at any time.

external probe



power supply	100÷265V AC
power consumption standby/on	<0.2W/<0.6W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	67×50×26mm
mounting	two screws to substrate
protection level	IP20

rain sensor

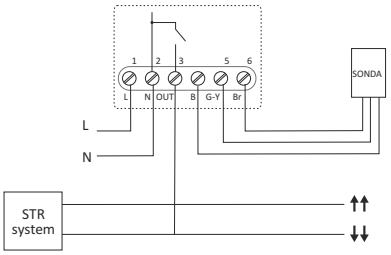
dimensions	55×50×13mm
wire	3×0.25 mm², l=5m
mounting	screw hole Ø3/adhesive tape
protection level	IP65

STR-S SHOCK SENSOR

NEW !

S-STR controller along with an external acceleration probe is used to monitor the tremors of the awnings and the like. When the awning under the influence of the wind begins to shake with an acceleration greater than a predetermined threshold value, the internal relay will be activated and as a result the roller blinds will be closed or the awnings will be rolled up. The controller operates in two modes: **Continuous mode** - at the start of precipitation the internal relay contact closes and remains closed for the entire duration of precipitation (LOCK). **Pulse mode** - at the start of precipitation the internal relay contact closes for approx. 1.5 sec issuing a single closing command to the controllers

external probe

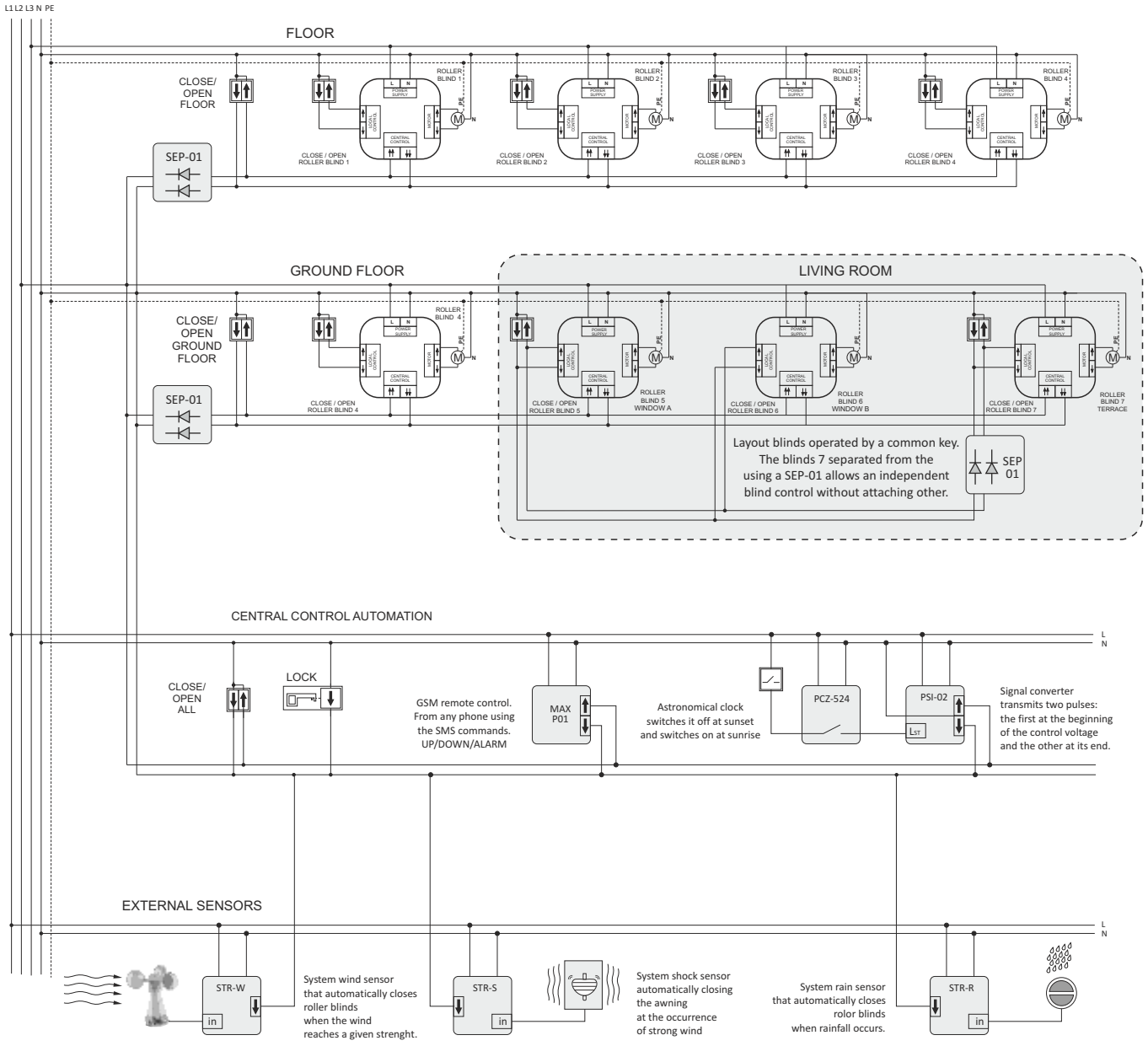


power supply	100÷265V AC
power consumption standby/on	<0.2W/<0.6W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	67×50×26mm
mounting	two screws to substrate
protection level	IP20

shock probe

dimensions	15×40×8mm
wire	3×0.25 mm², l= 5m
mounting	clamps/adhesive tape
protection level	IP65

A schematic diagram of the manual and automatic control system using the system sensors and other control relays



ROLLER BLIND CONTROL SYSTEMS

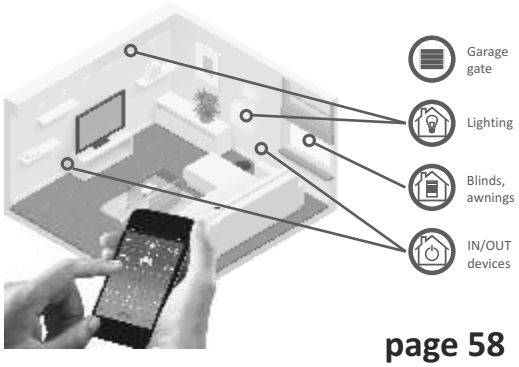
F&Wave

Wireless control system

page 50

PROXI

Bluetooth Smart remote control system



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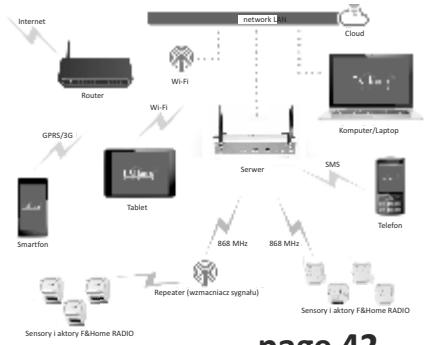
F&Home / F&HomeRADIO

Smart home system



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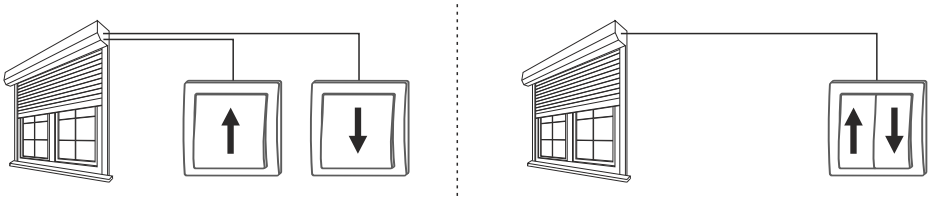
DOUBLE-BUTTON TYPE TWO BUTTONS LOCAL CONTROL UP AND DOWN

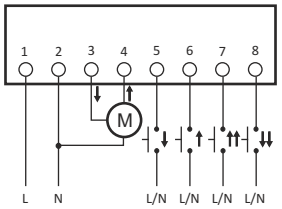


Local control - a group of push-buttons that controls one roller blind. ↓-upwards (opening); ↓- downwards (closing). Pressing the local control push-button activates the movement of the roller blind in a selected direction. If the roller blind is already moving, pressing the local control push-button will stop the roller blind.

Central control - a common group of push-buttons for many controllers (minimum two controllers) that controls all roller blinds included in the central control system. ⇈ - all upwards; ⇊ - all downwards.

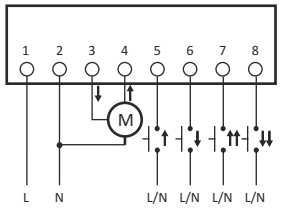
Pressing the central control push-button activates the movement of the roller blinds in a selected direction. If one of the roller blinds is already moving in the same direction, its movement will be continued. If one of the roller blinds is moving in the opposite direction, this roller blind will be first stopped and then its movement will be activated in the direction in accordance with the command sent to the central input. The central control enables only activating the movement of the roller blinds in a selected direction. The roller blind will be stopped after the programmed movement time or when any of the local control push-buttons is pressed.

STR-1



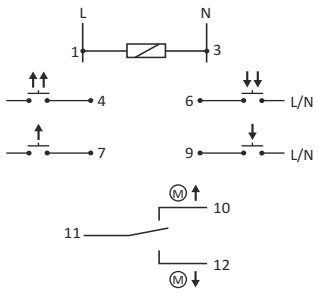
power supply	230V AC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
power consumption	1W
working temperature	-25÷50°C
signal terminal	4×DY 1mm², l=10cm
supply terminal	4×DY 1.5mm², l=10cm
dimensions	Ø55, h=20mm
mounting	in flush mounted Ø60
protection level	IP20

STR-21



power supply	230V AC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
power consumption	1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

STR-421



power supply	
STR-421 230V	230V AC
STR-421 24V	24V AC/DC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
signalling activation	2×red LED
power consumption	1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

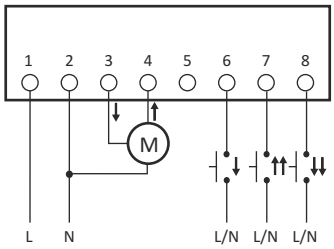
ONE-BUTTON TYPE

ONE COMMON BUTTON LOCAL CONTROL UP/DOWN

Local control - a button that controls one roller blind. ↑-upwards (opening), ↓ -downwards (closing). Pressing the local control push-button activates the movement of the roller blind in a direction opposite to the direction of a previously performed movement (after connecting the controller to the power supply, the first movement closes the roller blind). If the roller blind is already moving, pressing the local control push-button will stop the roller blind movement. When the local control push-button is pressed again, the movement of the roller blind in the opposite direction is activated.

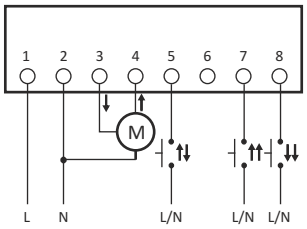
Central control - a common group of push-buttons for many controllers (minimum two controllers) that controls all roller blinds included in the central control system. ↑↑ - all upwards; ↓↓ - all downwards. Pressing the central control push-button activates the movement of the roller blinds in a selected direction. If one of the roller blinds is already moving in the same direction, its movement will be continued. If one of the roller blinds is moving in the opposite direction, this roller blind will be first stopped and then its movement will be activated in the direction in accordance with the command sent to the central input. The central control enables only activating the movement of the roller blinds in a selected direction. The roller blind will be stopped after the programmed movement time or when any of the local control push-buttons is pressed.

STR-2



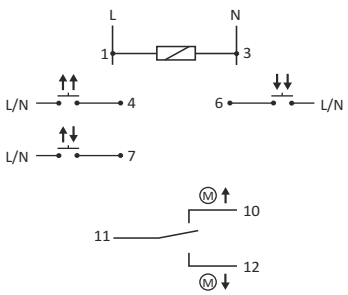
power supply	230V AC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
power consumption	1W
working temperature	-25÷50°C
signal terminal	4×DY 1mm², l=10cm
supply terminal	4×DY 1.5mm², l=10cm
dimensions	Ø55, h=20mm
mounting	in flush mounted Ø60
protection level	IP20

STR-22



power supply	230V AC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
power consumption	1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

STR-422



power supply	
STR-422 230V	230V AC
STR-422 24V	24V AC/DC
load current (AC-3)	<1.5A
L/N current control pulse	<1mA
switch-on time - programmable	0sec÷10min.
power indication / programming	green LED
signalling activation	2×red LED
power consumption	1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

8. LIGHTING CONTROL SYSTEM

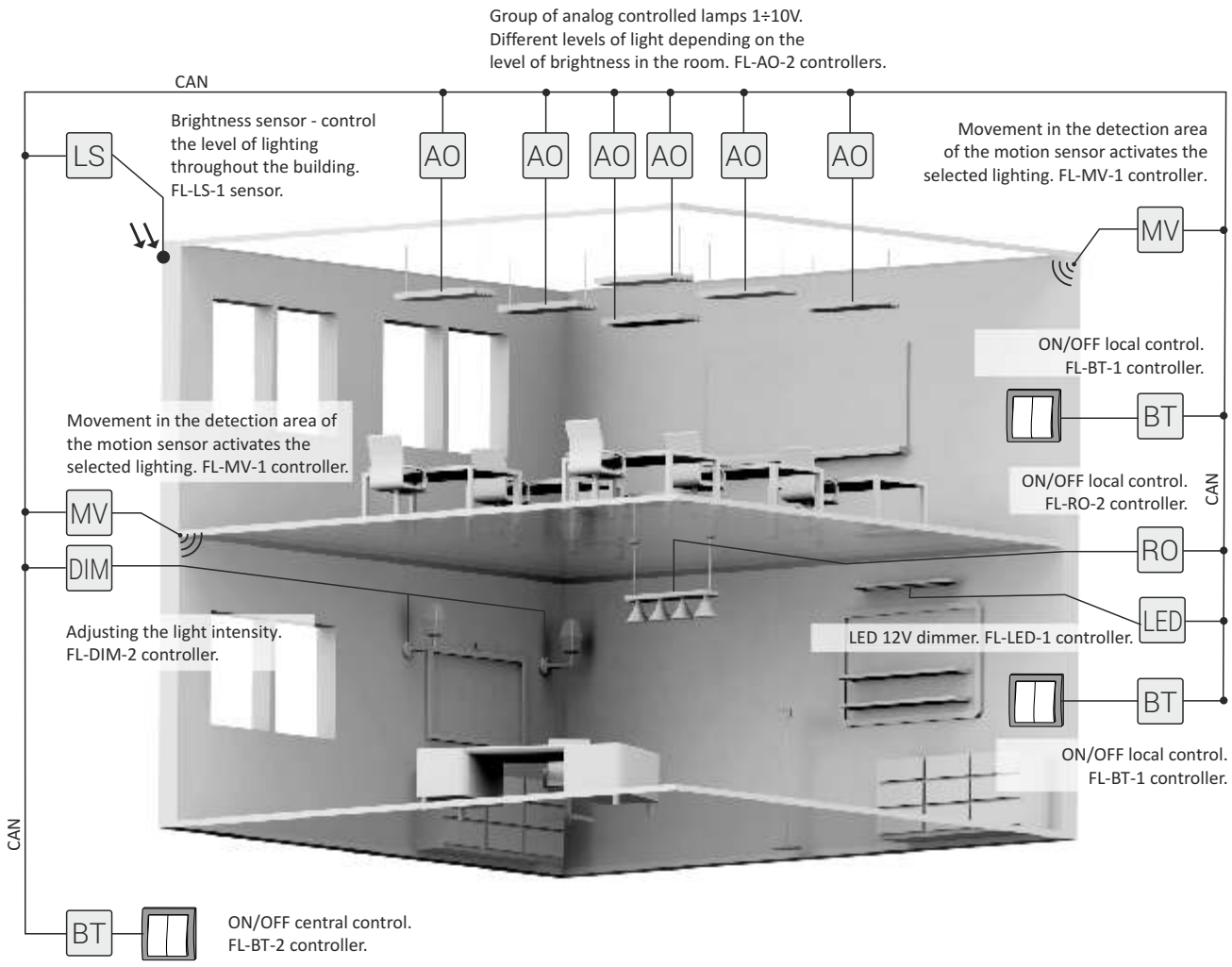
F&Light

PURPOSE

F&Light is a system that allows you to build a simple in configuration and at the same time an advanced lighting control system.

FUNCTIONS

* control various sources of light in a single system;
* cooperation with brightness and motion sensors. Ability to use motion sensors from the alarm system;
* grouping devices according to, for example, room or floor (up to 10 different groups);
* central control of all receivers;
* independent brightness correction for each receiver so that with one brightness sensor the lighting can change depending, on the distance from the window (for example);
* synchronizing work of receivers (for example forcing the same level of brightness on multiple dimmers);
* simplicity of configuration - you need only a screwdriver to "program" the system.



OPERATING MODES OF THE COMPONENTS OF F&LIGHT SYSTEM

The receivers can operate in one of five modes of operation. The operating mode is set independently for each of the receivers.

1) OFF

The receiver is OFF - does not respond to the signals from buttons and sensors.

2) Automatic mode A1

In automatic mode A1 after powering all the modules go into standby mode. Depending on the signals from motion and brightness sensors they control switching on, switching off and brightness. The light is switched on provided the movement is detected by the motion sensor. The brightness of light is set based on the reference light sensor.

3) Automatic mode A2

In automatic mode A2 after powering all the modules go into standby mode Depending on the signals from brightness sensor they control switching on, switching off and brightness of the lighting.

4) Semi-automatic mode P1

In the semi-automatic mode P1 the user decides about switching on the lighting by pressing the button responsible for that action. When you press the button the light switches on for 5 seconds (indicates that the system reacted to the push of a button), then the lighting control is taken over by the brightness and motion sensors. In semi-automatic mode, you may experience a situation that the light switches off completely, then switches on by itself upon receiving the relevant command from sensors. Pressing the button again switches off the lights and blocks the ability to switch it on again.

5) Semi-automatic mode P2

In the semi-automatic mode P1 the user decides about switching on the lighting by pressing the button responsible for that action. When you press the button the light switches on for 5 seconds (indicates that the system reacted to the push of a button), then the lighting control is taken over by the brightness sensor. In semi-automatic mode, you may experience a situation that the light switches off completely, then switches on by itself upon receiving the relevant command from brightness sensor. Pressing the button again switches off the lights and blocks the ability to switch it on again.

6) Single switching mode Z1

In single switching mode Z1 the light switches on by pressing the button for 1 minute. If after that time the brightness and motion sensors indicate that the light should remain switched on the it is so. If the sensor don't send any information - the light switches off and will remain off until the next switching on (pressing of a button).

7) Single switching mode Z2

In single switching mode Z1 the light switches on by pressing the button for 1 minute. If after that time the brightness sensor indicates that the light should remain switched on the it is so. If the sensor don't send any information - the light switches off and will remain off until the next switching on (pressing of a button).

8) Manual mode

Switching on and off of the lighting is done only via the buttons. Signals from the sensors are ignored.

9) Remote

Settings of the potentiometers are ignored. The module operates based on the remotely set configuration.

10) ON

The receiver is switched of the commands from buttons and sensors.

OPERATING MODES OF THE F&LIGHT SYSTEM TRANSMITTERS

1) ON

Pressing the button will switch on all receivers that are on the same level as the button. If the button is set to level 0, receivers on all levels will be switched on.

2) OFF

Pressing the button will switch off all receivers that are on the same level as the button. If the button is set to level 0, receivers on all levels will be switched off.

3) SWITCH

Short press of a the button switches each of the receivers that are on the same level to the opposite state (ON -> OFF, OFF -> ON). Long press of a button will brighten/dim the light.

Warning!

Switch does not synchronize the action. After receiving the Switch command each receiver is set to the state opposite to the current one.

Warning!

The Switch function only works on the selected level. If the level is set to 0, the button works only on level 0.

4) SET

Synchronization of the status and brightness level - the button sends to the receivers a direct command stating whether they are to be set to ON or OFF, and the required level of brightness. This allows for synchronizing a group of receivers to the same brightness level.

Warning!

Status and level are maintained in the memory of the button. If there are several SET buttons on a given level, each of them will remember its settings and will send them to the receivers when you press the button.

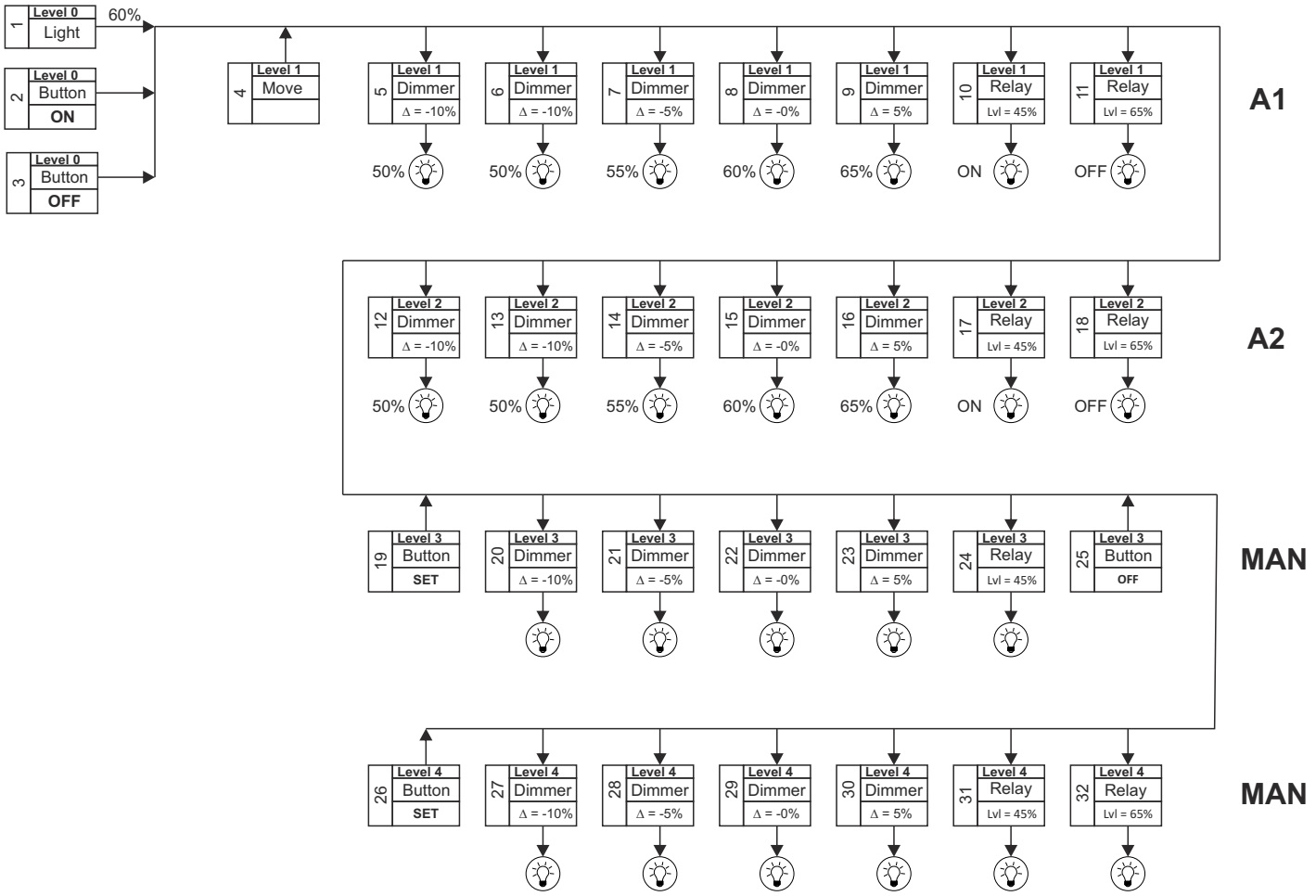
Operation of the button is similar to the Switch-short switches on/off the lights, long press brighten/dim.

LEVELS

Devices connected to the bus are organized up to ten independent levels (0-9).
At each level you may find:
- one brightness sensor;
- multiple motion sensors;
- multiple receivers.

Commands sent from the controller at a given level are received by all receivers that are on the same level. Number of the level will be determined for each module with 10-position potentiometer or remotely - through configuration saved in a non-volatile memory module.
Level 0 is a special level and it will perform the following functions:
- signals issued by the sensors at a 0 level will be received by the receivers at all levels (for example: one sensor of external light may affect all receivers in the system);
- buttons on level 0 can control all receivers in the system (does not apply to Switch function that will only work within the level 0).

EXAMPLE APPLICATION



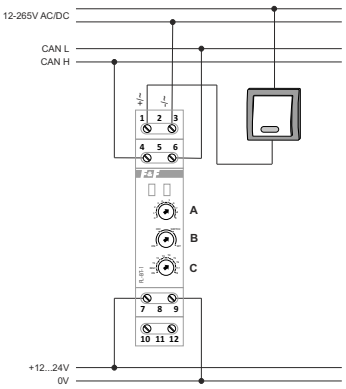
Brightness sensor at 0 level issue a signal about the need to adjust the brightness at 60%. The sensor signal reaches the receivers operating in mode A1 and A2. Depending on the set adjust the brightness (dimming) and the resultant switching level of the brightness level for each of the receiver changes from 50% to 65%. Buttons at 0 enable the realization of the function of the central switching on and off.

F&LIGHT SYSTEM COMPONENTS

Transmitters

FL-BT-1 MOMENTARY BUTTON (FOR DIN RAIL)

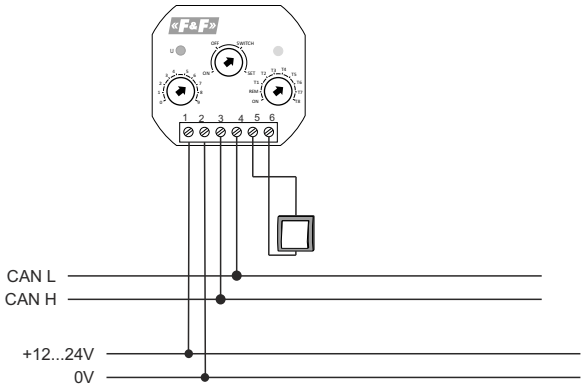
The FL-BT-1 transmitter module is designed for integration of any momentary button with F&Light system. Buttons circuit can be supplied with voltage in the range of 12 to 265 V AC/DC and backlit buttons can be used.



power supply	12÷24V DC
control input	
trigger voltage	12÷265V AC/DC
trigger pulse	<20mA
maximum current that does not trigger	5mA
power consumption	<0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-BT-2 MOMENTARY BUTTON (FOR FLUSH-MOUNTED BOX)

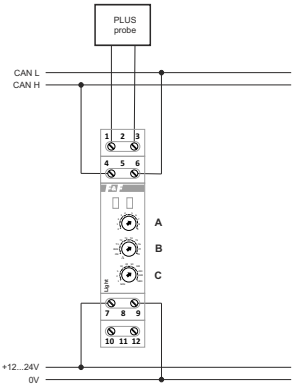
The relay module designed to control any two devices or electrical circuits. Simple installation in electrical outlet box allows you to install the module without the need for invasive and costly renovations.



power supply	12÷24V DC
control input	
trigger voltage	12÷265V AC/DC
trigger pulse	<20mA
maximum current that does not trigger	5mA
power consumption	<0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-LS-1 EXTERNAL BRIGHTNESS SENSOR (COOPERATION E.G. WITH PLUS PROBE)

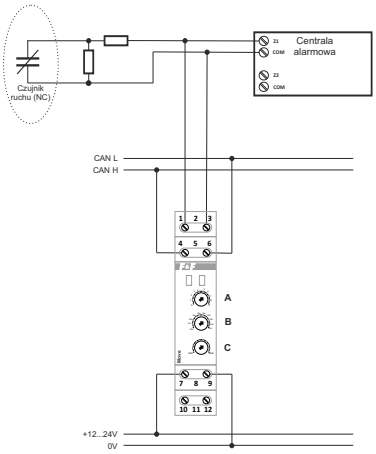
The FL-LS-1 transmitter module is designed for the integration of brightness sensors type "Ø10 probe" or " Plus probe" with the F&Light system.



power supply	12÷24V DC
power consumption	<0.6W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-MV-1 MOTION SENSOR

The FL-MV-1 transmitter module allows you to connect any motion sensor with the NC type output with the F&Light system providing it with the information about movement detection in controlled areas.

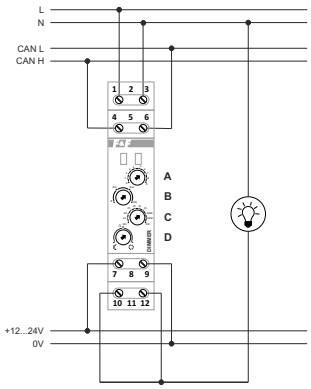


power supply	12÷24V DC
measurement input	
input impedance	>1MΩ
allowable voltage	≤15V
power consumption	<0.6W
working temperature	-25÷50°C
thermal protection	YES
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

Receivers

FL-DIM-1 230V/350W UNIVERSAL DIMMER

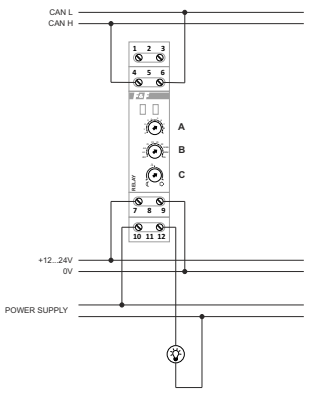
The FL-DIM-1 receiver module is designed for integration with the F&Light system and lets you control 230 V AC receivers with different load characteristics: incandescent and halogen lamps, toroidal transformers, adjustable electronic transformers, dimmable LED bulbs and dimmable energy saving lamps ESL.



power supply	12÷24V DC
power consumption	<0.6W
overload	
power supply	230V AC (-20% ÷ +10%)
lamp power connected	
incandescent and halogen lamps	350W
toroidal transformers	300W
electronic transformers and LED	200W
ESL bulbs	200W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-RO-2 16A/250V RELAY (INRUSH)

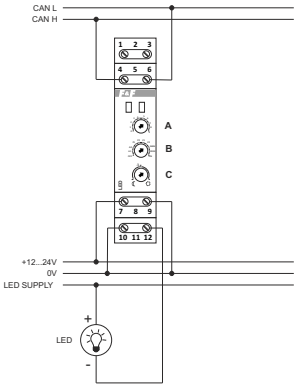
The FL-RO-1 receiver module is designed for integration with the F&Light system and allows you to switch on/off the receivers by separated NO contact with load up to 16 A.



power supply	12÷24V DC
power consumption	<0.6W
overload	
output current (AC-1)	≤16A
overload	160A/20msec
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-LED-1 12/24V LED CONTROLLER

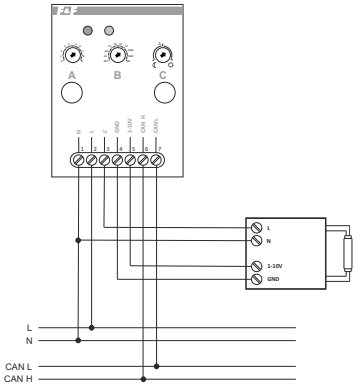
The FL-LED-1 receiver module is designed for integration with the F&Light system and allows you to control the brightness of 12 V LED strips and 12 V dimmable LED bulbs.



power supply	12÷24V DC
power consumption	<0.6W
overload	
current	≤8A
overload	24A/250msec
allowable voltage	<24V
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FL-AO-2 CONTROLLER WITH 1÷10 V VOLTAGE OUTPUT

The FL-AO-2 receiver module is designed for integration with the F&Light system and allows you to control the brightness of electronic ballasts regulated with a voltage of 1÷10 V and other receivers controlled with voltage of 1÷10 V. The module also allows for interrupting the 230 V power supply from the receiver, thereby reducing the power consumption when the light is switched off.



power supply	85÷265V AC/DC
power consumption	<1.5W
voltage output	
voltage	1÷10V
load	25mA
output relay	
voltage	230V AC
load (AC-1)	<16A
overload	160A/20msec
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	two screws to substrate
dimensions	50×67×26mm
protection level	IP20

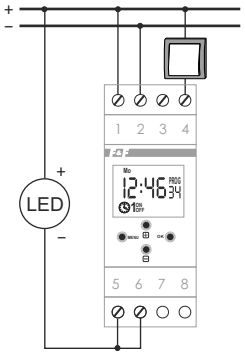
LIGHTING BRIGHTNESS CONTROLLERS WITH WEEKLY PROGRAMMER

PCZ-531LED
with 9÷30 V LED control output

PCZ-531A10
with 0÷10 V analog output

Brightness controllers with weekly timer designed to programmatically control the brightness level according to an individual time program set by the user.

Read more - page 29.



9. WIRED SMART HOME SYSTEM

www.fhome.pl

F&Home

STANDARD OF THE FUTURE IN YOUR HOME

F&Home is a system designed for flats, houses and business premises.
It provides all the basic functionality of building automation, such as:
* management and control of heating, cooling and ventilation;
* control of lighting (dimmers, light scenes, RGB);
* control of roller blinds, gates and other motor elements;
* switching on/off various circuits and receivers (including slots), external lighting, sprinklers, small household appliances;
* remote control via a dedicated application and GSM supervision;

Thanks to "unfolding" of the system into separate subsystems (modules) individually pursuing individual functions everyone can adjust the system to their individual needs and financial capabilities

GENERAL FEATURES

The F&Home smart home system integrates systems operating independently in standard solutions. The integration creates new opportunities and simplifies the control of an extensive installation. F&Home is wired system for control of the lighting, roller blinds, heating, air conditioning and other appliances powered by any voltage. Communication is carried through the UTP cables coming down to the main switchboard (star system). Due to the characteristic way and control the position of cables the system is dedicated to the newly built or thoroughly modernized buildings. An important feature of the system is the flexibility of equipment application. You can use buttons, switches and sockets from any manufacturer.

CENTRAL UNIT

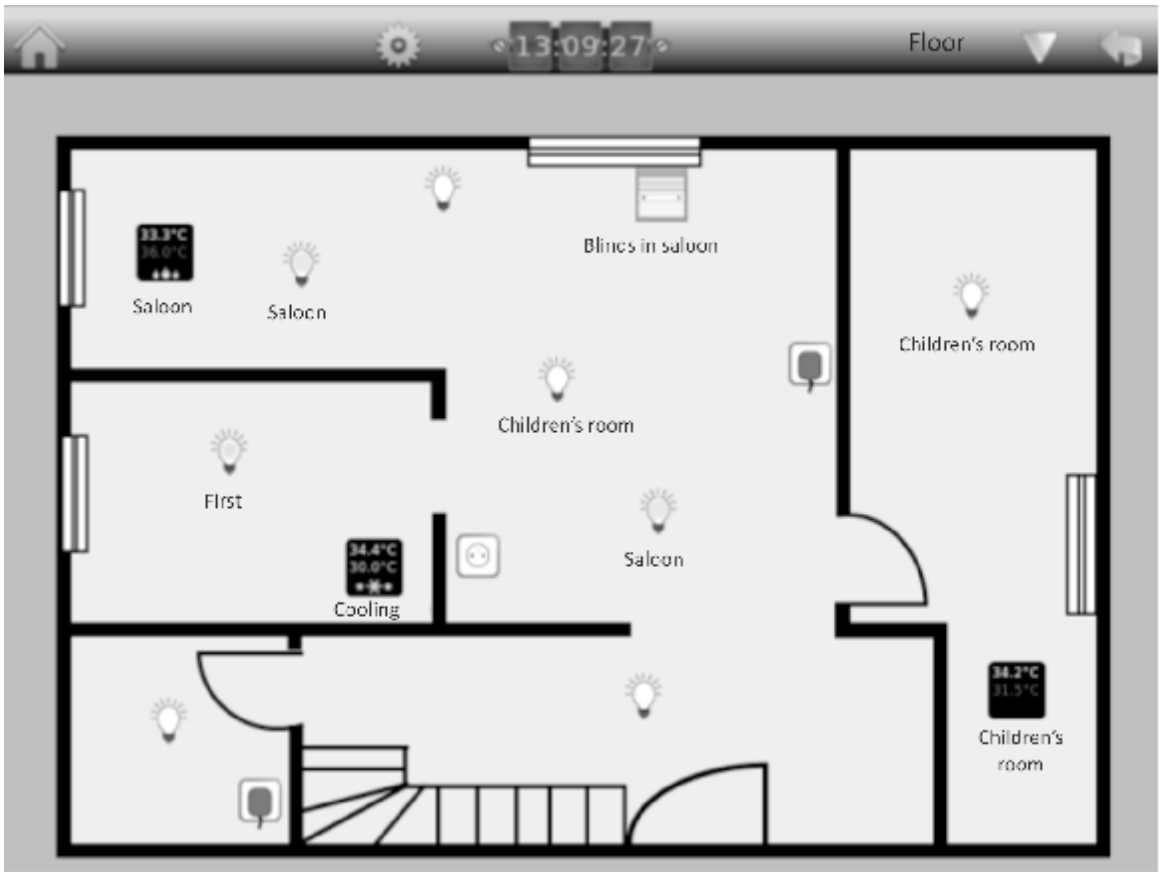
The central element of the system is a computer with a 12" or 15" touch panel. It is mounted outside the switchboard in the wall using a steel assembly housing. It is powered from 230 V mains and requires a separate connection to the switchboard. It communicates with the system via the CAN line. You can set your own screen menu color and upload your own favorite graphics and pictures as screen savers.

Functions:
* initial programming (distribution of elements on the building plan);
* programming the settings of the dimmers (hysteresis);
* setting programmers of devices (on an annual basis every 15 minutes);
* setting programmers heating and cooling;
* setting times of motorized devices (roller blinds, shutters, awnings);
* defining scenes (may include light, roller blinds, temperature, switching on selected receivers);
* set the color of the interface (adaptation to individual needs);
* upload photos to the screen (electronic box);
* configure the GSM module;
* software update (with USB drive)

Bearing in mind the aesthetics of the interior, the customer can choose an aluminum cover frame, painted on the selected color.
Easy installation of the frame and color palette are a guarantee to fit any interior.

GRAPHICAL USER INTERFACE-USER MENU

Clear and intuitive menu structure allows you to centrally control all devices within the system. Attractive visualization is an additional decorative element. In addition, there is the possibility of color screen menu and upload your own favorite graphics and photos as screensavers. Basic visualization House or apartment-based on the client-provided plans-it is performed by our graphic designers and is included in the price of the system.



Sample user interface on the control panel

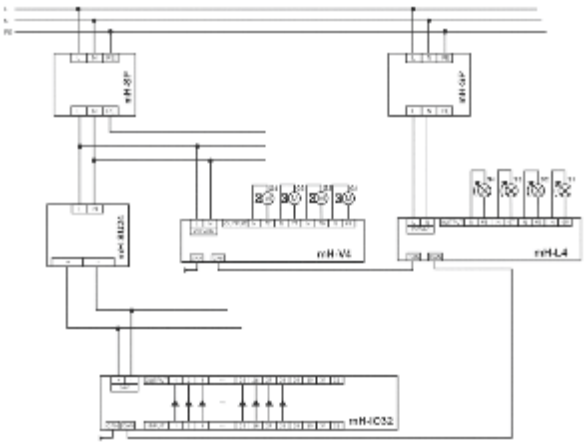
GSM AND WI-FI REMOTE CONTROL

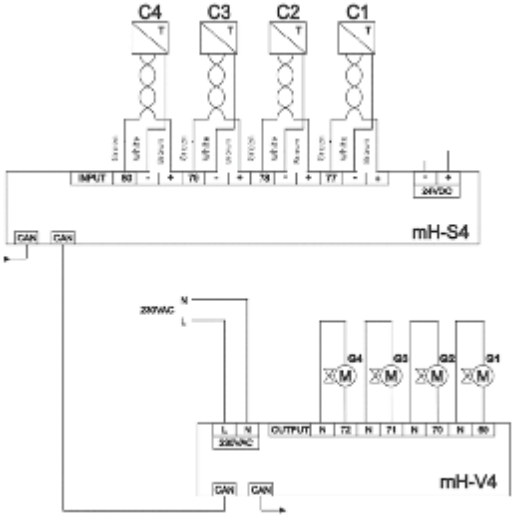
The GSM functions allow you to in easy way to control the system via SMS text messages. By sending a special SMS message you can switch on/off any receiver in the building, check whether the indicated circuit is switched on, read the temperature in rooms or run a particular scene (e.g. raise the temperature, open the gate, light your driveway, etc.).

The function of the feature rich remote control can be performed by any phone or tablet with Android or iOS and the F&Home Mobile app for control of the system via Wi-Fi on or through the Internet. The application allows you to control devices and defined scenes.

SWITCHGEAR, ACCESSORIES AND CABLES

The system operates in a star system, which means that all control and power cables and of individual receivers come together in the switchgear. Due to the large number of wires, use of a large switchboard (96 modules or more) or free-standing cabinets is recommended. It is also acceptable to use two switchgear, for example on the ground floor and the first floor of the building. In this case a wire of a CAN bus should be laid between switchboards.
The system requires a large amount of cable, so be sure to carry out installation before plastering. At the stage of installation work closely with plasterers (planting switchboards and computer housings) and plumbers (control of the solenoid valves). The focal point of the system is the switchboard and all the wires comes to it (star system). Signal from the buttons which control devices of the on/off type (lighting, sockets, other devices) must be carried to the switchboard using the UTP cable. You can use any other accessories (buttons, switches, sockets) available on the market to control the system.





INSTALLATION COST AND SAVINGS

The initial cost of building an intelligent system is certainly higher. But the economic effect is not defined just a one-time cost of the investment, but above all the subsequent maintenance and operating costs. Deciding on the installation of F&Home, we must be aware that this is an investment in the future. With time, we will save on the cost of heating and lighting and operation of the TV equipment. The highest, initial cost is associated with purchasing the components of the system. The cost of building a wired F&Home installation slightly exceeds the cost of standard wiring - the work of installers/electricians is comparable with the installation of the computer or alarm system. The entire cost of the system is still 2- or 3-times lower than other known systems of this type.

Integration of the central heating with F&Home system allows to reduce the cost of heating up to 30%. This effect is achieved thanks to the ability to control the valves of central heating and the individual temperature control program depending on the time of day and the presence and activity of the household members. Savings - up to 15% - are achieved through lighting control as a function of time and place, for example setting the light intensity depending on the time of day. Additional savings can be achieved by appropriate control of other receivers, for example brown goods - when leaving the house while using the ALL OFF function, turn off the receivers from the standby mode.

SYSTEM INSTALLATION

Installation of F&Home system can only be done by a qualified installer, who received training related to the installation, operation and configuration.
In case of a self-assembly or by the unauthorized installer, the F&F company may refuse free technical support and denounce warranty provided for the elements and installation of the system. Authorized installer holds a personalized card with his name and authorization number.

SYSTEM COMPONENTS

mH-IO32	Input-output module controlling 28 devices of the switch on/off type
mH-IO12E6	Mixed module controlling 12 devices of the switch on/off type and 6 motor devices
mH-E16	Motor module controlling 16 motor devices (such as blinds, awnings, gates, roof windows with the drive)
mH-L4	Four-channel (4× 350W) actuator module of the dimmers
mH-S4	Four-channel module of the sensors (sensors included)
mH-S8	Eight-channel module of the sensors (sensors included)
mH-V4	Four-channel actuator module of the valves (actuator element - semiconductor)
mH-V8	Four-channel actuator module of the valves (actuator element - semiconductor)
mH-V7+	Seven-channel actuator module of the valves + CO pump or furnace control
mH-R2×16	Relay module (2 pcs. 16A)
mH-R8/2	Relay module (8 pcs. 8A)
mH-RE4	Relay module for roller shutters
mH-SP	RFI filter module with voltage surge suppressor module
mH-SU50	Power unit 50 W
mH Kh	Wires set "Home"
mH-Kf	Wires set "Apartment"
mH-Mrg	GSM module
mH-Mb	Master module (for installation in a computer)
mH-TS12	12” computer with a touch panel
mH-TS12	12” computer frame
mH-TS15	15” computer with a touch panel
mH-TS15	15” computer frame
mH-RGB	LED RGB control module
mH-MS	Scenes module (16 inputs), it allows you to trigger scenes using the buttons
mH MK	Controls module (16 inputs)

10. RADIO SMART HOME SYSTEM

www.fhome.pl

F&Home RADIO

STANDARD OF THE FUTURE IN OUR HOUSE

The F&Home RADIO is an innovative and comprehensive solution for the design and setup of the installation and for remote control of the network of devices fitted in a building or being its integral part. Through the use of universal radio and sensory actuators that control the operation of each device, the system wirelessly integrates various and until now separated components: lighting, heating, air conditioning, ventilation, access control, monitoring, audio-video systems and garden automation.

SYSTEM ARCHITECTURE

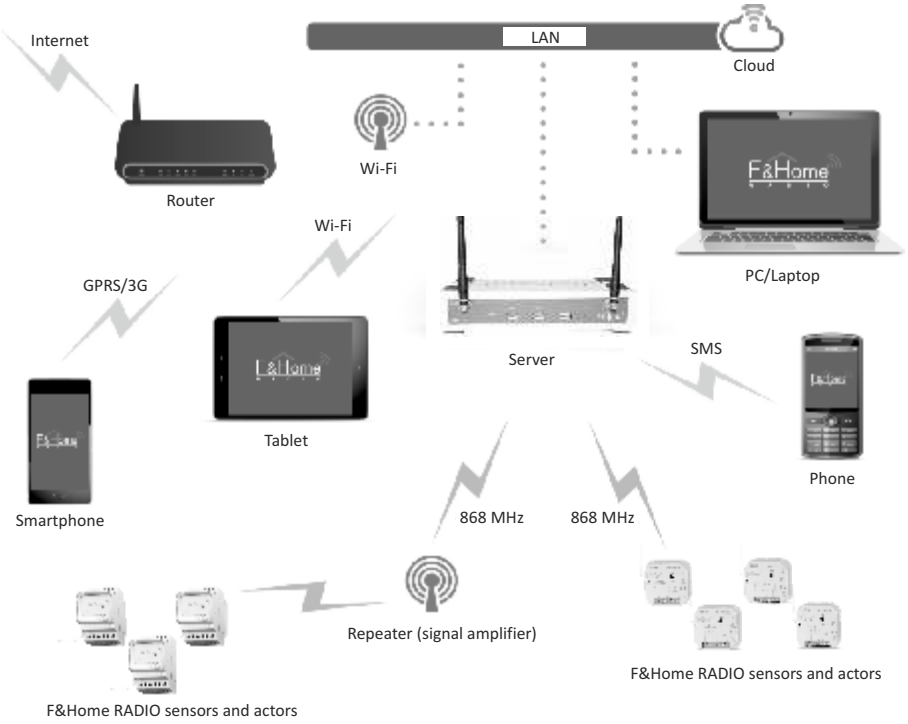
The F&Home RADIO system is built on the basis of a central server that controls all its functions. The server is based on Embedded Linux operating system and characterized by high performance and reliability at a very low power consumption (4W). The server communicates by radio in the 868 MHz band with sensory elements - the so-called sensors (for example: switches, motion detectors, temperature probes, humidity probes and other sensors) and actuators - the so-called actors (relays, dimmers, LED control modules, electric motors controllers, pumps, water and heating valves and other actuators). By using two radio modules operating simultaneously in two independent channels, the system has a very high resistance to external interference. Radio coverage, typically amounting to several dozen of meters, can be extended through the use of repeaters (signal amplifier units).

Both sensors and actors in the F&Home RADIO system are universal. For example, when household members are not at home, the motion sensor can serve as an alarm sensor. With disarmed alarm, it can switch the light or change the settings of the ventilation system, depending on the activity of the household members. Similarly, the power controller can control the intensity of the light or speed of the bathroom fan. This approach means that the available range of sensory and actuator elements in no way limits the functionality of the system, on the contrary - it extends it significantly!

Signal processing in the F&Home RADIO system takes place in real time (guaranteed response time to any events and their combinations is less than 30 ms). The F&Home Radio server cooperates with local area network (LAN) and communicates with a wide variety of mobile devices (phones, smartphones and tablets). This configuration allows you to manage, control and monitor the system from any device without external servers. The system also has direct support for text message-based communication through a standard USB modem equipped with a SIM card.

WIRELESS SYSTEM BENEFITS

* Reduction of wired connections.
* Non-invasive installation of radio system components through the use of: in-wall transmitter and controller modules, alternative modules mounted on DIN rail and battery powered sensors.
* Quick and easy installation of systems in new buildings and modernization of existing installations without absorbing and expensive repairs.
* Easy reconfiguration of system components in case of a house or apartment expansion, growing requirements or change of preferences of household members.
* Option to connect and control the operation of already installed devices fitted in a building or being its integral part (e.g. the elements of lighting, automatic doors and windows, shutters/roller blinds, heaters, solenoids valves, circulating pumps, lawn sprinklers, watering plants equipment etc.), that do not have a remote control function.
* Much wider range of flexibility, performance and functionality relative to a wired solutions that can be adapted or fully integrated.



DISTINCTIVE FEATURES OF THE SYSTEM

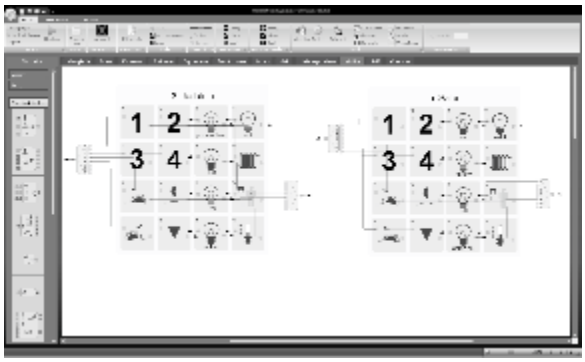
* Server-based architecture allows for unmatched functionality using a relatively narrow range of universal actuator and sensory modules.
* Integration of independently working devices and installations.
* Flexible expansion and scaling of the system.
* Small size modules to simplify and speed up the installation, designed to work with equipment from other manufacturers.
* The use of a wide range of mobile devices (phones, smartphones and tablets) as an universal remote controls or fixed or portable control panels.
* Integration of systems using radio and wired communication solutions (selected systems only).
* Limiting the number of system components by simultaneous use of their features (reduction of installation costs).
* Built-in algorithms to prolong the life of the components (e.g. preheating for incandescent lighting).
* The use of information from websites to manage the physical components of the system (e.g. heating systems with high inertia or watering plants systems based on the weather forecast).
* Built-in astronomical clock (in conjunction with weather forecast tools it allows you to resign from twilight sensors which reduces cost of installation).
* Unique tools for design and configuration of installation.

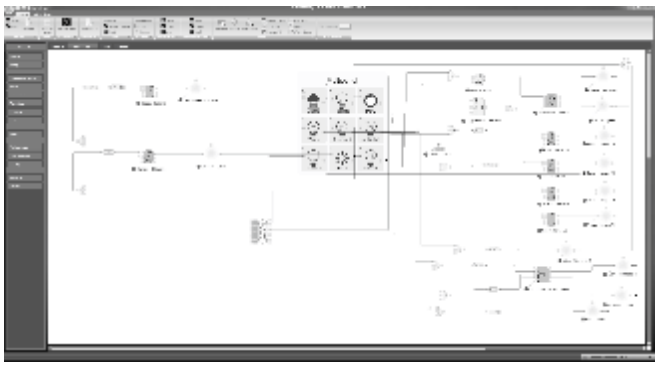
AUTONOMOUS OPERATION

Architecture and the various components of the F&Home RADIO system are designed to not only allow the user to remotely control individual components but above all, wherever possible, to relieve him by autonomous management and intelligent control of devices. Depending on the type and configuration of the installed automated equipment in the building, system can control its operation after detecting specific activity of the household members, for example the user sleeps, wakes
up, leaves the house, is away from home, comes home, enters, stays at home, goes to bed - or other types of events such as: guests visiting, watching a movie, party, barbecue in the garden, etc. Below is an example of autonomous execution of the function for one of the example activities:
User arrives at home - the system identifies the activity (e.g. GPS localization, text message sent by the user) and automatically:

* adjusts temperatures (heats or cools the selected room or zone) to the values preferred by the user
* raises the roller blinds to the desired position (according to your settings)
* switches on the lights in selected rooms and zones (e.g. a driveway, garden, garage) and adjusts its intensity to external conditions (time of day, weather conditions, personal preferences)
* airs selected rooms (tilts windows or turn on the ventilation system), taking into account information from the sensors (e.g. detection of rainfall, wind strength and direction)
* starts the hot water circulation in advance of a planned return time (switching on the circulation pump)
* sets the roller blinds, drapes, curtains in preferred positions, taking into account information from the sensors (e.g. temperature control, angle of the sunrays)
* prepares audio-video systems for media playback in selected zones or rooms
* starts, controls work or prepare for work the other devices.

CONFIGURATION TOOLS FOR FITTERS





An integral part of the F&Home RADIO system is a tool support in the form of the configuration software WiHome Configurator dedicated mainly for fitters, architects, developers, engineers, but also users - hobbyists. This software is a unique solution in the area of design and construction of smart home installation as well as configuration and management of the servers of the building automation based on the WiHome technology. With a virtual representation of the physical sensory and actuator elements and an extensive library of software objects implementing the logic of interaction between these elements, it is possible to freely create virtually any configuration of operational scenarios for individual devices, installation and entire systems.
Other advantages of this approach include:

* Saving time and increasing work comfort of the fitter
* Ability to perform most of the configuration work outside the place of assembly
* Simplifying and minimizing installation work at the customer's home
* Fast copying installation projects for a larger number of similar objects (multi-family buildings, twin buildings, single family houses)
* Easy installation reconfiguration in the event of system expansion or change of user preferences
* Ability to remotely configure and management and service

EXAMPLES OF SYSTEM FUNCTIONALITIES FOR SELECTED INSTALLATIONS

Lighting:

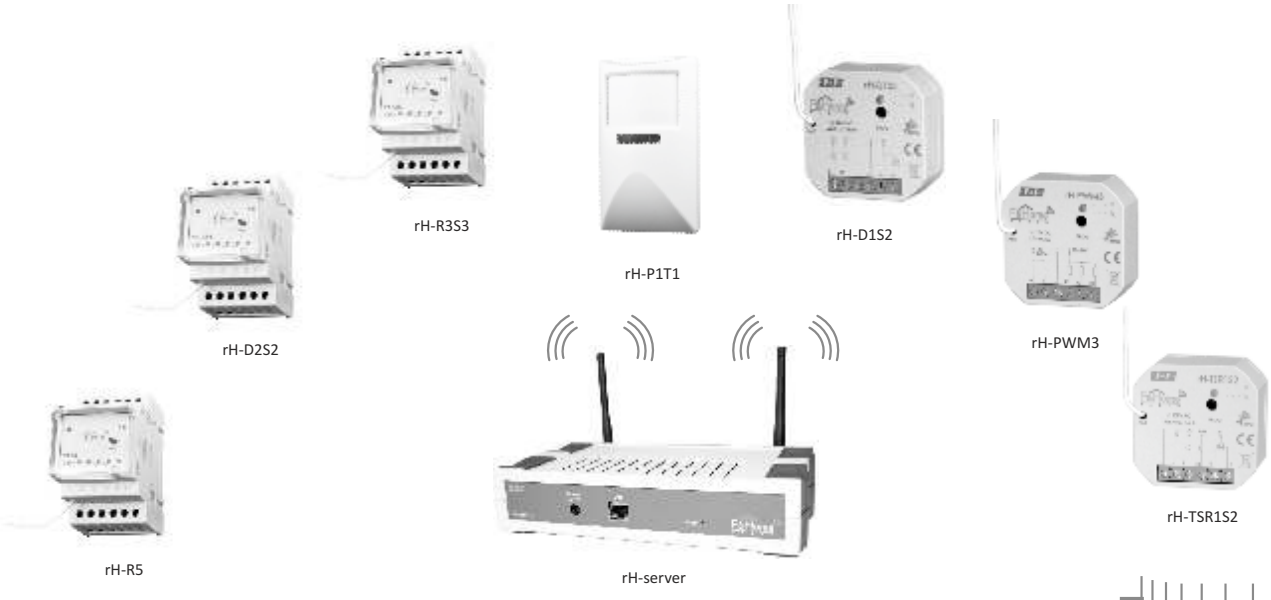
* Free configuration of the points of light, the place of physical switches installation and features and appearance of mobile applications control panels
* Remote control of the time and the intensity of illumination of individual points, defined sections and whole circuits
* Create any color compositions for RGB LED lighting
* The composition of different light scenes defined by the user, according to his preferences
* Sequential operation (e.g. control of different light scenes using only one switch)
* Freedom to combine light scenes with the work of other systems within the defined scenarios (e.g. integration with audio-video systems)
* Intelligent operation depending on the time of day or night, motion detecting, traffic and other events (e.g. the gradual lighting up the rooms in night mode)
* Configuration of lightning for simulating the presence of family members at home during their actual absence

Heating, Air Conditioning, Ventilation:

* The direct or indirect control of the heating system components (using controllers of furnaces, electric valves, circulation pumps, ventilation systems, etc.)
* The use of temperature sensors embedded in the components of the system
* Local management of temperature and ventilation in individual rooms or zones
* Remote control of temperature and work of ventilation equipment at selected locations
* Freedom to define scenarios modes for specific activities (e.g. summer mode, winter mode, holiday mode, short absence, coming back to house, etc.).
* Configuration mode for each user preferences
* Intelligent operation depending on the time of day and night, household members activities and other events (e.g. temperature adjustment to the presence and traffic in the room)
* Sync operation with websites
* Control and remote control using SMS gate (e.g. remote management of operation of the heating system in the holiday home without access to the Ethernet network)

COMPONENTS OF THE SYSTEM

rH-D1S2	In-wall module of single-channel dimmer with two-channel transmitter
rH-D2S2	Two-channel module with two-channel transmitter mounted on DIN rail
rH-PWM3	In-wall module of three-channel PWM low voltage controller (LED RGB)
rH-PWM2S2	In-wall module of two-channel PWM low voltage controller with two-channel transmitter
rH-TSR1S2	In-wall module of two-channel relay with two-channel transmitter
rH-TSR1S2 DIN	DIN module of two-channel relay with two-channel transmitter
rH-R1S1	In-wall module of single-channel relay with single-channel transmitter
rH-R2S2	In-wall module of two-channel relay with two-channel transmitter
rH-R3S3	Three-channel relay module with three-channel transmitter
rH-R5	Five-channel relay module mounted on DIN rail
rH-S2	In-wall module of two-channel transmitter
rH-S4T	In-wall module of four-channel transmitter with temperature probe
rH-S4Tes	In-wall module of four-channel transmitter with external temperature probe. Battery powered
rH-S4TesAC	In-wall module of four-channel transmitter with external temperature probe. Mains powered
rH-T1X1	Temperature sensor and illumination sensor (insolation) module
rH-T1X1es	Temperature sensor and illumination sensor (insolation) module. Battery powered
rH-T1X1es AC	Temperature sensor and illumination sensor module mounted on DIN rail
rH-S6	Six-channel transmitter module mounted on DIN rail
rH-P1	Motion detector module. Battery powered
rH-P1T1	Low-current, passive motion detector module with temperature probe
rH-E2	Two-channel signal amplifier module
rH-IR16	Infrared remote control module
rH-EQ3HUB	Integration with thermostatic heads module
rH-SERVER	System control and management server



LONG RANGE

LONG RANGE

A new generation of modules marked with LR sign (e.g. rH-R1S1 LR) have significantly increased range of operation of up to 350 meters in the open area. Installation based on LONG RANGE server and LONG RANGE modules does not require the use of signal amplifiers (rH-E2).

11. RADIO CONTROL SYSTEM

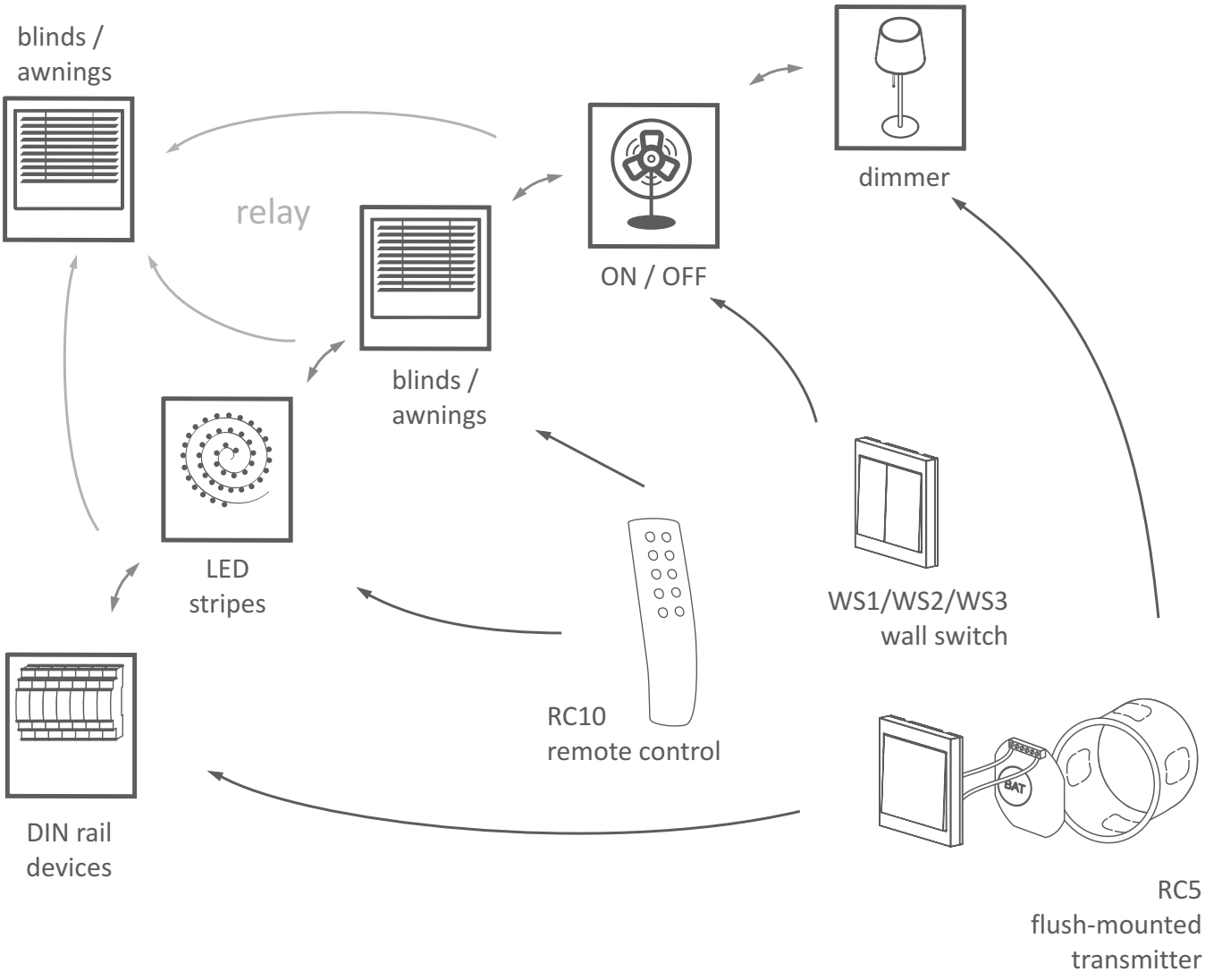
F&Wave

PURPOSE

The F&Wave wireless radio control is intended for direct control of electrical devices in homes and apartments. The system consists of dedicated transmitters and receivers. You can associate multiple transmitters with a single receiver and a single transmitter with multiple receivers.

SYSTEM FUNCTIONS

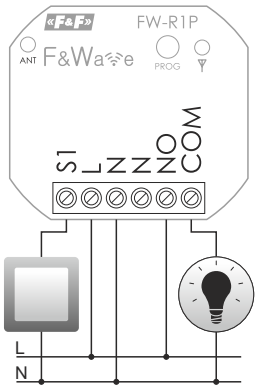
* Control different receivers in one system: single and dual relay, dimmer 230 V, dimmer LED, roller blinds controller
* Receivers designed for mounting it under plaster in Ø60 flush-mounted box or on a DIN rail
* Transmitters in the form of 4- and 10-button remote controls or for mounting under plaster in Ø60 flush-mounted box
* The ability to control from up to 8 transmitters
* Retransmission of commands from the transmitter - the ability to increase the range of the remote control
* Range of up to 100 meters in open space without any interfering factors. In building conditions and in the presence of interference sources (power lines, transmitters, etc.) the actual range may be smaller. The range can be improved by direct retransmission of modules located in mutual coverage area



SYSTEM COMPONENTS

FW-R1P Single bistable relay

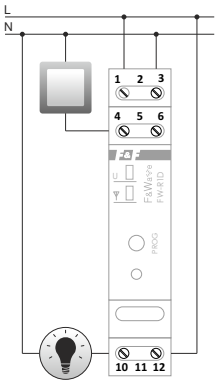
Single bistable relay with a separated NO output contact with a load capacity of 8 A (AC-1), radio-controlled via transmitters of the F&Wave system and locally, using the monostable button. Installation under plaster in Ø60 mm flush-mounted box - a small enclosure and screw terminals for easy mounting. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA
power consumption	
on	0,6W
standby	0.25W
output load (AC-1)	8A/250V
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×20mm
protection level	IP20

FW-R1D Single bistable relay

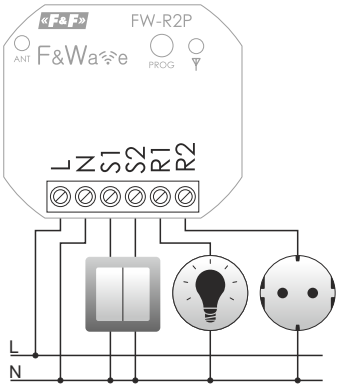
Single bistable relay with a separated NO output contact with a load capacity of 16 A (AC-1), radio-controlled via transmitters of the F&Wave system and locally, using the monostable button. Installation on DIN rail - only one field in the switchboard. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA
power consumption	
on	0,6W
standby	0.25W
output load (AC-1)	16A/250V
output overload	160A/20msec
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FW-R2P Dual bistable relay

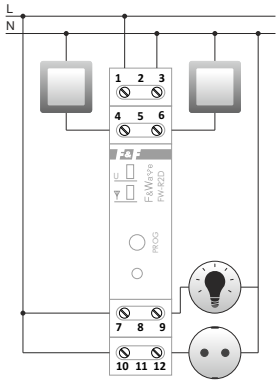
Dual bistable relay with NO-type outputs with a load capacity of 8 A (AC-1) per channel. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation under plaster in Ø60 mm flush-mounted box - a small enclosure and screw terminals for easy mounting. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on (2 relays)	1W
standby	0.25W
output load (AC-1)	2×8A/250V
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×20mm
protection level	IP20

FW-R2D Dual bistable relay

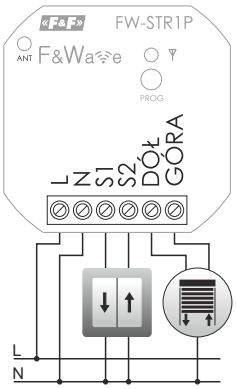
Dual bistable relay with NO-type outputs with a load capacity of 8 A (AC-1) per channel. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation on DIN rail - only one field in the switchboard. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on (2 relays)	1W
standby	0.25W
output load (AC-1)	2×16A/250V
output overload	160A/20msec
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FW-STR1P 230V AC roller blind controller

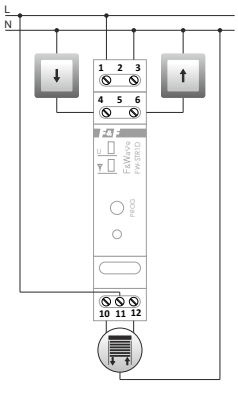
Roller blind controller with 230 V motor. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation under plaster in Ø60 mm flush-mounted box - a small enclosure and screw terminals for easy mounting. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on	1W
standby	0.25W
output load	
AC-1	3A
AC-3	0.6A
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×25mm
protection level	IP20

FW-STR1D 230V AC roller blind controller

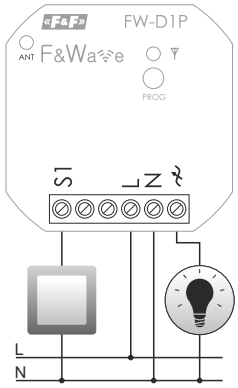
Roller blind controller with 230 V motor. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation on DIN rail - only one field in the switchboard. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on	1W
standby	0.25W
output load	
AC-1	8A
AC-3	1.5A
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FW-D1P 230V AC universal dimmer

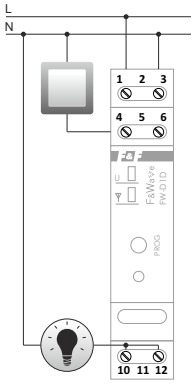
230 V dimmer - cooperation with different loads (incandescent and halogen lamps, dimmable LED and ESL bulbs, adjustable electronic transformers). Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation under plaster in Ø60 mm flush-mounted box - a small enclosure and screw terminals for easy mounting. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on	<0.4W
standby	0.25W
output load (overload R, L C)	180W
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×20mm
protection level	IP20

FW-D1D 230V AC universal dimmer

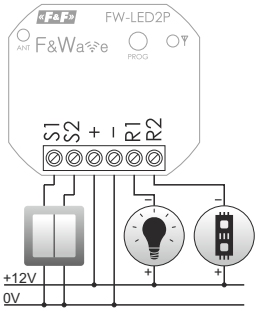
230 V dimmer - cooperation with different loads (incandescent and halogen lamps, dimmable LED and ESL bulbs, adjustable electronic transformers). Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation on DIN rail - only one field in the switchboard. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on	<0.4W
standby	0.25W
output load (overload R, L C)	250W
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

FW-LED2P LED 12V DC dual channel controller

Two-channel12 V DC LED controller is designed, among others, to power the 12 V LED bulbs, 12 V LED strips and dimmable LED bulbs powered by 12 V. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation under plaster in Ø60 mm flush-mounted box - a small enclosure and screw terminals for easy mounting. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.

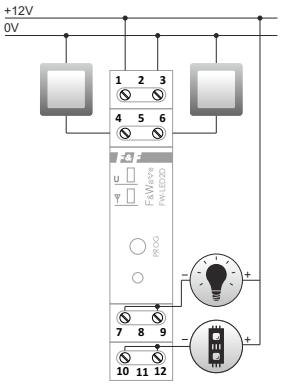


power supply	10÷16V DC
power consumption	
on	<0.4W
standby	0.25W
output load	4A/12V
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×20mm
protection level	IP20

Due to the different designs used in electronic light sources, such as LED bulbs, ESL, transformers, there is a possibility of dimmer malfunction in conjunction with such receivers.

FW-LED2D LED 12V DC dual channel controller

Two-channel12 V DC LED controller is designed, among others, to power the 12 V LED bulbs, 12 V LED strips and dimmable LED bulbs powered by 12 V. Radio-controlled via transmitters of the F&Wave system and locally, using the monostable buttons. Installation on DIN rail - only one field in the switchboard. Low power consumption reduces operating costs. Thermal protection increases safety in the event of an overload or malfunction.



power supply	10÷16V DC
power consumption	
on	0,4W
standby	0.25W
output load (AC-1)	6A/12V
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	on TH-35 rail
dimensions	1 module (18mm)
protection level	IP20

Due to the different designs used in electronic light sources, such as LED bulbs, ESL, transformers, there is a possibility of dimmer malfunction in conjunction with such receivers.

FW-RC4 / FW-RC4G Four-channel remote control (black/grey)
FW-RC10 / FW-RC10G Ten-channel remote control (black/grey)

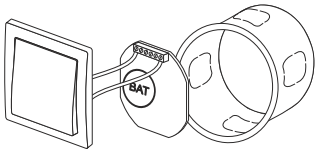
Remote control transmitters, designed to work with all the receivers of the F&Wave system. Very low power consumption during standby increases battery life.

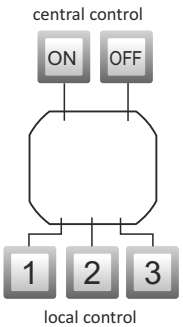
NEW !

power supply	3V
battery	CR2032
working frequency	868 MHz
working temperature	-25÷50°C
dimensions	
FW-RC4/FW-RC4G	37×72×30 mm
FW-RC10/FW-RC10G	44×149×44 mm

FW-RC5 5-button battery transmitter for Ø60 flush-mounted box
NON-VOLTAGE power supply with 3 inputs of local and central ON/OFF control

Remote control transmitter designed for all receivers of the F&Wave system. It does not require 230 V power supply. Very low power consumption during standby increases battery life. Connection of monostable (momentary) buttons is required. It has 3 inputs of local control for any 3 receivers and 2 inputs of central control ON/OFF (switch on/switch off and/or raise/lower paired receivers).



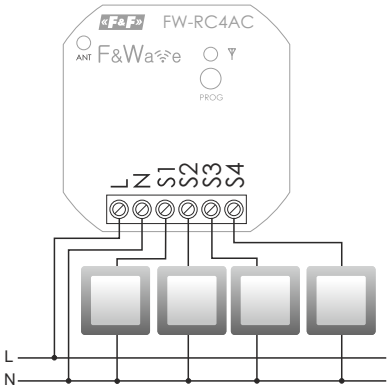


power supply	3V
battery	CR2032
working frequency	868 MHz
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	41×46×15mm

FW-RC4AC Network remote control transmitter to a Ø60 flush-mounted box, 230 V power supply with an inputs of local control and central ON/OFF control

Remote control transmitter designed to work with all receivers of the F&Wave system. 230 V local power supply. Required connection of momentary button. The transmitter has 4 universal inputs, which are designed for local control SWITCH and central control ON/OFF (on/off and/or raises/lowers the paired receivers). Functions of the inputs are assigned in accordance with the operating program.

NEW !



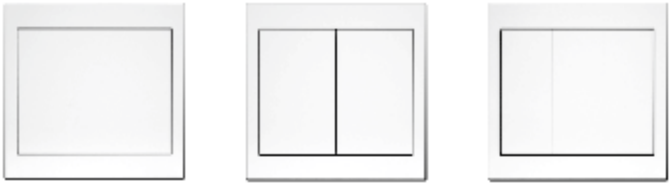
power supply	85÷265V AC/DC
control input	85÷265V AC/DC; <1mA triggered with L or N level
power consumption	
on	<0.6W
standby	0.25W
radio frequency	868 MHz
working temperature	-25÷65°C
terminal	2.5mm² screw terminals
tightening torque (max)	0.4Nm
mounting	flush-mounted box Ø60
dimensions	43×48×20mm
protection level	IP20

Mode \ Input	S1	S2	S3	S4
A	SWITCH	SWITCH	SWITCH	SWITCH
B	**OFF**	SWITCH	SWITCH	SWITCH
C	SWITCH	**ON**	SWITCH	SWITCH
D	**OFF**	**ON**	SWITCH	SWITCH

FW-WS1 1-button
FW-WS2 2-buttons
FW-WS3 3-buttons

NEW !

Battery powered wall-mounted remote control transmitters



power supply	3V
battery	CR2032
working frequency	868 MHz
working temperature	5÷50°C
dimensions	86×86×15 mm

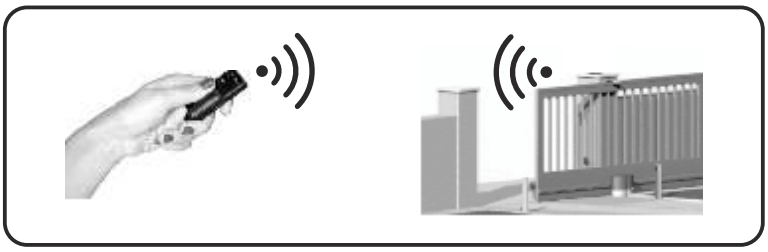
Remote control transmitters designed to work with all receivers of the F&Wave system.
Supplied from the built-in battery type 2032. Does not require 230 V power supply. Very low power consumption when in standby mode prolongs battery life.
Button functions:
* SWITCH - on/off locally
* ON - switch on/raise all (FW-SW2 and FW-SW3)
* OFF - switch off /lower everything (FW-SW2 and FW-SW3)

Button installation:
* screwed to the wall (two installation holes)
* glued to the wall (for example with double-sided tape)
* free button location

12. RADIO CONTROL RELAYS

PURPOSE

Electronic relays are used for radio remote control of gates, shutters, lighting, arming alarm systems etc. The remote control system consisting of a transmitter (remote) and receiver (relay). There is a possibility of cooperation between many transmitters to one receiver and one transmitter to multiple receivers.



FUNCTIONING

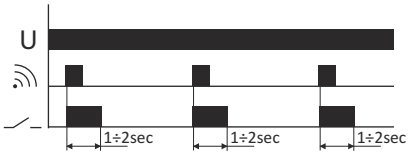
The impulse caused by the push of a button on the remote control to send a coded signal to the receiver. Remote control is protected against break transmission after releasing the button. Thanks to this, even the shortest activation function is the full frame of data transmissions. Data transmission from the remote control is indicated by flashing of red LED on the remote. The range of the system is up to 100 m (range depends on many factors, among others on: the weather (humidity), terrain characteristics (reflection), placement of the receiver and transmitter and all kinds of obstacles such as walls).

RECEIVERS

Receivers are designed for under plaster box montage. In receiver's non-volatile memory can be store up to 32 transmitters.
Radio receivers RS-407 B i RS-407 M cooperate with dedicated production units F&F: transmitter RS-N and RS-P.

RS-407 M MONOSTABLE TYPE

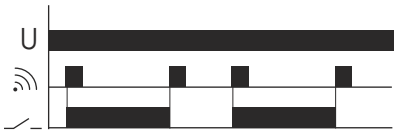
The push transmiter's button will effect of closes the receiver's contact of X1-X2 at time 1 ÷ 2 sec (pulse).

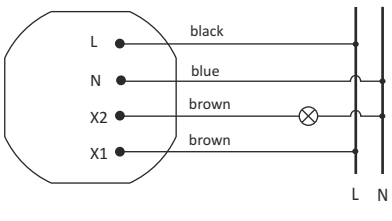


power supply	230V AC
load current	<5A
contact	separated 1×NO
signalling receiving / programming	red LED
contacts state signalling	green LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	4×LY 1mm², l=10cm
dimensions	Ø55, h=21mm
mounting	in flush mounted Ø60
protection level	IP20

RS-407 B BISTABLE TYPE

The push transmiter's button will effect of closes the receiver's contact on the opposite interface (ON/OFF).

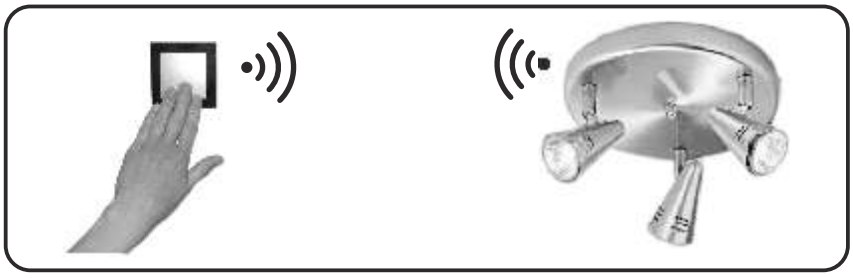




TRANSMITTERS

The impulse caused by the push of a button on the remote control to send a coded signal to the receiver. Remote control is protected against break transmission after releasing the button. Thanks to this, even the shortest activation function is the full frame of data transmissions.
Data transmission from the remote control is indicated by flashing of red LED on the remote.
Radio transmitters cooperate with dedicated production units F&F: monostable receiver RS-407 M monostable and bistable receiver RS-407 B.

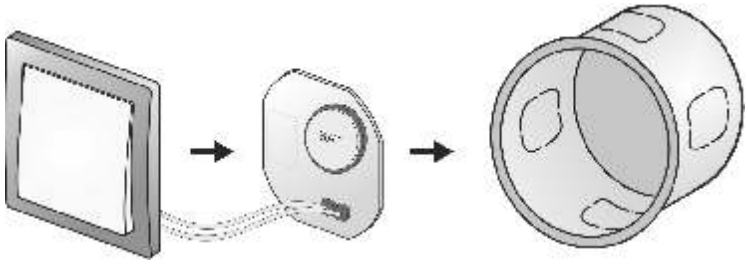
RS-N... in flush mounted TRANSMITTER



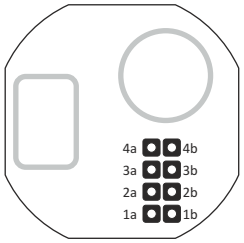
The transmitter for installation in inder plaster box. It has a stand-alone battery powered, which eliminates the need for a power cable at the mounting location of buttons. For the control we can use the monostable (instantaneous) buttons of any series wiring accessories.

Type	Function
RS-N1	one-button
RS-N2	two-button
RS-N3	three-button
RS-N4	four-button

power supply	3V
battery type	CR2032
transmission	dynamic variable code
frequency	868MHz
coding	Keelog®
working temperature	-25÷50°C
terminal	LGY 0.5mm²
dimensions	Ø52; h=11mm
mounting	in flush mounted Ø60
protection level	IP20



Mounting in flush mounted



Channels connections

RS-P... REMOTE CONTROL

The small remote as a pendant.

Type	Function
RS-P1	one-button
RS-P2	two-button
RS-P3	three-button
RS-P4	four-button

power supply	12V
battery type	A23
transmission	dynamic variable code
frequency	868MHz
coding	Keelog®
working temperature	-25÷50°C
color	black
dimensions	30×68×14mm
protection level	IP20

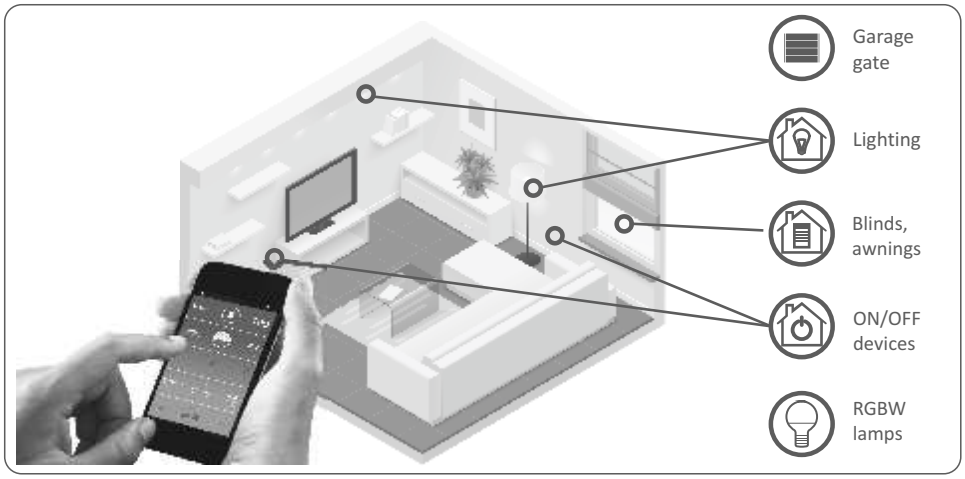
13. BLUETOOTH SMART REMOTE CONTROL SYSTEM

getproxi.com

Controlling:
BluetoothSMART

PURPOSE

Proxi is an innovative wireless control system for electrical equipment in homes and apartments. The control is carried out via Bluetooth Smart Technology. The system consists of dedicated relays and free software application for both smartphones and tablets running Android or iOS (Apple). Installed relays are automatically added to the app list of devices and immediately ready to control.



Application available on:
Android
iOS

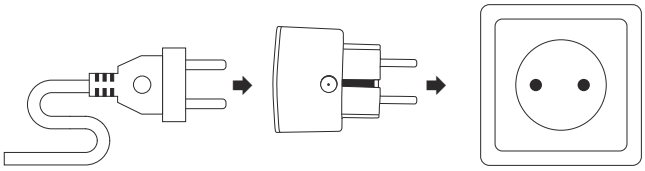
SYSTEM FEATURES

* **Remote control**
  Control a wide range of devices without central stations, controllers, Wi-Fi routers.
* **Wireless communication**
  Two-way transmission of commands, confirmations and other information between your phone and the device.
* **Easy to install**
  Easy to connect to an existing installation.
* **Ease of use**
  No programming, easy to use application with a friendly interface.
* **Safety**
  Secure communication and the ability to manage access rights to the devices.
* **Notification support**
  Presentation of equipment operating status, activity, alerts and diagnostic information.
* **NFC contactless features**
  Automatic control of the devices in proximity, recognizing the presence of the user, Apple iBeacon.
* **Access Management**
  Device configuration in public and private modes, sharing devices, privacy protection.
* **Settings personalization**
  Editing devices and premises, individual layout.
* **Scenarios**
  Simultaneous control of the devices within established groups.
* **The prevalence of control devices**
  Phones and tablets running iOS7 and Android 4.3+ and equipped with Bluetooth SMART Low Energy.

Proxi Plug

PLUG

Relay module in the form of an adapter for a power socket designed to control the on-off 230 V receive. Plug is controlled using a mobile application and manually with the button on the unit. LED located in the button indicates the operating status and load (LED color change depending on the load).

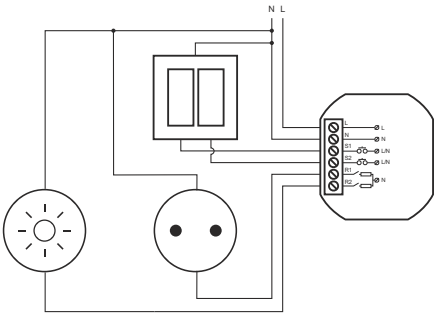


power supply	230V AC
output	contact 1×NO (13A 250V AC)
receiver's power connected	3000W
socket type	E EEC 7/4 schuko F EEC 7/5
Bluetooth transmission	
frequency	2.4GHz
signal power	1mW
transmission	bidirectional
coded	AES
range	30m
power consumption	0.2÷0.8W
working temperature	0÷65°C
thermal protection	YES
dimensions	44×44×70mm
protection level	IP20

Proxi Power

rB–R2S2 relay on / off

Relay module designed to control any two devices or electrical circuits.
Easy installation in the box of a power socket allows you to install the module without the need for invasive and costly renovations.

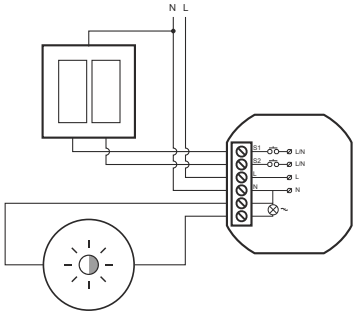


power supply	230V AC
L/N input control	×2
L/N control pulse	<1mA
outputs	contact 2×[1×NO] (4A 250V AC)
Bluetooth transmission	
frequency	2.4GHz
signal power	1mW
transmission	bidirectional
coded	AES
range	30m
power consumption	1W
working temperature	0÷45°C
thermal protection	YES
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

Proxi Light

rB–D1S2 lighting dimmer

The module is designed to control a variety of light sources with smoothly adjustable light intensity. The module can be installed in classical electrical box and allows you to connect the receiver and one or two switches. Light can be remotely controlled directly from your phone and with buttons.

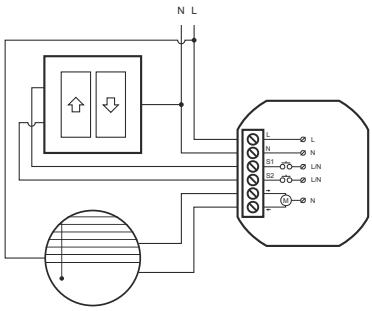


power supply	230V AC
L/N input control	×2
L/N pulse control	<1mA
output	
resistive load	150W
inductive load	100W
Bluetooth transmission	
frequency	2.4GHz
signal power	1mW
transmission	bidirectional
coded	AES
range	30m
power consumption	0.4W
working temperature	0÷45°C
thermal protection	YES
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

Proxi Shade

rB–TSR1S2 blind controller

The radio module is designed to control the drives of roller shutters, blinds, screens, awnings and curtains offered by different manufacturers. The module can be installed in an electrical box and connected to the two-keys switch (used in traditional solutions) or installed directly on/in unit.



power supply	230V AC
L/N input control	×2
L/N pulse control	<1mA
output (AC-3)	0.6A / 230V
Bluetooth transmission	
frequency	2.4GHz
signal power	1mW
transmission	bidirectional
coded	AES
range	30m
power consumption	1W
working temperature	0÷45°C
thermal protection	YES
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

Proxi Gate

rB–TO2S2 gate controller

Radio module designed to control automatic gates and garage doors offered by different manufacturers. It can be installed in the gate controller along with other radio modules. This solution allows you to utilize all the phone attributes to remotely control opening and closing of the gates. At the same time it leaves the possibility of using traditional remote controls.

antenna

1	PWR +/-
2	PWR +/-
3	OUT 1 -
4	OUT 1 +
5	OUT 2 -
6	OUT 2 +
7	IN 1
8	IN 1
9	IN 2
10	IN 2

PWR - power supply
OUT1 - OPEN button
OUT2 - CLOSE button
IN - limit switch

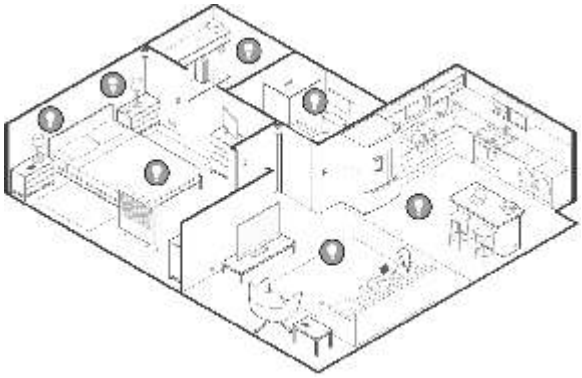
power supply	9÷30V AC/DC
outputs	×2
overload	20mA 50V DC
Bluetooth transmission	
frequency	2.4GHz
signal power	1mW
transmission	bidirectional
coded	AES
range	30m
power consumption	0.4W
working temperature	-30÷55°C
thermal protection	YES
terminal	0.5mm² screw terminals
dimensions	42×98×30mm
mounting	2 fastening screws to the ground
protection level	IP65

Proxi BULB

NEW !

rB-BULB LED lamp 230 V RGBW

Proxi Bulb lamp gives you the opportunity to choose from 64 million colors, lets you adjust the brightness and color saturation to suit your own, even the most original needs. The lamp can be controlled using a free application on your smartphone or tablet, and thanks to Bluetooth Smart technology you don't have to connect to the Internet. By using intelligent Proxi Bulb lamp you can switch on the light or change its hue and saturation, introducing a unique mood to your home, apartment or office. Intelligent Proxi Bulb light is a profitable investment because the LED technology ensures continuous operation for up to 50 000 hours.



type	LED RGBW
size	Ø65×135 mm
screw type	E27
supply voltage	85÷265V AC
frequency	50÷60Hz
energy consumption	9W
power factor	≥0.95
luminous flux	600 lm
color temperature	3000÷6000K (LED white)
CRI	≥80
handling	Bluetooth SMART
working temperature	-20÷40°C
LED life	50.000 h
handle	E27 screw

Technology of possibilities - the possibilities of technology

Availability

Phones with iOS7 or Android 4.3+ equipped with Bluetooth Low Energy

Remote control

Control of a wide range of devices without going through centrals, controllers, WiFi routers

Wireless communication

Bi-directional transmission of commands, confirmations and other information between the phone and the device

Notification support

Presentation of the status of equipment, activities, alerts and diagnostic information

Proximity features

Automatic control of the devices in range, user presence recognition, Apple iBeacon

Access management

Configuration of devices in public and private mode, devices sharing, privacy protection

Settings personalization

Editing devices and rooms, creating groups, graphic design

14. GSM REMOTE CONTROL

REMOTE CONTROL RELAYS

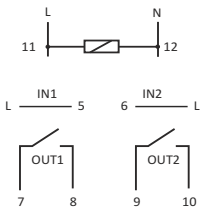
PLC MAX

SWITCH ON / SWITCH OFF / NOTIFY

PURPOSE

Relay with built-in GSM communicator, used for remote control via mobile phone. It allows you to easily manage the outputs and monitor operating status of devices connected to the inputs of the controller.

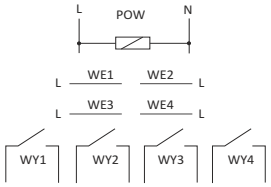
SIMply MAX P01



power supply	230V AC
inputs	
P01 / P04 quantity	2/4
voltage tolerance	160÷260V AC
relay outputs	
P01 / P04 quantity	2/4
type	1×NO/NC
nominal voltage	230V AC
load	<8A
ports	SIM
power consumption	
standby	1.3W
GSM communication	<3W
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	
P01	3 modules (52mm)
P04	4 modules (70mm)
mounting	on TH-35 rail
GSM antenna SMA connector	20×100m
length	2.5m
protection level	IP20

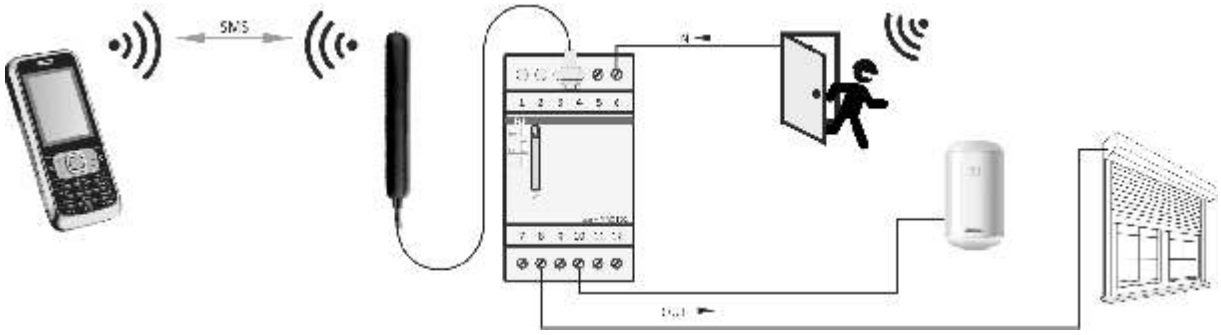
SIMply MAX P04

NEW !



FUNCTIONING

The relay works in cellular communications networks GSM 900/1800 of any operator in Poland (unlocked). To be able to make calls and execute the desired function they relay must have an active SIM card. The relay has two controlled relay outputs for switching on and off the controlled receivers and two high-input voltage for notifications about activation of controlled devices. Commands and notifications are SMS texts messages exchanged between controller and telephone of the user.



FUNCTIONS

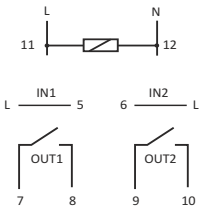
* switching the outputs on and off ON/OFF;
* time switching-on of the output, for example 30 sec (interval 1 sec÷600 min);
* alarms - SMS notifications on the user's phone about activation of the input. ON - notification on a preset number about high state at the input 1; OFF - notification on a preset number about low state at the input 1; NF - notification on a preset number about low and high state at input 1;
* parallel notifications to 5 phone numbers;
* query about the state of the input or the output;
* redefinition of the names of inputs and outputs, for example IN1 = attack, OUT2 = pump;
* password (4 to 8 digits);
* automatic answer after receiving a command and its program implementation (as an option);
* automatic restore of output states after returning of the power (output status memory);
* optional configuration with a MEMORY ON command. Disable this feature with MEMORY OFF command.

COST-FREE GSM CONTROL OF A GATE, GATEWAY DOOR, BARRIER

SIMply MAX P02 WITH CLIP FEATURE

PURPOSE

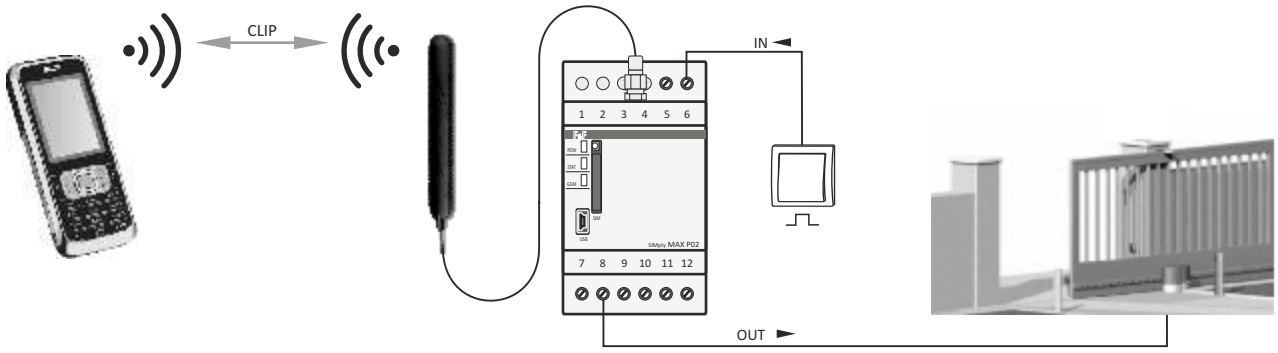
MAX P02 relay with built-in GSM communicator is designed for remote opening of automatic gates, garage doors, barriers and gateway doors using a mobile phone. It is used for objects with protected access and a large number of users with permission to enter, for example housing estates, garages, public and company car parks, etc. It eliminates the traditional control with the radio remote controls and costs associated with their purchase for a large number of users.



power supply	230V AC
inputs	
quantity	2
voltage tolerance	160÷260V AC
relay outputs	
quantity	2
type	1×NO
nominal voltage	230V AC
load	<8A
ports	SIM
power consumption	
standby	1.3W
GSM communication	<3W
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	3 modules (52mm)
mounting	on TH-35 rail
GSM antenna SMA connector	20×100m
length	2.5m
protection level	IP20

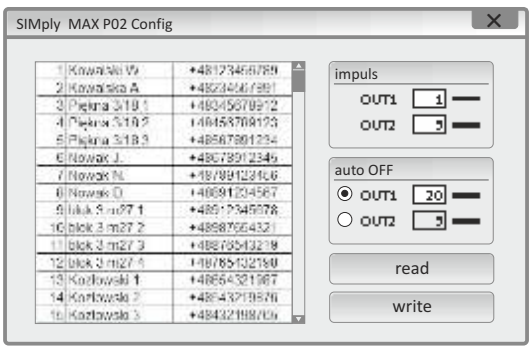
FUNCTIONING

The relay works in cellular communications networks GSM 900/1800 of any operator in Poland (unlocked). To be able to make calls and execute the desired function the relay must have an active SIM card. The relay has two controlled contacts, through which pulses are driven to the controller of the gate or the bolt of the gateway door. Both outputs operate in parallel, but with arbitrarily set times of contact closing (pulse). The control itself is done at no cost. The user initiates the standard connection on the number of the controller. The controller identifies the number and automatically rejects the call, at the same time activating the outputs (the CLIP dial-up function). In addition, it is possible to drive the outputs using the control buttons connected to the inputs of the relay. The relay has a choice of operating mode: manual or automatic closing. In automatic mode, after activation of the outputs by the user the relay activates them again by itself after a certain amount of time in order to close the gate.
Phone numbers of the users and the times of pulses and automatic closing are determined by the configuration program on the PC.
The connection to the relay via the USB cable.



FUNCTIONS

* cost-free control on the side of users (CLIP dial-up function);
* two parallel relay outputs;
* the ability to set different times of outputs activation for each output individually (for example simultaneous control of gate and gateway door);
* two pulse inputs allow for manual activation of outputs using connected external buttons;
* automatic shutdown after a specified period of time;
* authorization of 500 numbers of users;
* configuration program on the PC;
* the ability to remotely define and remove users via SMS commands.



Configuration programm

COSTS

Given the current rate of GSM operators for prepaid tariffs the cost of maintaining a SIM card for the controller can reach between 5÷10 zlotys per year.

TEMPERATURE CONTROL + SWITCH ON/SWITCH OFF/NOTIFY

SIMply MAX P03

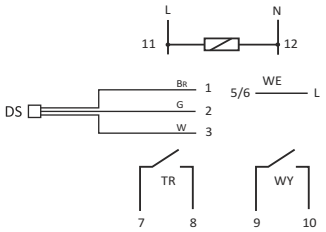
NEW !

PLC MAX

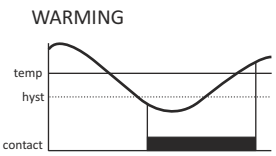
Relay with built-in GSM communicator is used as a two-state thermostat with remote temperature management using a mobile phone. It performs simple functions of notifying about the exceeded temperature and allows to control additional connected device on the ON/OFF basis. Phone numbers of users, temperature, alarms and other functions are set using the configuration program on the PC. Connection to the relay via the USB cable.

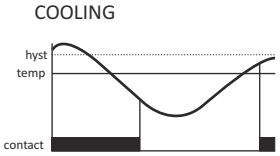
antenna

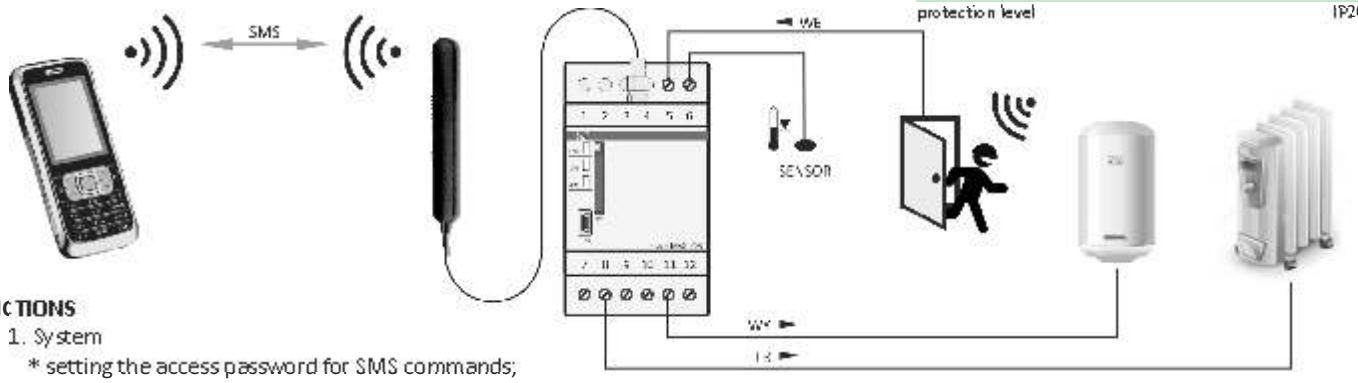
RT4 probe



power supply	230V AC
inputs	
quantity	1
voltage tolerance	160÷260V AC
relay outputs	
quantity	2
type	1×NO
nominal voltage	230V AC
load	<8A
type of temperature sensor	DS1820
temperature probe	RT4
temperature range	-30÷65°C
hysteresis - adjustable	0÷10°C
setting accuracy	0.1°C
measurement accuracy	0.5°C
ports	SIM
power consumption	
standby	1.3W
GSM communication	<3W
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	3 modules (52mm)
mounting	on TH-35 rail
GSM antenna SMA connector	20×100m
length	2.5m
protection level	IP20





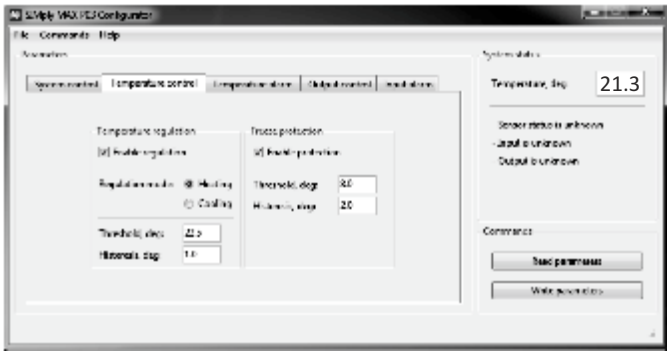


FUNCTIONS

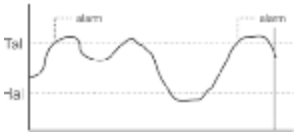
1. System
   * setting the access password for SMS commands;
   * output status memory;
   * readout of the current temperature;
   * monitoring the status of the sensor and reporting faults.
2. Temperature control
   * operating modes: heating or cooling;
   * ability to switch on and off the regulator (ON / OFF).
3. Temperature alarm
   * alarm about exceeding the maximum and minimum temperature;
   * notifications to 5 phone numbers;
   * ability to enable/disable the alarm function (ON/OFF);
   * option to repeat SMS in case of permanent temperature above the threshold for more than a preset number of minutes.
4. Anti-freeze temperature
   * ability to enable/disable the anti-freeze function (ON/OFF);
   * activated function is active despite inactive temperature control.
5. Output OUT
   * output control - two separate operating modes: SMS / ALARM:

   SMS: - output controlled directly via SMS commands
   - redefinition of the output name, for example OUT1 = lamp
   - ON / OFF control and time switching-on of the output

   ALARM: - contact assigned to the temperature alarms - exceeding the threshold forces the actions of the contact: ON / pulse
   - ON: contact closed above the alarm threshold, the contact opens after falling below the hysteresis
   - pulse: contact closed temporarily for a preset number of seconds after crossing the threshold
   - options on / pulse are set separately for minimum and maximum alarm.
6. Input IN
   * redefinition of the input name, for example IN1 = ATTACK;
   * selecting the option of SMS triggering: ON - the appearance of the signal; OFF - loss of signal; ON/OFF - loss and appearance of the signal;
   * notification about activation of the input are sent to 5 phone numbers.



P03 Configurator



PROGRAMMABLE CONTROLLER WITH GSM COMMUNICATOR

MAX H04 with front panel (LCD screen + keypad) + H04 Configurator program

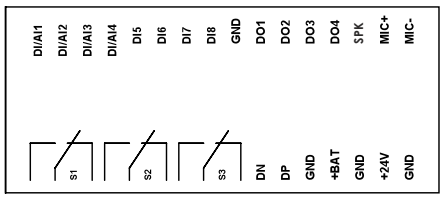
PURPOSE

MAX H04 is one of the few controllers that allow you to connect it and use it without the programming elements.
Thanks to the special configuration program it can be used by anyone who does not want to know the languages and the complicated procedures of PLC programming.

power supply	9÷30V DC
digital inputs	4 (30V; 0.2A)
analog/digital inputs	4 (0/4÷20mA/0÷10V)
digital outputs OC	4 (50V; 0.2A)
relay outputs	3×NO/NC (<5A)
ports	SD, microUSB, SIM, RS-485
communication protocol	MODBUS RTU
internal memory of the recorder	1.3MB
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	110×79×40mm
mounting	screws to the ground or on TH-35 rail
protection level	IP20

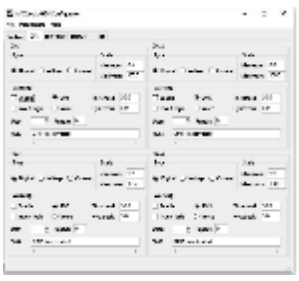
FUNCTIONS

* control of the outputs via SMS commands
* query about the status of inputs and outputs via SMS commands
* SMS/VOICE messages on user's phone about activation of digital inputs
* SMS/VOICE messages on user's phone about exceeding the defined threshold for analog input
* definition of the content of the outgoing SMS message (up to 160 characters)
* optional setting of the number of minutes after which an SMS message is repeated in the case of continuous support of the status at the input
* control of the output depending on the assigned input: LEVEL option - mapping of the status (IN1 -> OUT 1, IN 0 -> OUT 0); PULSE - temporary switch-on of the outputs for a set time after input activation
* function of a bistate regulator based on the definitions of scale of analog input, threshold and output assigned to it
* scaling for the actual measured values of the analog input measuring range
* selection of the SMS-triggering signal option (high state 1 or low state 0) at the input



CONFIGURATION PROGRAM ON THE PC

Easy and simple way of the controller configuration using the H04 Configurator software. Definition of phones, setting alarm thresholds, scaling of analog inputs, time synchronization, etc.



15. VIDEO INTERCOM SETS

MONITORS

MK-10EX

NEW !

* hands free monitor
* 7" color widescreen, touch screen 800×600
* on-screen display menu in Polish
* support for 2 door station and 2 CCTV cameras
* possibility to connect motion sensors to cameras
* control of the electro latch and automatic gate
* a smooth adjustable opening time of the bolt 1÷99 seconds
* photo/video recording function (4 GB micro SD card included)
* adjustment of the parameters of each of the cameras separately (brightness, color, contrast)
* ability to set 3 volume modes (depending on the time of day)
* 11 ringer melodies / a separate ringtone for each input
* preview with the option of starting a conversation and opening gate
* intercom function
* touch control panel
* 4-wire installation
* can be expanded by 3 additional monitors
* 14.5 V DC power supply
* power supply for DIN rail included
* material: brushed aluminum / glass / plastic
* dimensions: 226×151×23 mm

Works with all F&F gate stations

MK-10FSD

NEW !

* hands free monitor
* 7" color widescreen LCD / on-screen display menu in Polish
* support for 2 door station and 2 CCTV cameras (or 1 station + 3 CCTV cameras)
* ability to connect alarm sensors to cameras
* control of the electro latch
* photo/video recording function (4 GB micro SD card included)
* adjustment of the parameters of each of the cameras separately (brightness, color, contrast)
* ability to set 3 volume modes (depending on the time of day)
* 11 ringer melodies / a separate ringtone for each input
* preview with the option of starting a conversation and opening gate
* intercom function
* touch and backlit control panel
* 4-wire installation
* can be expanded by 3 additional monitors
* 14.5 V DC power supply
* power supply for DIN rail included
* material: brushed aluminum, glass
* dimensions: 245×165×20 mm

Works with all F&F gate stations

MK-10K

NEW !

* hands free monitor
* 4" color LCD/on-screen display menu
* touch and backlit control panel (white backlight)
* support for 2 door station and 2 CCTV cameras
* control of the bolt and automatic gate
* photo/video function (4 GB micro SD card included)
* possibility to connect motion sensors to cameras
* ability to set 3 volume modes (depending on the time of day)
* a smooth adjustable opening time of the bolt 1÷99 sec
* 11 ringer melodies / a separate ringtone for each input
* preview with the option of activating audio and opening the bolt
* adjustment of the parameters separately for each gate station and CCTV camera (brightness, color, contrast)
* 4-wire installation
* 14.5 V DC power supply
* power supply for DIN rail included
* material: glass / plastic
* can be expanded by 3 additional monitors
* dimensions: 117×168×20 mm

Works with all F&F gate stations

MK-03G

* hands free monitor
* 7" color widescreen, TFT LCD touch screen 800×600, control panel (without backlight)
* support for 2 door station (or 1 station + 1 CCTV camera)
* control of the electro latch and automatic gate
* can be expanded by 3 additional monitors or uniphones
* intercom function with call forwarding
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* casing color: black
* preview with the option of starting a conversation and opening gate
* 14.5 V DC power supply
* power supply for DIN rail included
* 4-wire installation (2 wires for the bolt and 2 for the gate)
* dimensions: 241×161×23 mm

Works with all F&F gate stations

MK-03W

* speakerphone
* works with two cameras (gate stations)
* touch panel
* volume, brightness and color control
* plastic panel
* cover color: white
* 35 mm rail power supply included
* wall mounting
* additional control gate
* dimensions: 245×160×23 mm

Works with all F&F gate stations

MK-08B

* speakerphone
* 7" wide TFT LCD color screen
* 100 photos built-in memory
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function
* touch panel
* control of the electro latch and automatic gate
* cover color: black
* monitor parameters adjustment (ringer volume, brightness, color)
* can be expanded by 3 additional monitors or unifons
* preview with the option of starting a conversation and opening gate
* 4-wire installation
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 241×161×23 mm

Works with all F&F gate stations

MK-08F

* speakerphone
* 7" wide TFT LCD color screen
* 100 photos built-in memory
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function
* touch panel
* control of the electro latch and automatic gate
* cover color: white
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* can be expanded by 3 additional monitors or unifons
* backlit buttons: none
* preview with the option of starting a conversation and opening gate
* 4-wire installation
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 241×161×23 mm

Works with all F&F gate stations

MK-06WF

* speakerphone (with additional handset)
* 7" wide TFT LCD color screen
* 100 photos built-in memory
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function|
* backlit touch panel
* control of the electro latch and automatic gate
* can be expanded by 3 additional monitors or unifons
* cover color: white
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* preview with the option of starting a conversation and opening gate
* 4-wire installation
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 282×135×23 mm

Works with all F&F gate stations

MK-06B

* speakerphone (with additional headset)
* 7" wide TFT LCD color screen
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function
* touch and backlit control panel
* control of the electro latch and automatic gate
* cover color: black
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* preview with the option of starting a conversation and opening gate
* 4-wire installation
* can be expanded by 3 additional monitors or unifons
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 282×135×23 mm

Works with all F&F gate stations

MK-07WB

* speakerphone
* 7" wide TFT LCD color screen
* touch and backlit control panel
* support two door stations (or 1 station + 1 CCTV camera)
* control of the electro latch
* can be expanded by 3 additional monitors or unifons
* intercom function
* monitor parameters adjustment (call volume, brightness, color)
* cover color: black-silver
* preview with the option of starting a conversation and opening gate
* 14.5 V DC power supply
* power supply for DIN rail included
* 4-wire installation
* dimensions: 240×170×33 mm

Works with all F&F gate stations

MK-04W

* speakerphone
* 7" wide TFT LCD color screen
* support two door stations (or 1 station + 1 CCTV camera)
* control of the electro latch and automatic gate
* can be expanded by 3 additional monitors or unifons
* monitor parameters adjustment (call volume, brightness, color)
* cover color: black / white
* intercom: none
* buttons
* 14.5 V DC power supply
* power supply for DIN rail included
* 4-wire installation
* dimensions: 245×160×18 mm

Works with all F&F gate stations

MK-09W

* speakerphone
* 7" wide TFT LCD color screen
* support two door stations (or 1 station + 1 CCTV camera)
* control of the electro latch
* preview with the option of activating audio
* can be expanded by 3 additional monitors or unifons
* monitor parameters adjustment (call volume, brightness, color)
* cover color: pearl

Works with all F&F gate stations

MK-04B

* speakerphone
* 7" wide TFT LCD color screen
* support two door stations (or 1 station + 1 CCTV camera)
* control of the electro latch and automatic gate
* can be expanded by 3 additional monitors or unifons
* monitor parameters adjustment (call volume, brightness, color)
* cover color: black / white
* intercom: none
* buttons
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 245×160×18 mm
* 4-wire installation

Works with all F&F gate stations

MK-02

* speakerphone
* support two cameras (door stations)
* adjustment call volume, brightness, color
* panel material: plastic + aluminum
* cover color: white
* power supply for DIN rail included
* wall mounting
* dimensions: 245×160×18 mm

Works with all F&F gate stations

MK-10F

* speakerphone
* 7" wide TFT LCD color screen
* 400 photos built-in memory
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function
* touch panel
* control of the electro latch and automatic gate
* cover color: black
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* can be expanded by 3 additional monitors or unifons
* preview with the option of starting a conversation and opening gate
* 4-wire installation
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 241×161×23 mm

Works with all F&F gate stations

MK-310

* speakerphone
* 10" wide TFT LCD color screen
* support two door stations (or 1 station + 1 CCTV camera)
* intercom function
* touch and backlit control panel
* control of the electro latch
* preview with the option of activating audio
* 4-wire installation
* flush-mounted (optional)
* can be expanded by 3 additional monitors or unifons
* monitor parameters adjustment (ringer volume, call volume, brightness, color)
* 14.5 V DC power supply
* power supply for DIN rail included
* dimensions: 340×210×35 mm

Works with all F&F gate stations

UNIFONS

MU-01

headset

* electromagnetic control
* support 2 door stations
* adjust the ringer volume
* works with monitors: all
* 14.5V DC power supply
* warranty: 24 months
* dimensions: 100×200×45 mm

MU-02

speakerphone

* speakerphone, hands without headset
* electromagnetic control
* 4-wire installation
* support 2 door stations
* adjusting intercom (call volume, tone)
* dimensions: 160×120×42 mm
* 14.5V DC power supply (external power supply)

APPLICATION

Intercoms works with all types of monitors.

GATE STATIONS

KK-01 silver
KK-01B black

Features:
* 1-subscribers gate station
* image converter 1/3" color
* lens angle of view: approx. 87°
* resolution: 600 lines
* 3.6 mm lens
* backlight: 4 LEDs white light
* power supply: from monitor
* housing: hardened aluminum alloy
* flush-mounted
* dimensions: 58×135×39 mm

Works with all F&F monitors

KK-01FP

Features:
* 1-subscriber gate station
* image converter CCD color
* lens angle of view: approx. 60°
* resolution: 420 lines
* 3.6 mm lens
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* backlit dial button and name signboard
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* built-in fingerprint reader
* reader capacity: max 900 fingerprints
* camera power supply: from monitor
* biometric reader power supply: from DC 12÷15 V power supply
* output for additional bolt release button
* remote control included (necessary for programming)
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

Works with all F&F monitors

KK-03

Features:
* 1-subscriber gate station
* image converter 1/3” color
* lens angle of view: approx. 87°
* resolution: 600 lines
* 3.6 mm lens
* Lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* housing: hardened aluminum alloy
* backlit keypad
* surface-mounted
* dedicated output for bolt power supply - DC 12 V
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* ability to connect an additional output switch
* dimensions: 78×185×60 mm

Works with all F&F monitors

KK-04

Features:
* 1-subscriber gate station with camera
* image converter 1/3” color
* lens angle of view: approx. 87°
* resolution: 600 lines
* 3.6 mm lens
* Lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 8 LED IR (infrared)
* backlit dial button
* power supply: from monitor
* vandal-resistant front panel made of stainless steel
* flush-mounted
* dimensions: 150×203×55 mm
* installation rack dimensions: 130×183×50 mm

Works with all F&F monitors

KK-05

Features:

* 1-subscriber gate station with camera
* image converter 1/3” color
* lens angle of view: approx. 60°
* resolution: 420 lines / Lens 4.2 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* backlit dial button and name signboard
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* opening gateway door with a PIN
* camera power supply: from monitor
* keypad power supply from an DC 12÷15 V external power supply
* output for additional bolt release button
* output for a timer defining temporary access
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

Works with all F&F monitors

KK-05K

Features:
* 1-subscriber gate station
* image converter CCD color
* lens angle of view: approx. 60°
* resolution: 420 lines / lens 4.2 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* backlit dial button and name signboard
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* built-in RFID reader - UNIQUE 125 kHz
* reader capacity: max 1000 cards
* for reader programming: remote control
* MASTER card for adding cards included
* camera power supply: from monitor
* RFID reader power supply from an DC 12÷15 V external power supply
* output for additional bolt release button
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

Works with all F&F monitors

KK-08

Features:
* 2-subscribers gate station
* image converter CCD color
* lens angle of view: approx. 60°
* resolution: 420 lines / lens 4.2 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* backlit keypad and name signboard
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* opening gateway door with a PIN
* camera power supply: from monitor
* keypad power supply from an DC 12÷15 V external power supply
* output for additional bolt release button
* output for a timer defining temporary access
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

Works with all F&F monitors

KK-08K

Features:
* 1-subscriber gate station
* image converter CCD color
* lens angle of view: approx. 60°
* resolution: 420 lines / Lens 3.6 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* backlit dial button and name signboard
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* built-in fingerprint reader
* reader capacity: max 900 fingerprints
* camera power supply: from monitor
* biometric reader power supply: from DC 12÷15 V power supply
* output for additional bolt release button
* remote control included (necessary for programming)
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

Works with all F&F monitors

KK-09

Features:
* 4-subscribers gate station
* image converter 1/3" color
* lens angle of view: approx. 87°
* resolution: 600 lines
* lens 3.6 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 6 LED IR (infrared)
* backlit dial buttons and name signboards (highlight color - blue)
* vandal-resistant front panel made of stainless steel
* flush mounting or surface mounting with cover
* ingress protection - IP65
* powered from an external DC 12÷15 V power supply
* dimensions: 120×250×51 mm
* installation rack dimensions: 110×240×46 mm

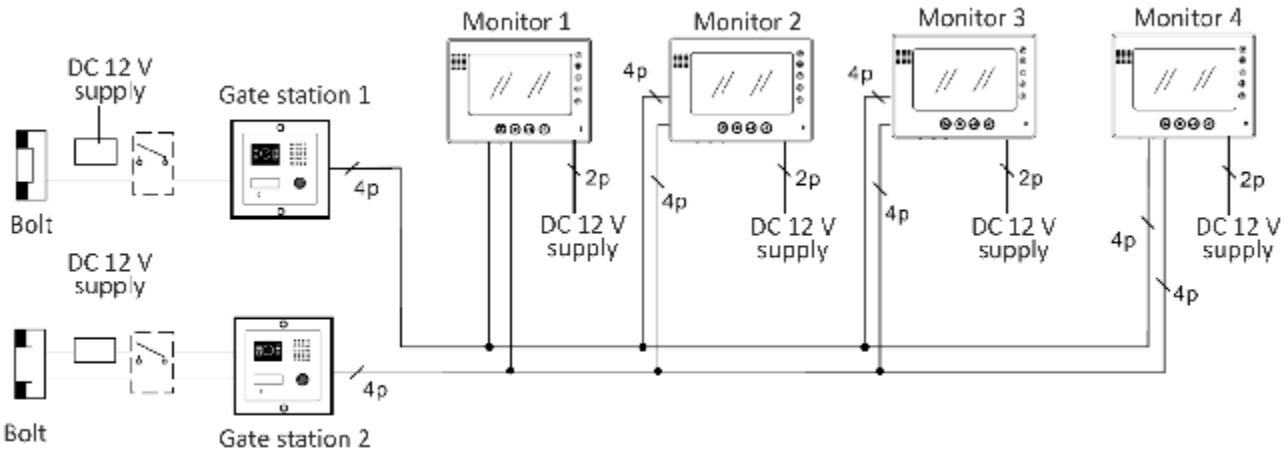
Works with all F&F monitors

KK-10

Features:
* 4-subscribers gate station
* image converter 1/3" color
* lens angle of view: approx. 87°
* resolution: 600 TVL
* lens 3.6 mm
* lens adjustment: horizontal and vertical (+/- 10°)
* backlight: 8 LED IR (infrared)
* backlit dial buttons and name signboards (highlight color - blue)
* twilight sensor
* vandal-resistant front panel made of stainless steel
* flush mounting (there is no option for surface mounting)
* electromagnetic door lock control with adjustable opening time 1÷99 sec
* ingress protection - IP65
* powered from an external DC 12÷15 V power supply
* dimensions: 150×355×55 mm
* installation rack dimensions: 130×335×50 mm

Works with all F&F monitors

Example wiring diagram



KEYPAD

KS-01

* lock with proximity card reader RFID
* vandal-proof metal housing
* built-in RFID proximity card reader
* 2 service areas (eg. open the gate and wicket)
* ringing function (alternatively 2 zones)
* memory capacity:
  zone 1 => 1000 user codes and cards;
  zone 2 => 10 user codes and cards
* backlit keyboard
* power supply: 12÷24V DC, 9÷18V AC
* set the relay opening time: 0÷99 sec (0 sec is unstable mode)
* the possibility of connecting additional switches the input opening
* open door sensor input, shortened to a minimum shutter electrocatch
* tamper switch
* power consumption: standby <40mA, on <70mA
* operating temperature range from -20°C ÷ +50°C
* protection level: IP65
* dimensions: 76×120×22 mm

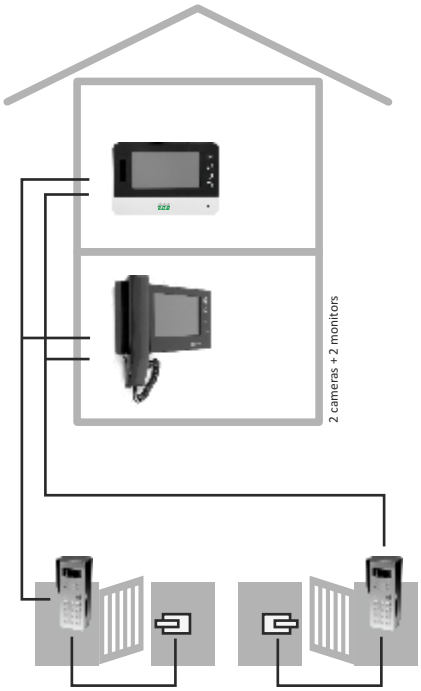
ATTACHMENTS

KB-01 RFID pendant

KB-02 RFID card

ATTENTION!

Pendants and cards works with selected gate stations and keypad models.



Working modes:
1 camera + 1 monitor
1 camera + 2 monitors
2 cameras + 1 monitor
2 cameras + 2 monitors

EZ-02 ELECTROSWITCH
EZ-03

* EZ-02
  low current
  U: 12 V DC
  I: 260 mA
* EZ-03
  low current with memory and switch-off
  U: 12 V DC
  I: 260 mA

APPLICATION

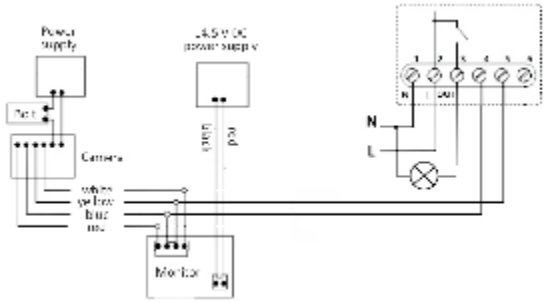
* mounting to the gates
* compatible with all monitors power supplies

MOUNTING

4-wire installation + 2 wires to electromagnetic door lock. When using low-current, DC 12 V max. 300 mA lock it is possible to use only 4-wire installation (power supply of the video intercom can be used). For the installation of up to 30 m use cables with a diameter of min. 0.5 mm², over 30 m - min. 0.7 mm². For the best picture quality in the video and audio line it is recommended to use 75 Ω coaxial cables.

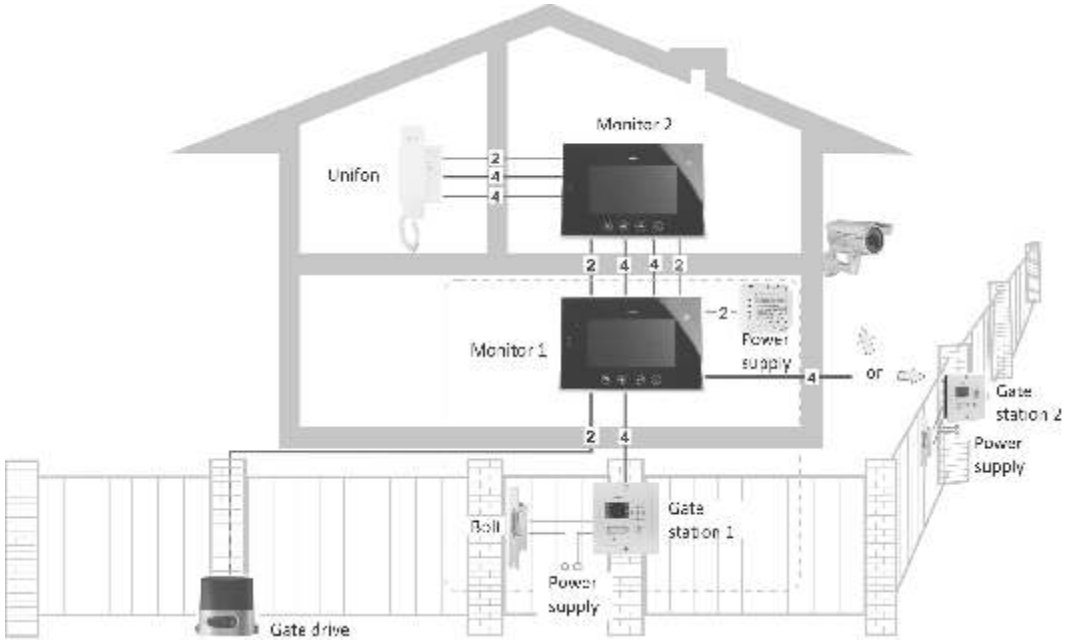
DSW-1 SIGNAL RELAY

The relay is designed for the F&F video intercoms. It activates an additional optical signaling (using light source) or sound signaling (using e.g. siren) at the time of the call from the gate station. At activation the contact switches every 1 sec. Duration can be adjusted in the range from 5 to 30 sec.



power supply	100÷265V AC
overload	2A
activation time - adjustable	5÷30sec
switching time on/off	1sec/1sec
power consumption standby/on	<0.2W/<0.6W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	67×50×26mm
mounting	two screws to substrate
protection level	IP20

CONNECTION SCHEME



16. TIMING RELAYS

PURPOSE

Timing relays are devised to time the control of industrial and domestic automatic control engineering systems (e.g. ventilation, heating, lighting, signalling, etc.).

SINGLE-FUNCTION

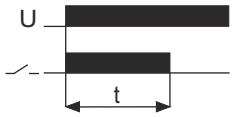
Operation mode: LAGGED DEACTIVATION

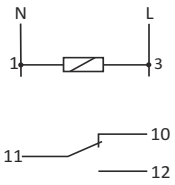
PCA-512

PCA-514

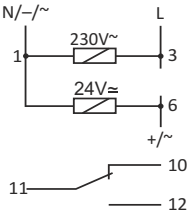
FUNCTIONING

Until the relay is activated, the contact remains in the 11-10 position. After the power voltage is supplied, contact is shifted to position 11-12 and the countdown of the preset value „t" is commenced. After the preset time „t" has been counted down, contact returns to position 11-10. The working sequence of the relay may be repeated after turning the power supply off and on.





PCA-512



PCA-514

power supply	
PCA-512 230V	230V AC
PCA-512 24V	24V AC/DC
PCA-512 UNI	12÷264V AC/DC
PCA-514 DUO	230V AC / 24V AC/DC
load current	<10A
contact	separated 1×NO/NC
working time - adjustable	0,1sec÷576h
switching ON delay	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

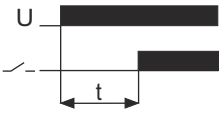
Operation mode: LAGGED ACTIVATION

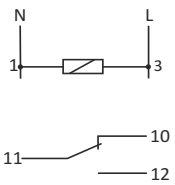
PCR-513

PCR-515

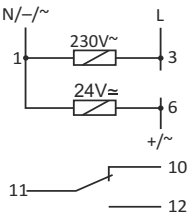
FUNCTIONING

After the power voltage is supplied, the contact remains in position 11-10 and the timing of the preset value „t"is commenced. After the preset time „t" has been counted down, the contact is shifted to position 11-12. The working sequence of the relay may be repeated after turning the power supply off and on.





PCR-513

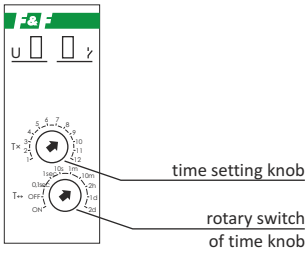


PCR-515

power supply	
PCR-513 230V	230V AC
PCR-513 24V	24V AC/DC
PCR-513 UNI	12÷264V AC/DC
PCR-515 DUO	230V AC / 24V AC/DC
load current	<10A
contact	separated 1×NO/NC
working time - adjustable	0,1sec÷576h
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

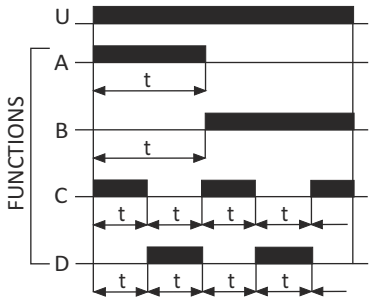
ATTENTION!

* Setting the time range knob regulator in the:
  ON - position with power supply activated results in the permanent closure of the contact.
  OFF - position (power supply activated) causes the contact to be permanently opened.
* With the power supply on, the system does not respond to time range setting modifications.
* The newly set time range is active after the power supply has been turned off and on.
* With the power supply on, it is possible to regulate the preset time freely within the selected time range.



UNIWERSAL

FUNCTIONING



***Delayed deactivation (A)**

Contacts remain in the 11-10 (and 8-7 for PCU-510) position until the relay is activated. After powering up, contacts are shifted to position 11-12 (and 8-9 for PCU-510) and the preset work time „t" starts running. When the designated time „t" is up, contacts return to the 11-10 (and 8-7 for PCU-510) position. To start next working sequence of the relay, power supply must be disconnected and reinstated.

***Delayed activation (B)**

Before and after supplying the power, contacts remain in the 11-10 (and 8-7 for PCU-510) position and the preset work time „t" starts running. When the designated time „t" is up, contacts return to the 11-12 (and 8-9 for PCU-510) position. To start next working sequence of the relay, power supply must be disconnected and reinstated.

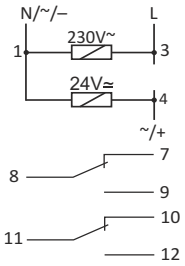
* **Delayed deactivation - cyclic (C)**

Delayed deactivation work mode is carried out cyclically in equal intervals of preset work and break time.

* **Delayed activation - cyclic (D)**

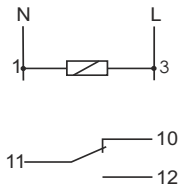
Delayed activation work mode is carried out cyclically in equal intervals of preset work and break time.

PCU-510 2×NO/NC contact

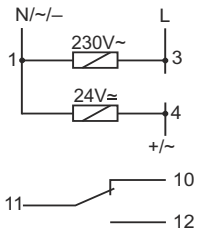


power supply	
PCU-510 DUO	230V AC / 24V AC/DC
load current	2×[<8A]
contact	separated 2×NO/NC
working time - adjustable	0.1sec÷576h
switching ON delay - aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PCU-511 1×NO/NC contact



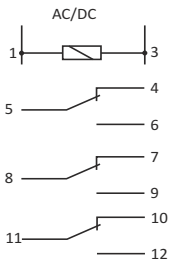
230V
UNI



DUO

power supply	
PCU-511 230V	230V AC
PCU-511 DUO	230V AC / 24V AC/DC
PCU-511 UNI	12÷264V AC/DC
load current	<8A
contact	separated 1×NO/NC
working time - adjustable	0.1sec÷576h
switching ON delay - aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

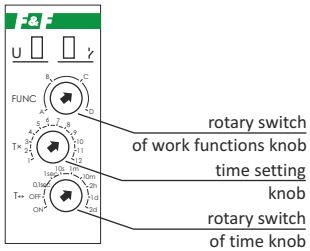
PCU-530 3×NO/NC contact



power supply	100÷264 AC/DC
load current (AC-1)	3×[<8A]
contact	separated 3×NO/NC
working time	0.1sec÷576h (24 days)
switching ON delay - aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.15W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

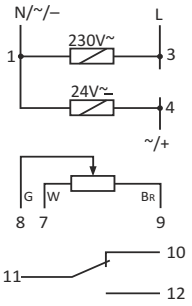
ATTENTION!

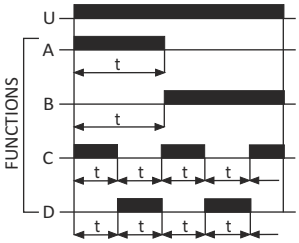
* Setting the time range knob regulator in the:
  ON - position with power supply activated results in the permanent closure of the contact.
  OFF - position (power supply activated) causes the contact to be permanently opened.
* With the power supply on, the system does not respond to time range setting modifications.
* The newly set time range is active after the power supply has been turned off and on.
* With the power supply on, it is possible to regulate the preset time freely within the selected time range.



WITH EXTERNAL TIME SETTING KNOB

PCU-518





power supply	230V AC / 24V AC/DC
load current	<8A
contact	separated 1×NO/NC
working time - adjustable	0.1sec÷576h
switching ON delay - aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

potentiometer

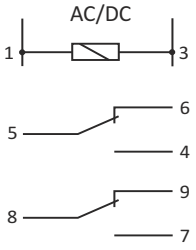
dimensions	63×42×30mm
terminal	3×0,34mm²; l=70cm
mounting hole	Ø10

ATTENTION!

* Setting the time range knob regulator in the:
  ON - position with power supply activated results in the permanent closure of the contact.
  OFF - position (power supply activated) causes the contact to be permanently opened.
* With the power supply on, the system does not respond to time range setting modifications.
* The newly set time range is active after the power supply has been turned off and on.
* With the power supply on, it is possible to regulate the preset time freely within the selected time range.

WITH BACKUP IN CASE OF A POWER FAILURE

PCU-504 UNI



power supply	12÷264V AC/DC
load current	2×4A
contact	separated 2×NO/NC
working time - adjustable	0.1sec÷10min.
switching ON delay - aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.56W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONING

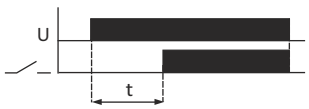
The relay has an internal condenser system for maintaining and switching contact after a power failure. The maximum backup time up to 10 minutes.

FUNCTIONS

A

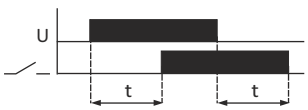
Closing contacts after switching on the power voltage.
In case of a power failure, contacts state is maintained for a set period of time.

B



The delayed activation.
The backup feature is not implemented.

C

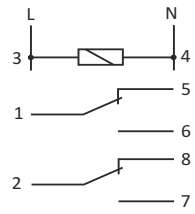


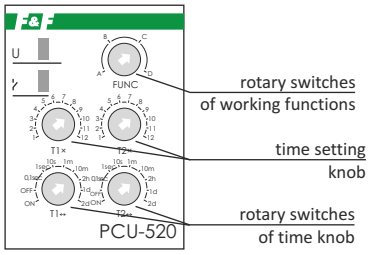
After switching on the power voltage, contacts are activated after a preset time (delayed activation).
In case of a power failure, contacts state is maintained for a set period of time.

TWO-TIME TYPE

SETTING OF TWO INDEPENDENT TIME VALUES T1 (work time) AND T2 (interruption time).

PCU-520 4-FUNCTION





power supply	
PCU-520 230V	230V AC
PCU-520 24V	24V AC/DC
PCU-520 UNI	12÷264V AC/DC
load current	2×[<8A]
contact	separated 2×NO/NC
working time - adjustable	0.1sec÷576h
break time - adjustable	0.1sec÷576h
switching ON delay for aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	1.2W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

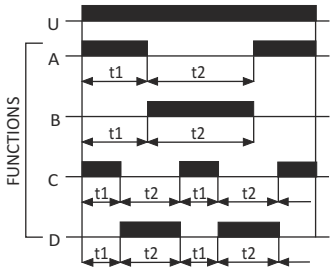
Functions:

*** LAGGED ACTIVATION (IR)**

Until the relay is activated, the contact remains in the 1-5 and 2-8 position. After the power voltage is supplied (the green „U" LED lights up), the contact is shifted to 1-6 and 2-7 position and the countdown of the preset value „t" is commenced (the red LED lights up). After the preset time „t" has been counted down, the contact returns to position 1-5 and 2-8. The working sequence of the relay may be repeated after turning the power supply off and on.

*** LAGGED DEACTIVATION (IA)**

Until the relay is activated, the contact remains in the 1-5 and 2-8 position. After the power voltage is supplied (the green „U" LED lights up), the contact is shifted to position 1-6 and 2-7 and the countdown of the preset value „t" is commenced (the red LED lights up). The working sequence of the relay may be repeated after turning the power voltage off and on.



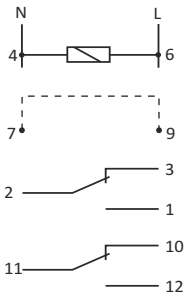
*** LAGGED ACTIVATION - CYCLIC (CR)**

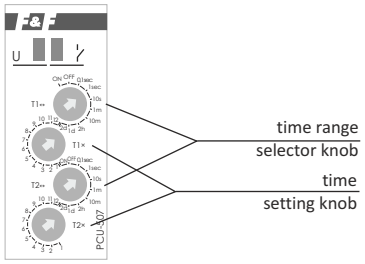
The LA operational mode is triggered in equal interruption/work cycles according to preset time values.

*** LAGGED DEACTIVATION - CYCLIC (CA)**

The LD operational mode is triggered in equal interruption/work cycles according to preset time values.

PCU-507 2-FUNCTION





power supply	
PCU-507 230V	230V AC
PCU-507 24V	24V AC/DC
load current	2×[<8A]
contact	separated 2×NO/NC
working time - adjustable	0.1sec÷576h
break time - adjustable	0.1sec÷576h
switching ON delay for aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

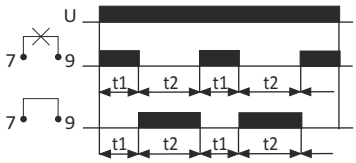
Functions:

*** DELAYED ON - CYCLIC:** 7 9

When the power supply is given then joints remain in the positions 2-3 and 11-10 for the time t1. After the preset time t1 switches the joints in position 2-1 and 11-12 at the time t2. After time t2 the relay joints return to the positions 2-3 and 11-10. The sequence of these switches is carried out periodically.

*** DELAYED OFF - CYCLIC:** 7 9

To time of switching the relay, the joints remain in the positions 2-3 and 11-10. After the power supply is given then joints are switched to position 2-1 and 11-12 at the time t1. After the preset time t1 joints return to the positions 2-3 and 11-10 for the time t2. The sequence of these switches is carried out periodically. Selection of a particular function is make by contact on terminals 7-9.

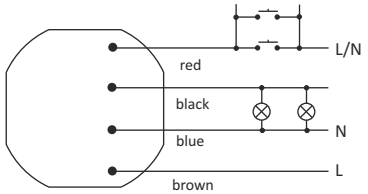


ATTENTION!

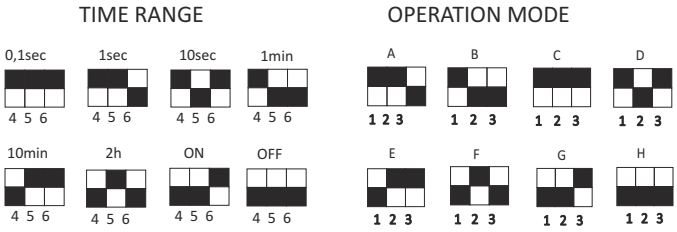
* Setting the time range knob regulator in the:
ON - position with power supply activated results in the permanent closure of the contact in position 1-6 and 2-7.
OFF - position (power supply activated) causes the contact to be permanently closed in the 1-5 and 2-7 position.
* With the power supply on, the system does not respond to time range setting modifications.
* The newly set time range is active after the power supply has been turned off and on.
* With the power supply on, it is possible to regulate the preset time freely within the selected time range.

MULTI-FUNCTION

PCS-506 8-FUNCTION



The required time range and the operation mode of the relay is selected by choosing the proper combination of the switches (black field in the diagram stands for the switch position).



Setting the wheel regulator in the:

* **ON** position with power supply activated causes the contact to be permanently closed.
* **OFF** position with power supply activated causes the contact to be permanently opened.

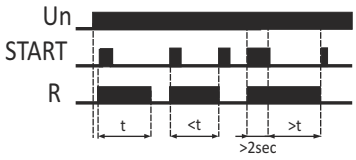
* With the power supply on, the system does not respond to time range setting modifications.
* The newly set time range is active after the power supply has been turned off and on.
* With the power supply on, it is possible to regulate the preset time freely within the selected time range.

power supply	230V AC
load current	<10A
contact	1×NO
current control pulse	<1mA
working time	0.1sec÷24h
switching ON delay for aversive functions	<50msec
power consumption	0.8W
working temperature	-25÷50°C
terminal	4×DY1mm², l=10cm
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

(A)

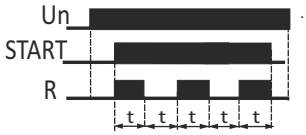
Presence simulator. When the START signal is being applied, the system turns the relay on and off at random for a period of 20 sec up to 20 min. The sequence in question is initiated by activation of the relay. After the START signal is discontinued, the system turns the relay off. The device does not respond to time range settings.

(B)



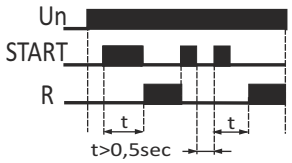
Bistable relay with step automatic module. A single pressing of the START button results in activating the relay for the preset time. A further START impulse generated during the countdown will deactivate the relay. Pressing and holding the button START for longer than 2sec will result in the permanent activation of the relay. The following impulse turns the relay off.

(C)



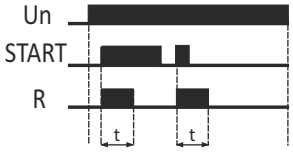
Generator with a pulse duty factor of 50% which initiates its working sequence from the moment of activation. It is active as long as START voltage is applied. Once the START signal is disconnected, the connection is broken and the device is deactivated.

(D)



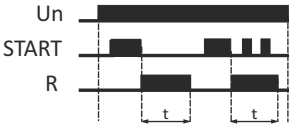
Lagged activation of the relay with the START signal. When the relay is active, another START impulse will turn it off. The following START impulse causes a repetition of the time countdown sequence and activation of the relay. The interval between the trailing edge of the reset signal and the leading edge of the START signal, which re-initiates the countdown sequence, should be at least 0.5 sec.

(E)



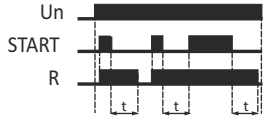
Generation of a single impulse of „t" time by the START signal trailing edge. During preset time countdown, the system does not respond to START impulses.

(F)



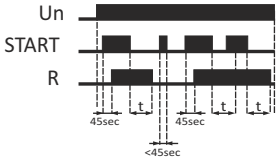
Generation of a single impulse of „t" time by the START signal trailing edge. During preset time countdown, the system does not respond to START impulses.

(G)



Lag in deactivation with support function enabled. The leading edge of the START signal results in relay activation, whereas the trailing edge of the same signal triggers the time countdown. The supply of the START signal during countdown results in an extension of the cycle by another „t" time value along the trailing edge.

(H)



Deactivation and activation lags with support function enabled. If the START voltage is supplied for less than 45sec, it is ignored by the system, however if it is longer, the relay is activated after the 45sec and the preset time value is counted down with the trailing edge of the START signal. If another START impulse is applied during the countdown, then the trailing edge of this signal will result in the repeated countdown sequence (e.g. for ventilation purposes: short activation of the lighting does not turn the fan on, but if the lilting lighting is activated for longer than the 45sec, the fan will start).

PCS-516 PCS-516AC PCS-516DC PCS-519 10-FUNCTION

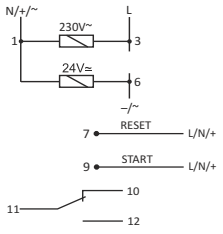
with START and RESET control inputs

NEW!

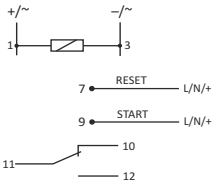
Selection of a specific time range and function of the relay operation means setting the right combination of rotary code switches.

Applying the RESET voltage during the execution of a function results in:
- for functions A, B, C, D, F - the execution of the operation mode from the beginning
- for functions F, G, H, I - the return of the relay to the initial status and waiting for the START signal
- for function K - permanent closing of the relay contact

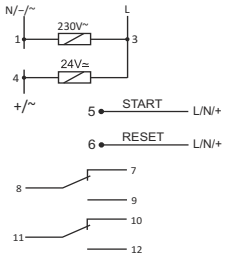
With power supply on, setting the rotary switch of time range in position:
* **ON** - results in permanent closing of the contact
* **OFF** - results in permanent opening of the contact



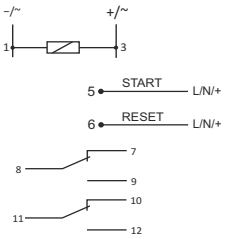
PCS-516 DUO



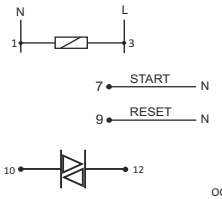
PCS-516 UNI



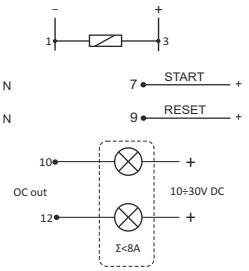
PCS-519 DUO



PCS-519 12V



PCS-516AC



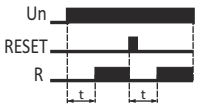
PCS-516DC

Features of AC and DC version relays.

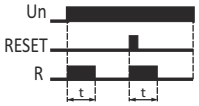
PCS-516AC:
* Semiconductor output (symistor) to control the loads supplied with AC voltage
* Switching on of the load at zero voltage, switching off at zero current - low surge at switching on
* No problems with wear of relay contacts - dedicated to the work of the high switching frequency
* Output separated from the input - you can power/control one phase and the receiver can be connected to a different phase

PCS-516DC:
* Semiconductor outputs (transistor in the OC open collector setup)
* No problems with wear of relay contacts - dedicated to the work of the high switching frequency

A. DELAYED ACTIVATION.
After applying the power voltage (the green LED is on), contact remain in position 3-5 and the preset "t" time of operation starts. After time "t" the contact switches in to position 3-7 (the red LED is on). To start the relay operation mode again the power voltage must be disconnected and reconnected.



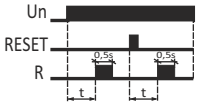
B. DELAYED DEACTIVATION.
Until the switching on of the relay the contact remains in position 3-5. After applying the power voltage (the green LED is on) the contact switches in to position 3-7 and the preset "t" time of operation starts (the red LED is on). To start the relay operation mode again the power voltage must be disconnected and reconnected.



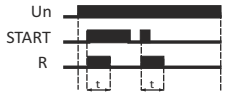
C. DELAYED ACTIVATION - CYCLICAL.
The operation mode of delayed activation is carried out in equal intervals of the set working hours and breaks.

D. DELAYED DEACTIVATION.
The operation mode of delayed activation is carried out in equal intervals of the set working hours and breaks.

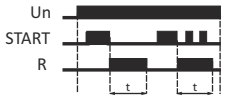
E. Generate pulse 0.5 s after the preset time "t".



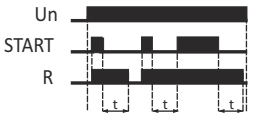
F. Generate single pulse at the "t" time with the trailing edge of the START signal. During the interval, the system does not respond to START pulses.



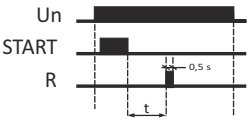
G. Generate single pulse at the "t" time with the trailing edge of the START signal. During the interval, the system does not respond to START pulses.



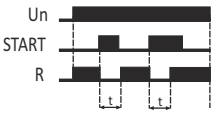
H. Delay in deactivation with support function.
Rising edge of the START signal activates the relay, while the trailing edge triggers the countdown. Applying the START signal during countdown will extend the cycle for another time "t" with a falling edge.



I. Generate single pulse 0.5 s after the time „t" with a triggered trailing edge of the START signal.

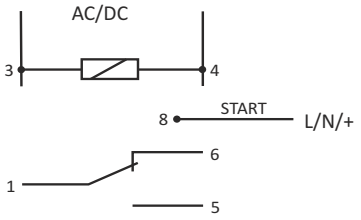


K. Break at the time "t" in the contact activation triggered with a rising edge of the START signal.



power supply	
PCS-516 DUO	230V AC / 24V AC/DC
PCS-516 UNI	12÷264V AC/DC
PCS-516AC	85÷264V AC
PCS-516DC	9÷30V DC
PCS-519 DUO	230V AC / 24V AC/DC
PCS-519 12V	12V AC/DC
load current	
PCS-516	<8A
PCS-516AC	<2A AC
PCS-516DC	<8A DC
PCS-519	2×[<8A]
contact	
PCS-516	separated 1×NO/NC
PCS-516AC	semiconductor (symistor)
PCS-516DC	semiconductor (OC open collector)
PCS-519	separated 2×NO/NC
current control pulse	<1mA
working time - adjustable	0.1sec÷576h
switching ON delay for aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PCS-517 18-FUNCTION



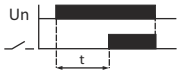
ATTENTION!

Wide range of time adjustment positions (0.25 sec - 99 hrs 59mins 59secs) enables the user to preset an extremely accurate contact actuation time, e.g. 2hrs - 13mins - 27sec.

power supply	24÷264V AC/DC
load current	<16A
contact	separated 1×NO/NC
current control pulse	<1mA
time setting range	0.25sec÷99h59min59sec
switching ON delay	
for functions triggered with supply voltage	500msec
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

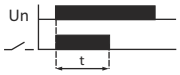
P00 IDLE MODE

P01



After supply voltage has been applied, the contact remains in 1-6 position and countdown of the preset delay time „t" is commenced. After this time is counted down, the contact is switched to position 1-5 (actuation). The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

P02



Until the supply voltage is applied, the contact remains in 1-6 position. Once the voltage is applied, the contact is switched to position 1-5 (actuation) and countdown of the preset delay time „t" is commenced. The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

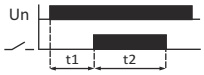
P03

Delayed actuation work mode is realised in cycles with the following preset time interruptions: „t1" interruption and „t2" work (actuation).

P04

Delayed deactivation work mode is realised in cycles with the following preset time interruptions: „t1" actuation and „t2" interruption.

P05

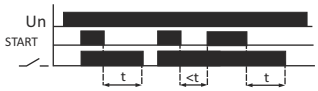


After supply voltage has been applied, the contact remains in position 1-6 and countdown of the preset delay time „t" is commenced. After this time is counted down, the contact is switched to position 1-5 (actuation) for time „t2". The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

P06

Once the START signal is applied, the contact is switched to position 1-5 (actuation). After the signal's decay, the contact is held in the position for the preset „t" time. When time „t" is counted down, the contact does not respond to the next pulses of the START signal.

P07

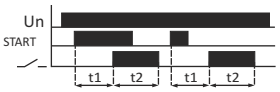


Once the START signal is applied, the contact is switched to position 1-5 (actuation). After the signal's decay, the contact is held in the position for the preset time „t". Another application of the START signal during countdown time „t" results in the countdown interruption, with the contact still actuated (pos. 1-5). Another decay of the START signal triggers off time „t" countdown and the contact support in that position.

P08

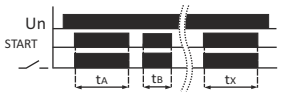
Contact actuation (pos. 1-5) for time „t" by the leading edge of the START signal.

P09



Delay time „t1" (pos. 1-6) is triggered off by the leading edge of the START signal. After the „t1" time has been counted down, the contact is actuated (pos. 1-6) for the „t2" time.

P10



tA+tB+...+tx=t

Contact actuation (pos. 1-5) during the countdown of time t from value set as „zero" only during the application of the START signal. The signal's decay stops the countdown. Another application of the START signal results in the continuation of the countdown for the remaining time „t". The decay of the supply voltage results in the remaining time „t" being reset. After the supply voltage and START signal are reinstated, the countdown of time „t" from the preset value will be restarted.

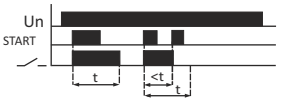
P11

Contact actuation (pos. 1-5) for time „t" with the trailing edge of the START signal. When time „t" is counted down, the contact does not respond to the next pulses of the START signal.

P12

Contact actuation (pos. 1-5) for time „t" with the trailing edge of the START signal. Another application of the START signal, as well as its decay during time „t" countdown triggers off the countdown from the beginning.

P13

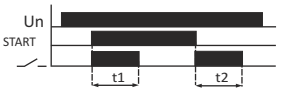


Contact actuation (pos. 1-5) for time „t" by the leading edge of the START signal. Another application of the START signal during time „t" countdown results in the countdown's interruption and the contact's deactivation (pos. 1-6).

P14

Contact actuation (pos. 1-5) for time „t" by the leading edge of the START signal. Another application of the START signal during time „t" countdown triggers off the countdown from the beginning.

P15



Contact actuation (pos. 1-5) for „t1" time by the leading edge of the START signal and another actuation for time „t2" with the trailing edge of the START signal.

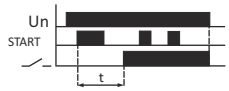
P16

Contact actuation (pos. 1-5) for time „t1" by the leading edge of the START signal. When time „t" is counted down, the contact does not respond to the next pulses of the START signal.

P17

Delayed contact actuation after the lapse of time „t", with the countdown triggered off by the leading edge of the START signal. Another application of the signal deactivates the contact (pos. 1-6) for time „t". A further application of the START signal during time „t" countdown triggers off the countdown from the beginning.

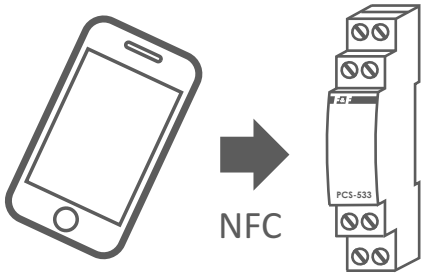
P18



Delayed contact actuation after the lapse of time „t", with the countdown triggered off by the leading edge of the START signal. When time „t" is counted down, the contact does not respond to the next pulses of the START signal. The contact is deactivated (pos. 1-6) on the decay of the supply voltage. The next run of the relay's working sequence is operable after the supply voltage is cut off and reinstated.

PROGRAMMABLE
with NFC wireless communication

PCS-533

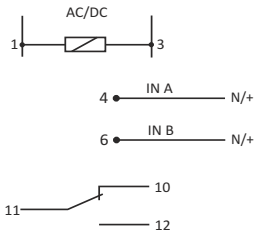


PURPOSE

PCS-533 is a programmable time relay that allows you to switch on, switch off and switch the relay as a function of time and as a function of control signals applied from two inputs.

FUNCTIONING

The operation of the relay is carried out according to the program prepared by the user via a dedicated, free app for Android smartphone and loaded to the controller via NFC wireless communication system. You can define in the program up to 200 sequentially performed operations or conditions.



power supply	9÷264V AC/DC
load current	16A
contact	separated 1×NO/NC
current control pulse	<1mA
working time - adjustable	0.1sec÷24h
switching ON delay aversive functions	<50msec
power indication	green LED
contacts state signalling	red LED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PCS533 CONFIGURATOR

Function:

* Prepare the program as a list of subsequent commands. Each command is symbolized by an icon. Pressing the tile with the command allows you to edit the details (e.g. time of the action, the expected input signal, etc.).
* Easily add, move or delete commands of the program (by dragging the tiles).
* A set of templates (in the form of diagrams) - ready programs with functions of relay PCS-516 and PCS-517.
* Write and read programs to and from file. The ability to share programs via email, Bluetooth, network drives, and so on.
* Automatic program backup - each relay has its own ID. The application maintains a full history of programs uploaded to the relay.
* Mass programming mode - the possibility of uploading one program to multiple relays (even without connecting power supply).

List of commands:

1. EXIT – set the relay status (on, off, switch). You can set a specified period of time or switch it on permanently.
2. INPUT A/B – wait for the preset status at the input. Status: rising edge, trailing edge, any edge, low level, high level. Everything can be linked to time (e.g. wait for press of a button and hold it pressed for 2 seconds). Once the condition is fulfilled the next command is executed.
3. GO BACK TO – return to the previous command. This allows you to repeat a sequence of commands (indefinitely or predetermined number of times)
4. PAUSE – stops the execution of the program for a given time.
5. STOP – stops the execution of the program (until the next power-up or reset). After setting the time you can force the operation of the program only for a preset period of time.
6. RESET – start program execution from the beginning.
7. SPECIAL INPUT A/B – commands configuring the input in such a way that regardless of the program status the command PAUSE or RESET can be executed.

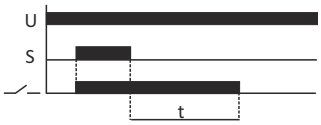
LAGGED-PULSE TIME RELAYS

PURPOSE

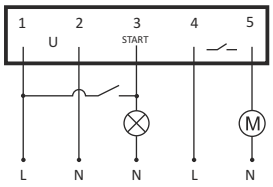
Lagged-pulse time relays are devised to support the power supply of the controlled receiver for a specified period of time after decay of the control voltage, e.g. in bathroom ventilation systems in which the upkeep of the fan operation (activated along with the lighting) is required for a specified period of time after turning off the accompanying lighting.

FUNCTIONING

The application of control voltage S to the relay causes its activation and the resulting supply of voltage R to the controlled receiver. After decay of the control voltage, the operation of the receiving device is kept for the support time „t" (preset with the potentiometer). After the „t" time has been counted down, the controlled receiver is turned off automatically. If control voltage S is re-supplied before the lapse of the preset time, the relay will repeat its operational sequence.



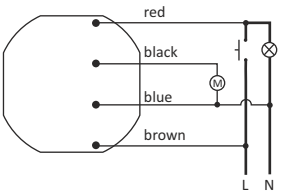
PO-405



Ⓜ - controlled receiver

power supply	
PO-405 230V	230V AC
PO-405 24V	24V AC/DC
load current	<10A
contact	1×NO
current control pulse	<300mA
backup time	0.5÷15min.
power indication	green LED
signalling activation	red LED
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

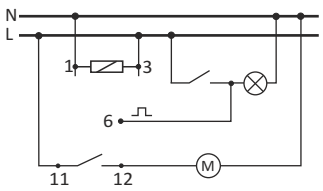
PO-406



Ⓜ - controlled receiver

power supply	230V AC
load current	<10A
contact	1×NO
current control pulse	<300mA
backup time	1÷15min.
power consumption	0.56W
working temperature	-25÷50°C
terminal	4×DY 1mm², l=10cm
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

PO-415



Ⓜ - controlled receiver

power supply	
PO-415 230V	230V AC
PO-415 24V	24V AC/DC
load current	<10A
contact	separated 1×NO/NC
current control pulse	<300mA
backup time	1÷15min.
power indication	green LED
signalling activation	red LED
power consumption	0.56W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

17. TIME CONTROLLERS

PROGRAMMABLE CONTROLLER (LEFT/RIGHT activation mode)
STP-541

PURPOSE

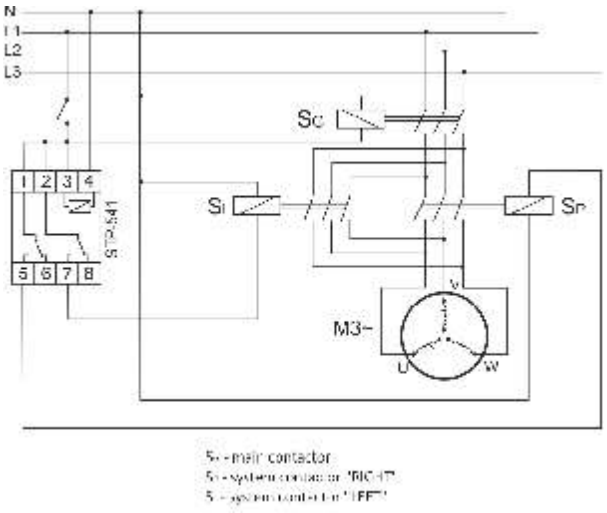
Programmable controller is used for control of technological processes in industrial automation systems that require temporary, cyclical, alternating activation of receivers with forced and timed intervals between successive activations.

FUNCTIONING

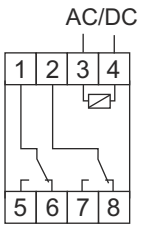
The controller performs its tasks in accordance with the program of four times and the number of cycles. The cycle is a sequence of four consecutive contacts closing. After powering, the controller automatically executes the program. Contact is switched to position 1-5 for the time "t1". When time "t1" is up, contact returns to position 1-6 for the time "t2". Only after time "t2" the second contact is switched to position 2-7 for the time "t3". When time "t3" is up, contact is switched to position 2-8 for the time "t4". After time "t4", the controller will start from the beginning of the program cycle (from the time "t1").

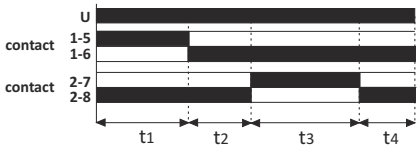
The cycle is repeated according to the programmed number of repetitions or infinitely in the "loop" work mode. Power failure >1 sec will stop the execution of the controller program. When the power is back, the controller will begin to execute the program from the beginning, including the programmed number of repetitions of cycles.

Diagram of the LEFT-RIGHT contactor based switching system



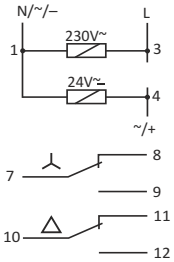
Sc - main contactor

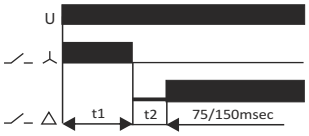


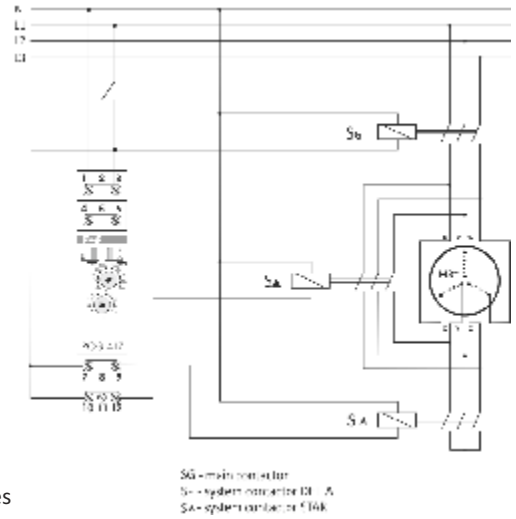


power supply	24÷264V AC/DC
load current	2×[<16A]
contact	2×[1×NO/NC]
time settings t1, t2, t3, t4	1sec÷99h59min59sec
time setting accuracy	1sec
number of cycle repetitions	1÷999999 or in an infinite loop
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

STAR-DELTA SWITCH
PCG-417







Sa - main contactor

FUNCTIONING

The PCG-417 relay has a special system of two electromagnetic relays, which eliminates the risk of activating two contactors at the same time. Each relay controls a suitable contactor. At the moment of switching from the STAR to DELTA system the STAR contactor disconnects, followed by a forced interval, and then a second relay activates DELTA contactor.

After applying power, the STAR contact is switched to position 7-9 for the set start-up time t1. Contact DELTA remains in position 10-11. After start-up time t1, the STAR contact is switched to position 7-8 (DELTA contact remains in position 10-11), followed by a break in switching at the preselected time t2. After the time t2, the DELTA contact is switched to position 10-12 and remains in this state until the disconnection of supply voltage (the STAR contact remains in position 7-8).

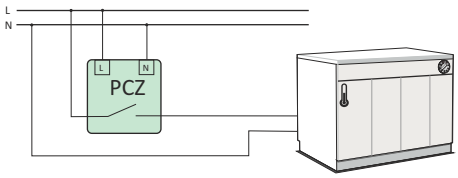
STAR = 人 DELTA = △

power supply	230V AC / 24V AC/DC
load current	2×[<8A]
contact	2×[1×NO]
start-up time 人	1÷1000sec
switching time	75msec / 150msec
power indication	green LED
signalling of supply	red LED
signalling 人△	yellow RED
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

18. PROGRAMMABLE CONTROL TIMERS

PURPOSE

Programmable control timer is used to time control the devices in home or industrial automation systems by an individual time program set by the user.



ON / OFF TYPE

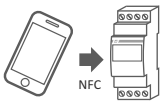
WEEKLY

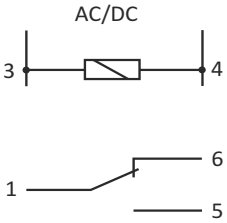
FUNCTIONING

The timers activates and deactivates a given device at preset hours in the following cycles: 24-hour, weekly, working day (Mon-Fri) or weekend (Sat-Sun).

PCZ-521.3 SINGLE CHANNEL

* 500 memory cells
* relay state memory
* battery indicator
* LCD brightness adjustment
* NFC wireless communication
* PCZ Configurator app



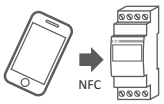


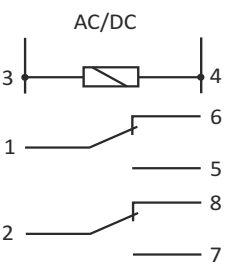
power supply	24÷264V AC/DC
load current	<16A
contact	separated 1×NO/NC
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
accurate time setting	1min.
number of memory cells	500 250 pairs ON/OFF commands
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

PCZ-522.3 DUAL CHANNEL WITH TWO INDEPENDENTLY PROGRAMMABLE CHANNELS

* 500 memory cells
* relay state memory
* battery indicator
* LCD brightness adjustment
* NFC wireless communication
* PCZ Configurator app





power supply	24÷264V AC/DC
load current	2×[<16A]
contact	separated 2×[1×NO/NC]
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
accurate time setting	1min.
number of memory cells	500 2×(125 pairs ON/OFF commands / channel)
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

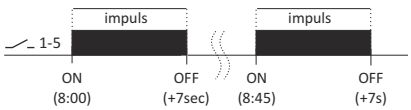
* battery life addicted to weather conditions and frequency of mains failure

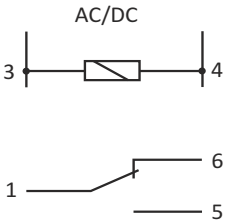
PULSE TYPE (SCHOOL)

PCZ-523.2 SINGLE CHANNEL WITH TWO PROGRAMME LINES

FUNCTIONING

The PCZ-523 activates a given device at a preset time and deactivates it after preset time (by pulse) in the following cycles: 24-hour, weekly, working day (Mon-Fri) or weekend (Sat-Sun). Pulse range: 1 sec ÷ 99 min. 59 sec. The relay has been equipped with two independent switch able programme lines to control an connected receiver.





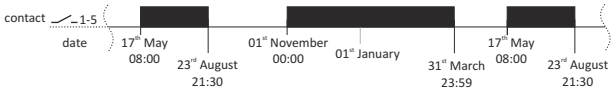
power supply	24÷264V AC/DC
load current	<16A
contact	separated 1×NO/NC
backup time clock operation	6 years*
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
time setting accuracy activation	1min.
time setting accuracy hold	1sec
time setting range	1sec÷99min59sec
number of memory cells	250 2×(60 ON/HOLD commands/ programm)
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

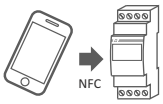
YEARLY
PCZ-529.3 SINGLE CHANNEL

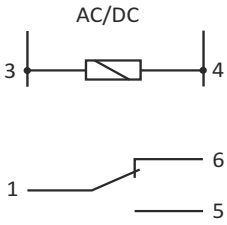
FUNCTIONING

Timer allows to set overriding seasonality in the automation system. Timer activates and deactivates the device or electrical circuit on the programmed dates and hours in a yearly cycle. User can set activation for only one selected day of the year. In addition, user can set the start and stop time, which means specifying a particular hour and minute for the preset date.



* 500 memory cells
* relay state memory
* battery indicator
* LCD brightness adjustment
* NFC wireless communication
* PCZ Configurator app





power supply	24÷264V AC/DC
load current	<16A
contact	separated 1×NO/NC
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
accurate time setting	1 day
number of memory cells	500 (250 pairs ON/OFF commands)
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm^2 screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

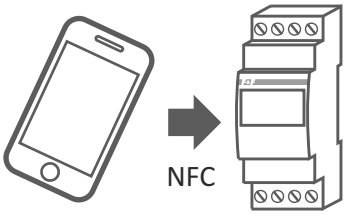
NEW FEATURES CLOCKS Series 3 [PCZ-521.3, PCZ-522.3, PCZ-529.3]

NFC WIRELESS COMMUNICATION - possibility wireless read and write timer configuration from an Android phone equipped with the NFC module.

PCZ CONFIGURATOR APP - free application for Android mobile phones and tablets equipped with the NFC module for wireless communication.

Features:

* timer configuration in offline mode (without the connection with the PCZ-xxx timer)
* read and write the configuration of the controller
* quick programming of multiple controllers using a single configuration
* read and write the configuration from and to a file
* sharing the configuration via e-mail, Bluetooth, network drives
* unequivocal identification of the connected timer and the ability to name individual devices
* automatic backups of the configuration.
* along with a unique identifier for each timer, user can easily restore previous configuration
* set the time and date according to the clock in mobile phone



App available on:

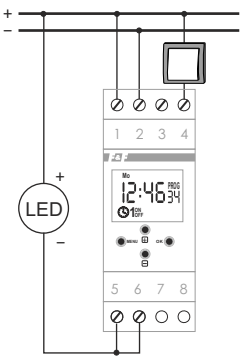
Google play

https://play.google.com/store/apps/details?id=pl.com.fif.clockprogramer

LIGHTING BRIGHTNESS CONTROLLERS WITH WEEKLY TIME PROGRAMMER

PCZ-531LED
with control output LED 9÷30 V

PCZ-531A10
with analog output 0÷10 V



PURPOSE

Brightness controllers with weekly time programmer are designed to programmatically control the brightness level according to an individual time program set by the user.

Read more - page 29.

ASTRONOMICAL TYPE

PURPOSE

Astronomical clock is used for turning on and off lights and other electrical receivers according to the daily, astronomical points of sunrise and sunset.

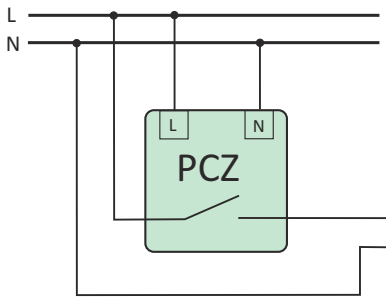
FUNCTIONING

On the grounds of information about the current date, geographical coordinates of the installation (location) and hourly shift relative to Universal Time (Greenwich UT), the astronomical clock automatically sets daily, temporary points of closing and opening of clock contact in accordance with astronomical times of sunrise and sunset. Temporary points of switching can be configured by the user with the hourly shift and time correction, which means that user can accelerate or delay the preset program points of start and stop (switch-on and switch-off points separately) in relation to sunrise and sunset.

ATTENTION!

For more precise switching settings of the clock working in areas with different geographic coordinates, user can set the latitude and longitude or select the specific code, which contain the automatic setting of geographic coordinates for a given city in Poland (the complete list of cities and corresponding codes is in the manual and on the F&F website).

CITY CODE	°N	°E
1. Albania Tiranë	41:20:00 °N	019:49:00 °E
2. Austria Salzburg	47:54:00 °N	013:03:00 °E
3. Austria Vienna	48:13:00 °N	016:22:00 °E
4. Belgium Brussels	50:50:00 °N	004:21:00 °E
• • •		
21.France Brest	48:23:00 °N	004:30:00 °W
22.France Lyon	45:46:00 °N	004:50:00 °E
23.France Marseille	43:18:00 °N	005:22:00 °E
24.France Nantes	47:14:00 °N	001:35:00 °W
25.France Paris	48:52:00 °N	002:20:00 °E
26.France Strasbourg	48:35:00 °N	007:45:00 °E
27.Germany Berlin	52:30:00 °N	013:26:00 °E
28.Germany Frankfurt	50:06:00 °N	008:41:00 °E
29.Germany Hamburg	53:33:00 °N	010:00:00 °E
30.Germany Köln	50:53:00 °N	007:00:00 °E
31.Germany München	48:08:00 °N	011:35:00 °E
32.Germany Osnabruck	52:16:00 °N	008:02:00 °E
33.Greece Athens	38:00:00 °N	023:44:00 °E
34.Greece Iraklion	35:20:00 °N	25:09:00 °E
35.Greece Patra	38:14:40 °N	21:44:4 °E
• • •		



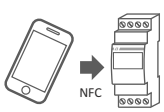
ATTENTION!

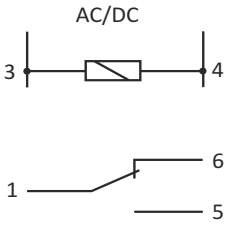
Automatic change function! (concerns all types)

Time change from winter to summer occurs automatically at 2 AM, on the last Sunday of March by adding one hour to the current time.
Time change from summer to winter occurs automatically at 3 AM, on the last Sunday of October by taking away one hour from the current time.

ATTENTION!
It is possibilities to switch-OFF of automatic change function.

PCZ-524.3 SINGLE-CHANNEL





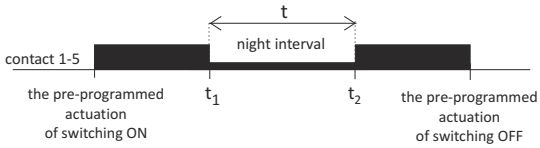
power supply	24÷264V AC/DC
load current	<16A
contact	separated 1×NO/NC
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
tightening torque	0.4Nm
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

WITH PROGRAMMABLE NIGHT INTERVAL

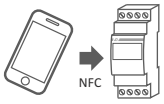
FUNCTIONING

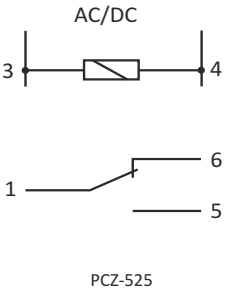
The ability to set a night break, which means disabling the controlled receiver for a specified time "t" (for example from 9:15 PM to "t1", then from "t2" to 4:20 AM) between the switching points of the program.



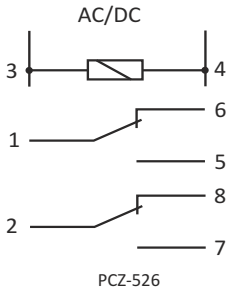
PCZ-525.3 SINGLE CHANNEL

PCZ-526.3 DUAL CHANNEL Night break programmable for each channel separately





PCZ-525



PCZ-526

power supply	24÷264V AC/DC
load current	
PCZ-525	<16A
PCZ-526	2×[<16A]
contact	
PCZ-525	separated 1×NO/NC
PCZ-526	separated 2×[1×NO/NC]
backup time clock operation	6 years*
battery type	2032 (lithium)
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
tightening torque	0.4Nm
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

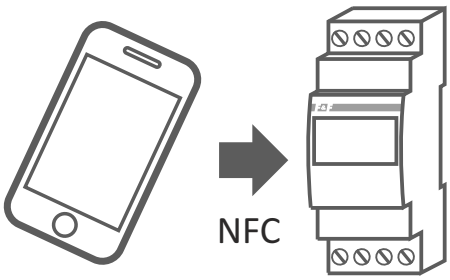
* battery life addicted to weather conditions and frequency of mains failure

ADDITIONAL FUNCTIONS

The additional ability to manually set "rigid" hour to get ahead of the sunset and switch on the lightning every day at the same time regardless of the setting. Similarly, you can set the "rigid" time of switching off, extending the working time of the lightning after sunrise.

NEW FEATURES CLOCKS Series 3 [PCZ-524.3, PCZ-525.3, PCZ-526.3]

NFC WIRELESS COMMUNICATION - possibility wireless read and write timer configuration from an Android phone equipped with the NFC module.
PCZ CONFIGURATOR APP - free application for Android mobile phones and tablets equipped with the NFC module for wireless communication.
Features:
* timer configuration in offline mode (without the connection with the PCZ-xxx timer)
* read and write the configuration of the controller
* quick programming of multiple controllers using a single configuration
* read and write the configuration from and to a file
* sharing the configuration via e-mail, Bluetooth, network drives
* unequivocal identification of the connected timer and the ability to name individual devices
* automatic backups of the configuration.
* along with a unique identifier for each timer, user can easily restore previous configuration
* set the time and date according to the clock in mobile phone
* setting the geographical coordinates of the place of clock installation by using the user's phone GPS location feature

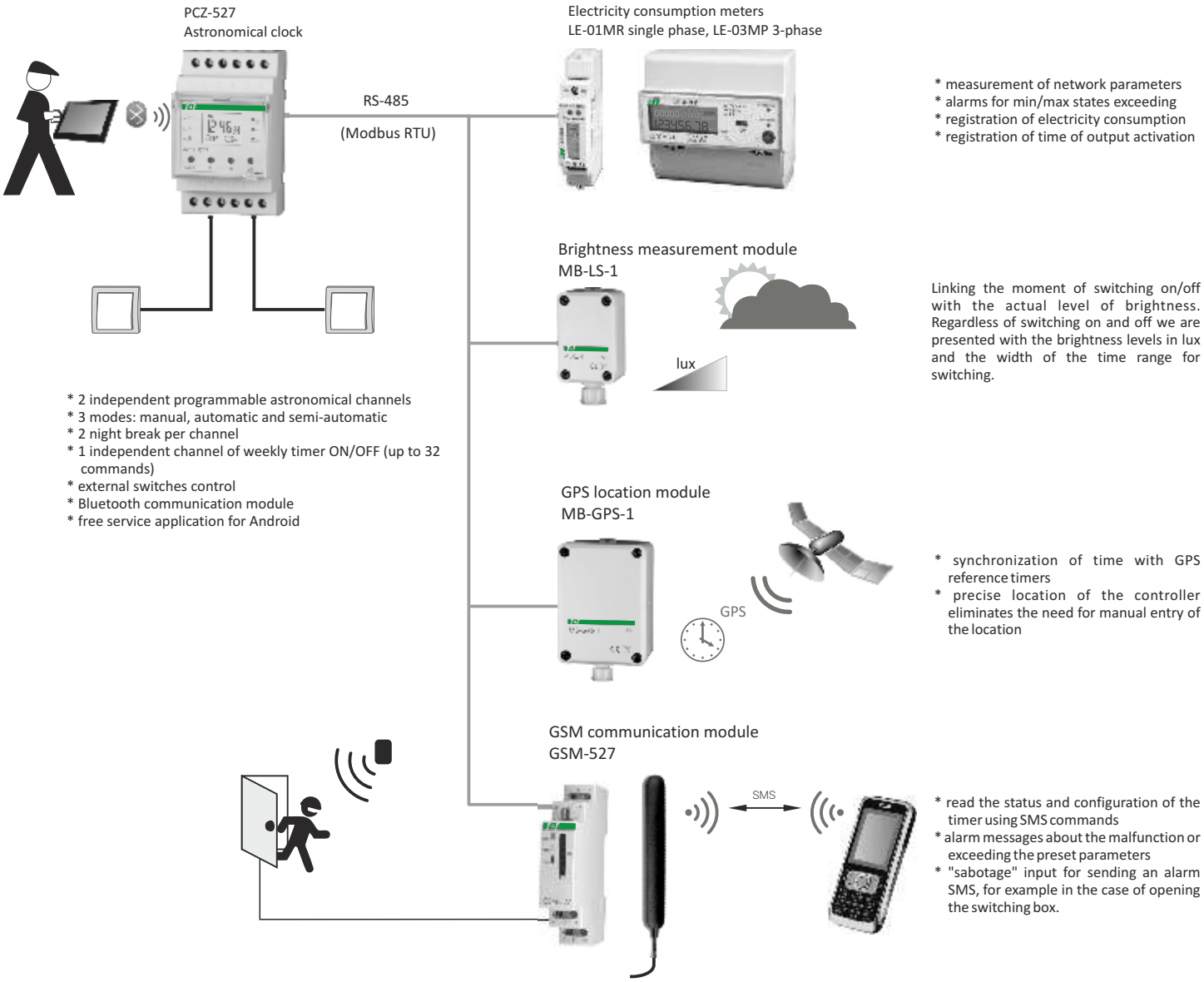


App available on:
Google play
https://play.google.com/store/apps/details?id=pl.com.fif.clockprogramer

LIGHTING CONTROL SYSTEM SSO

PURPOSE

System based on a central astronomical clock PCZ-527 is designed for switching on and off of the lighting or other electrical receivers according to the daily, astronomical points of sunrise and sunset.
With the additional devices it allows you to:
* monitor network performance and electricity consumption
* register time of operation
* read status and configuration of the timer using SMS commands
* SMS alarm messages
* synchronize time and GPS location
* measure the level of brightness (sunlight)
* preview of status and configuration using tablets and smartphones running Android



FUNCTIONING

The PCZ-527 is an advanced astronomical time controller that implements the following functions:
1. Two independently programmable astronomical output channels:
   Operating mode:
   * Manual - status of the outputs is set using the buttons on the control panel or by using external buttons connected to the timer.
   * Automatic - switching on and off of the lights is done automatically based on the position of the sun relative to the horizon. The moment of switching is set according to the preset position of the sun relative to the horizon, or as a time offset from the moment of sunrise / sunset.
   * Semiautomatic - when operating in automatic mode, you can switch the state of the outputs using buttons on the control panel or external buttons connected to the timer. New state of the outputs will be maintained until the end of the current cycle (for example output activated before the sunset remains switched on until dawn and then the timer will return to work in automatic mode).

* The mode of lighting control can change depending on the day of the week or holidays (including movable feasts like Easter or Corpus Christi):
  - output off for the whole twenty four hours
  - output on for the whole twenty four hours
  - lights on with the first night break
  - lights on with the second night break
  - lights on without a break

  (Two night breaks allow you to set two different pairs of switching off and switching on during the night. For example, you can set the night break to occur from Monday to Friday between midnight and 4 AM, and during the weekend between 10:30 PM to 5:00 AM.
* Relay-type outputs wit load capacity of 16 A and overload capacity of 165 A/20 msec

2. One output channel with the weekly programmer:
* Thirty-two independent entries of the programmer enables you to define the day (or days), hour and minute of a program execution and relay action (switch on - switch off).
* Operation in automatic or manual mode.
* Output - control relay with load capacity of 3 A.

3. Bluetooth communication module
* Free app available for Android system.
* Monitoring and configuration of the timer parameters.
* Access protection by the PIN number entered in the timer.
* Ability to disable access via Bluetooth or communication settings in read-only mode.

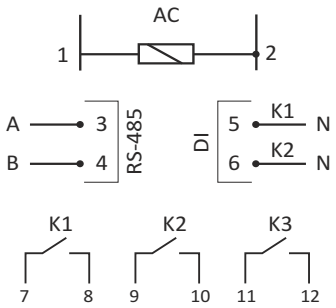
4. The functionality of the timer can be expanded by connecting to it dedicated devices via the RS-485 bus:
* LE-01MR or LE-03MP energy meters:
  - Each output channel of the timer works with its own energy meter.
  - Measurement of the current network parameters: voltage, current, power and power consumption (showing the results on the timer display, Bluetooth and SMS)
  - Control of network parameters - the ability to turn off the receiver and remote alarm notification (when the GSM module is connected) for: too low voltage; too high voltage; too much power consumption (for example in case of current theft); too low power consumption (this may point to faulty light sources)
  - Registration of energy consumption and time of outputs operation - the value from the last 12 months are stored in non-volatile memory of the timer.
* MB-LS-1 brightness sensor
  - Linking the moment of switching on/off with the actual level of brightness. Regardless of switching on and off we are presented with the brightness levels in lux and the width of the time zone for switching. For example if the switching level will be set at 50 lux, the width of the zone for 60 min., and switching point for twilight (7 PM), then if between 6 PM and 7 PM the brightness level will be less than 50 lux the lighting will be switched on earlier. Similarly, if after 7 PM the brightness level will be higher than 50 lux, the activation will be delayed (to 8 PM max).
* MB-GPS-1 position and time synchronization module
  - Time synchronization with GPS reference timers for correct indication of the MS-527 timer.
  - Precise location of the controller eliminates the need for manual entry of the location
* GSM-527 communication module
  - Read the status and configuration of the timer using SMS commands
  - Send alarm messages about faulty operation or exceeding the preset parameters of the network and load.
  - "Sabotage" input for sending an alarm SMS, for example in the case of opening the switching box.
  - Ability to determine the level of access to the controller via the GSM module: read only - Free reading of the state of the timer without the option to make changes; only alarm - GSM module will be used only to send alarm messages; access for users from the list - in memory of the PCZ-527 timer can be stored up to 5 phone numbers from which the commands will be accepted by the controller. For each of the numbers, you can also determine the permission level to perform the read, write and alarm indication; access via password; full access.

APP

The free app is available for Android operating system. It allows to monitor and configure the parameters of the timers. Access protected by a PIN number entered in the timer. Ability to disable access via Bluetooth or set communication in read-only mode.

App for Android system

PCZ-527 CENTRAL ASTRONOMICAL CLOCK



power supply	85÷264V AC/DC
load current	<16A
contact / load	
channel 1 and 2	separated 1×NO/NC / 16A (160/20msec)
channel 3	separated 1×NO/NC / 3A
backup time clock operation	6 years*
backup time display operation	none
accuracy of the clock	1sec
error time	±1sec/24h
time setting accuracy	1min.
correction of the switch on and off time	±0÷99min.
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

FUNCTIONS

* 2 control channels according to the sunrise and sunset (channel 1 and 2)
* 2 night breaks for each astronomical channel (channel 1 and 2)
* 2 digital inputs DI for manual control over channel 1 and 2
* weekly programmer ON/OFF up to 32 commands (channel 3)
* automatic change of summer/winter time
* monitoring of battery status and low battery alarm (display + SMS)
* user can replace the battery (type 2032) by himself
* monitoring the internal temperature - signaling operation at too high or too low temperature
* RS-485 port
* Bluetooth communications module for remote communication with the application for mobile devices

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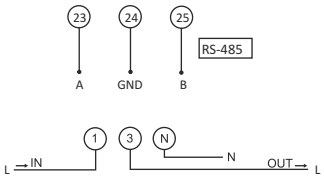
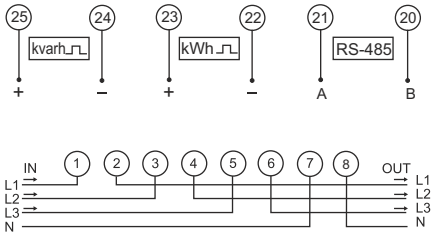
LE-01MR SINGLE-PHASE 100A DIRECT MEASUREMENT

Active energy	- AE+	[kWh]
Phase voltage	- U	[V]
Phase current	- I	[A]
Active power	- P	[W]



reference voltage	230V AC ±20%
base current	5A
maximum current	100A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<8VA; <0.4W
indication range	0÷99999.99kWh
meter constant (1.0Wh/pulse)	1000pulses/kWh
read-out signalling	red LED
port	RS-485
communication protocol	MODBUS RTU
working temperature	-20÷65°C
terminal	25mm² screw terminals
dimensions	1 module (19,5mm)
mounting	on TH-35 rail
protection level	IP20

LE-03MP THREE-PHASE 60A DIRECT MEASUREMENT

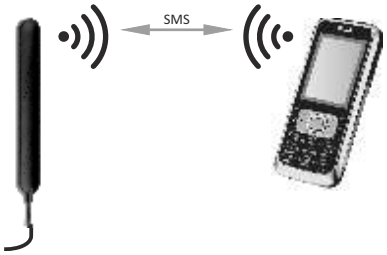


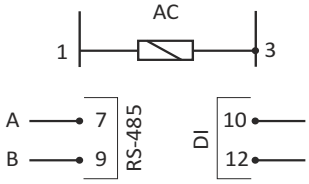
Active energy	- AE+	[kWh]
Phase voltage	- U1, U2, U3	[V]
Phase current	- I1, I2, I3	[A]
System active power L1+L2+L3	- P	[W]

reference voltage	3×400V
base current	5A
maximum current	60A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<10VA; <1.5W
indication range	0÷999999.99kWh
meter constant kWh (1.25Wh/pulse)	800pulses/kWh
meter constant kvarh (1.25varh/pulse)	800pulses/kvarh
read-out signalling	2×red LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
stała kWh/kvarh (1.25Wh/pulse)	800pulses/kWh
pulse time kWh/kvarh	10msec
port	RS-485
communication protocol	MODBUS RTU
working temperature	-20÷55°C
terminal	16mm² screw terminals
dimensions	7 modules (122mm)
mounting	on TH-35 rail
protection level	IP20

GSM-527 GSM COMMUNICATION MODULE

A modem designed to work only with PCZ-527 timer. Works in GSM 900/1800 cellular networks of any operator in Poland (unlocked). In order to make the calls and execute the predefined functions, the device must have an active SIM card. The module allows you to read the status and configuration of the timer using SMS commands. faulty operation or exceeding the preset parameters of the network and load. It has "sabotage" input for sending an alarm SMS, for example in the case of opening the switching box.



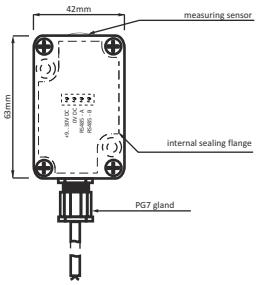


power supply	9÷30V DC
DI input	potential-free
ports	SIM / RS/485
power consumption	
standby	1.3W
GSM communication	<3W
working temperature	-10÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
GSM antenna SMA connector	20×100m
antenna wire lenght	2.5m
protection level	IP20

MB-LS-1 LIGHTING BRIGHTNESS LEVEL SENSOR

The sensor continuously measures the level of brightness (sunlight) in the range of 1÷2000 lux. It allows you to link the moment of switching on/off with the actual level of brightness. Regardless of switching on and off we are presented with the brightness levels in lux and the width of the time zone for switching. For example if the switching level will be set at 50 lux, the width of the zone for 60 min., and switching point for twilight (7 PM), then if between 6 PM and 7 PM hours the brightness level will be less than 50 lux the lighting will be switched on earlier. Similarly, if after 7 PM the brightness level will be higher than 50 lux, the activation will be delayed (to 8 PM max).

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.

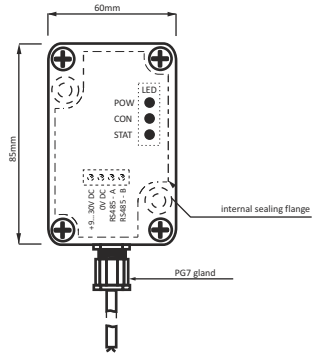


supply voltage	9÷30V DC
maximum current consumption	40mA
range of measurement	1÷2000Lux
maximum measurement error temp.	±1°C
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	42×63×30mm
mounting	2 fastening screws to the ground
protection level	IP65

MB-GPS-1 GPS LOCATION MODULE

The module is equipped with a standard location module of the GPS (Global Positioning System) satellite system. Based on the received signal the module provides current information about its location: geographic coordinates (longitude/latitude), date (year/month/day) and time (hours/minutes/seconds). This allows for PCZ-527 time synchronization with reference GPS timers and precise setting of timer location parameters, which eliminates the need to manually enter location.

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.



supply voltage	9÷30V DC
maximum current consumption	40mA
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	60×85×35mm
mounting	2 fastening screws to the ground
protection level	IP65

19. FLC PROGRAMMABLE CONTROLLERS

PURPOSE

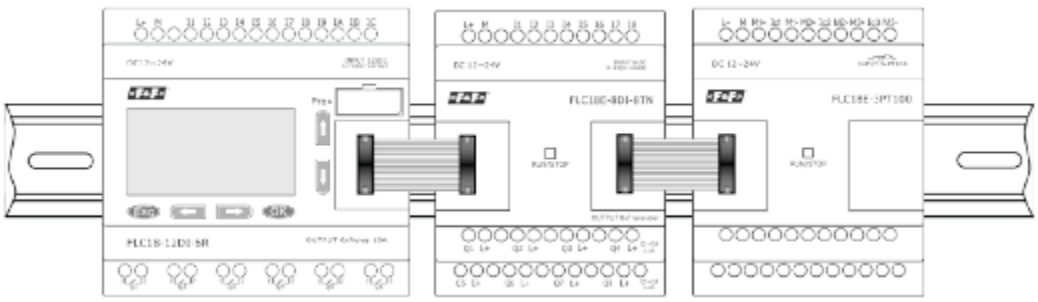
FLC is a universal, programmable logic controller, which can control the elements of domestic and industrial electrical installation (for example lighting control, roller blind control, watering the garden, control of simple machines). With the built-in user panel it does not require combining with costly external panels, while at the same time providing a user with a preview and configuration of the control system parameters. The controller is equipped with advanced communication interfaces and allows for easy connection to professional visualization stations (using the Modbus protocol).

FUNCTIONS

* more than 75 different function blocks
* LCD - four lines, 16 characters per line with backlight. Menus and messages available in Polish.
* MODBUS RTU/ASCII communication protocol
* expandable to 16 additional expansion modules I/O (only for FLC18)
* communication interfaces: RS-232 and optional RS-485 (only for FLC18)
* channels of analog inputs 0÷10 V DC or 0/4÷20 mA (current input only FLC18)
* channel analogue outputs 0 ÷ 10 V DC or 0/4 ÷ 20 mA (only for FLC18)
* support for PT-100 probes (only FLC18)
* real-time clock (RTC) with a weekly, annual and astronomical timer
* four channels of high-speed meter (up to 60 kHz with a 50% duty cycle)
* controller programming using function block diagram (FBD)
* a free application for programming controller in Polish
* ability to program up to 1024 function blocks (FLC18) or up to 512 function blocks (FLC12)
* pre-configured standard blocks (for example time functions, pulse relay, generator PWM)
* cable for communication and programming - RS-232 <-> USB converter with optoisolation
* controllers and modules power supply 12÷24 V DC
* modular mounting on DIN35 mm rail or directly on the wall

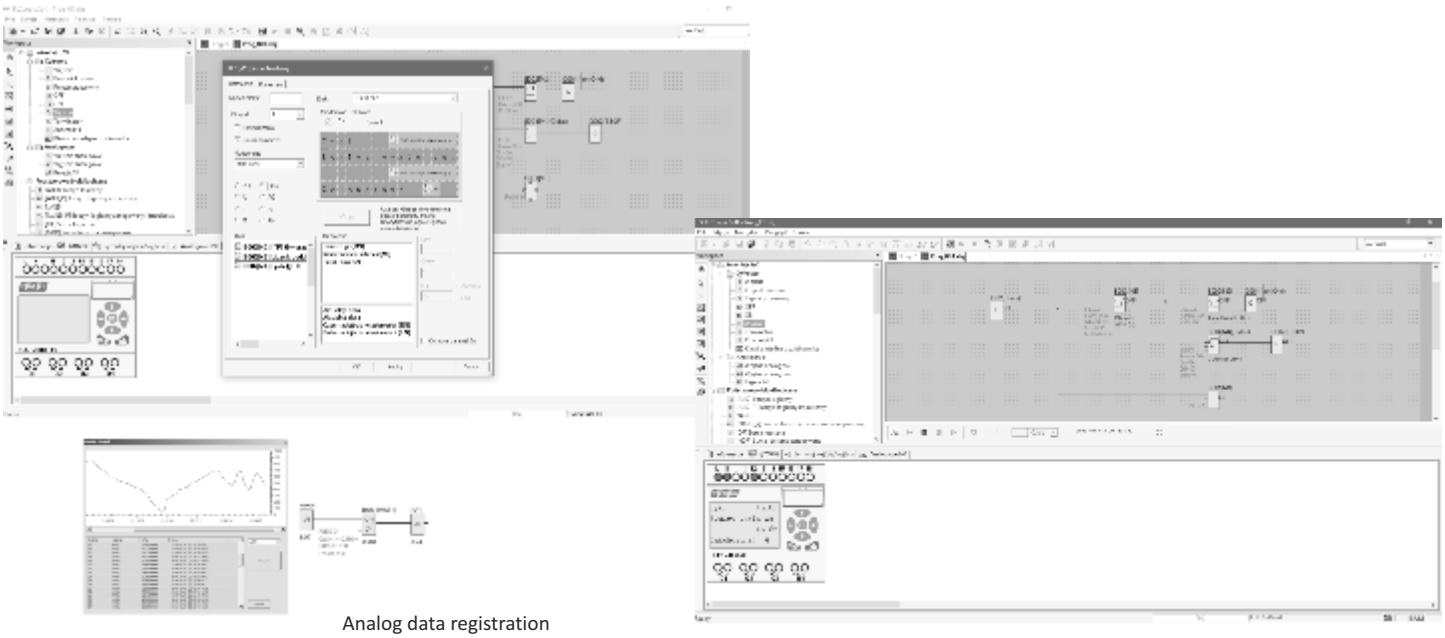
HARDWARE RESOURCES TABLE

Model	FLC12 8DI-4R	FLC18 12DI-6R	FLC18 E-8DI-8TN	FLC18 E4AI-I	FLC18 E3-PT-100	FLC18 E-RS485	FLC18 E-2AQ-VI
Type	CPU		Expansion module				
Power supply	12÷24V DC						
Digital inputs	8	12	8	-	-	RS-485	-
Analog inputs	4	6	4	4	4	-	-
Analog inputs type		voltage (0÷10 V DC)		current (0/4÷20 mA)	PT-100	-	-
Digital outputs	4	6	8	-	-	-	-
Digital outputs type	relay (10A/250 V AC)	transistor (PNP, 3A/60 V DC)	-	-	-	-	-
Analog outputs	-	-	-	-	-	-	2
Analog outputs type	-	-	-	-	-	-	voltage (0÷10 V DC) or current (0/4÷20 mA)
Fast meter	4		-	-	-	-	-
PWM	YES			-	-	-	-
RTC	YES		-	-	-	-	-
LCD	YES		-	-	-	-	-



SOFTWARE TOOLS

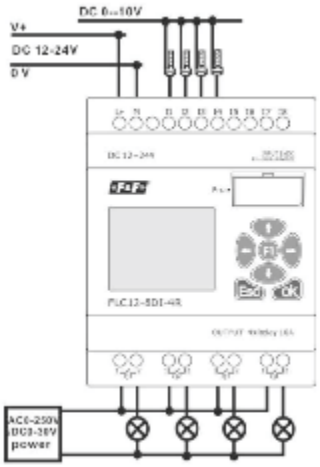
Free software tool FLCLogic Soft is used for programming the FLOGIC controllers. The application allows you to write a program, test it with the simulator (without connection with the controller), load it to the controller and perform hardware tests (preview of the operation of the actual device with the possibility of recording digital and analog data).

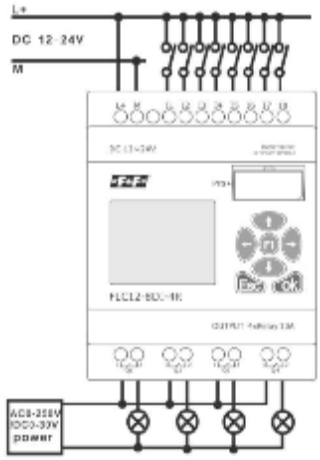


Analog data registration

SYSTEM COMPONENTS

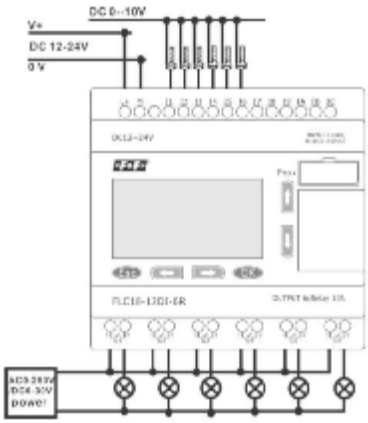
FLC12 8DI-4R CPU

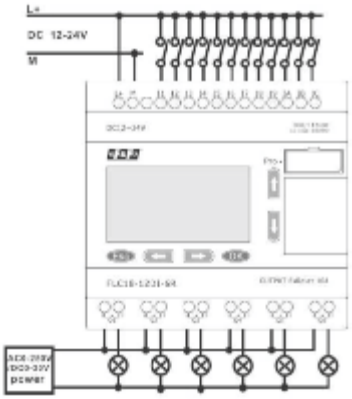




power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	3.5÷4 W
inputs	
total number of inputs	8 (I1÷I8)
number of digital inputs	8 (I1÷I8)
number of analog inputs	4 (I1÷I4) (0÷10 V DC)
range of input voltages	28.8 V DC
input type	resistive
isolation between input and power supply	resistance
isolation between inputs	none
analog inputs I1÷I4	
measuring range	0÷10 V DC
maximum input voltage	28.8 V DC
input impedance	34÷72 kΩ
resolution	10 Bit
accuracy at 25°C	20 mV
accuracy at 55°C	40 mV
outputs	
number of outputs	4 (Q1÷Q4)
type of output	relay
continuous current, resistive load	10 A
continuous current, inductive load	2 A
operating voltage (AC)	250 V
operating voltage (DC)	48 V
acceptable power load	300 W
electrical life, resistive load	10^5 cycles
mechanical durability	10^7 cycles
switching speed (mechanical)	10 Hz
short circuit and surge protection	none
other parameters	
number of function blocks	512
number of event counters (1÷99999999)	512
number of timers (10msec ÷ 99h59m)	512
number of digital flags	256
number of analog registers	256
number of PI regulators	30
number of mathematical blocks	512
number of HMI screens	64
RTC accuracy time	±2 sec/day
RTC support time	20 days
program lifespan	10 years
protection against the loss of data	YES
cycle time	0.6÷8 msec
single application processing time	100 msec
extension modules	NO
number of free inputs (4 Hz)	4
number of high-speed inputs (60 kHz)	4
operator panel	YES
RS232	YES
HMI panel	YES
working temperature	-20÷55°C
weight	300 g
protection level	IP20

FLC18 12DI-6R CPU

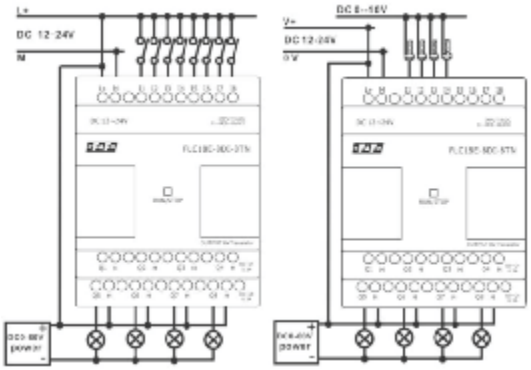




power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	3.5÷4 W
inputs	
total number of inputs	12 (I1÷IC)
number of digital inputs	12 (I1÷IC)
number of analog inputs	6 (I1÷I6) (0÷10 V DC)
range of input voltages	0÷28.8 V DC
input type	resistive
isolation between input and power supply	resistance
isolation between inputs	none
analog inputs I1÷I6	
measuring range	0÷10 V DC
maximum input voltage	28.8 V DC
input impedance	34÷72 kΩ
resolution	10 Bit
accuracy at 25°C	20 mV
accuracy at 55°C	40 mV
outputs	
number of outputs	6 (Q1÷Q6)
type of output	relay
continuous current, resistive load	10 A
continuous current, inductive load	2 A
operating voltage (AC)	250 V
operating voltage (DC)	48 V
acceptable power load	300 W
electrical life, resistive load	10^5 cycles
mechanical durability	10^7 cycles
switching speed (mechanical)	10Hz
short circuit and surge protection	none
other parameters	
number of function blocks	1024
number of event counters (1÷99999999)	1024
number of timers (10msec ÷ 99h59m)	1024
number of digital flags	256
number of analog registers	256
number of PI regulators	30
number of mathematical blocks	1024
number of HMI screens	128
RTC accuracy time	±2 sec/day
RTC support time	20 days
program lifespan	10 years
protection against the loss of data	YES
cycle time	0.6÷8 msec
single application processing time	100 msec
extension modules	16
number of free inputs (4 Hz)	8
number of high-speed inputs (60 kHz)	4
operator panel	YES
RS232	YES
communication protocol	Modbus RTU/ASCII
HMI panel	YES
program protection	PIN, 4 digits
working temperature	-20÷55°C
weight	400 g
protection level	IP20

FLC18E 8DI-8TN

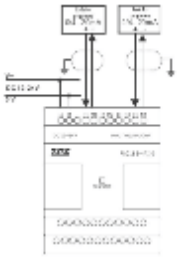
EXPANSION MODULE OF ANALOG-DIGITAL INPUTS/OUTPUTS



power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	3.5÷4 W
inputs	
total number of inputs	8 (I1÷I8)
number of digital inputs	8 (I1÷IC)
number of analog inputs	4 (I1÷I4) (0÷10 V DC)
range of input voltages	0÷28.8 V DC
input type	resistive
isolation between input and power supply	resistance
isolation between inputs	none
analog inputs I1÷I4	
measuring range	0÷10 V DC
maximum input voltage	28.8 V DC
input impedance	34÷72 kΩ
resolution	9 Bit
accuracy at 25°C	30 mV
accuracy at 55°C	60 mV
outputs	
number of outputs	8 (Q1÷Q8)
type of output	PNP transistor
continuous current, resistive load	300 mA
continuous current, inductive load	30 V DC
operating voltage (AC)	650 mA
operating voltage (DC)	2 V
acceptable power load	10 Hz
switching speed (mechanical)	0.5 Hz
short circuit and surge protection	none
other parameters	
cooperation with the CPU modules	FLC18-12DI-6R
working temperature	-20÷55°C
weight	300 g
protection level	IP20

FLC18E-4AI-I

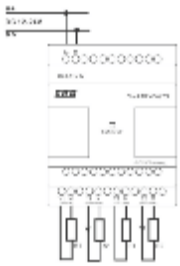
EXPANSION MODULE OF ANALOG INPUTS



power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	1 W
analog inputs	
number of analog inputs	4 (AI1÷AI4)
measuring range	0/4÷20 mA
resolution	20 µA
processing time	50 msec
accuracy at 25°C	50 µV
other parameters	
cooperation with the CPU modules	FLC18-12DI-6R
working temperature	-20÷55°C
number of event counters (1÷99999999)	
weight	400 g
protection level	IP20

FLC18E-2AQ-VI

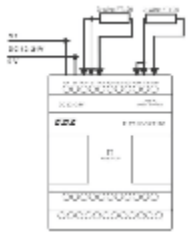
EXPANSION MODULE OF ANALOG INPUTS
2 VOLTAGE + 2 CURRENT



power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	1.8 W
analog inputs voltage/current	
number of analog outputs	2
range of output voltages	0÷10 V DC
range of output currents	0÷20 mA
voltage resolution	10 mV
current resolution	20 µA
voltage accuracy at 25°C	20 mV
current accuracy at 25°C	50 µA
other parameters	
cooperation with the CPU modules	FLC18-12DI-6R
working temperature	-20÷55°C
weight	300 g
protection level	IP20

FLC18E-3PT100

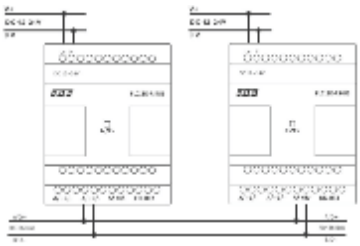
EXPANSION MODULE
FOR PT-100 TEMPERATURE SENSORS WITH 3 INPUTS



power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	1 W
PT-100 sensor inputs	
number of sensors	3 (AI1÷AI3)
measuring probe	PT-100
probe type	2- or 3-wires
resolution	12 Bit
accuracy at 25°C	0.3°C
other parameters	
cooperation with the CPU modules	FLC18-12DI-6R
working temperature	-20÷55°C
weight	300 g
protection level	IP20

FLC18E-RS485

EXPANSION MODULE
WITH RS-485 COMMUNICATION INTERFACE



power supply	12÷24 V DC
resistance to momentary power failure	5 msec
starting current	250 mA
power	1.8 W
communication output	
RS-485 type	1
output separation	galvanic
communication interface	RS-485
operation mode	Master/Slave
communication parameters configuration	YES
other parameters	
cooperation with the CPU modules	FLC18-12DI-6R
working temperature	-20÷55°C
weight	300 g
protection level	IP20

FLC-USB Programator

INTERFACE FOR PROGRAMMING FLC CONTROLLERS

power supply	
from the FLC controller port	5 V DC
from the PC USB port	5 V DC
separation between FLC and USB	galvanic

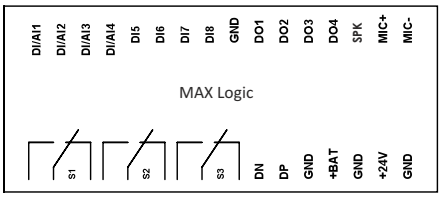
20. PLC MAX CONTROLLERS

MAX H04

PURPOSE

MAX H04 controller is freely programmable logic controller (PLC) with integrated GSM communicator. It is designed to solve a wide range of management tasks concerning the technological processes and data exchange via the GSM 900/1800 mobile networks in SMS mode. Thanks to the universal design the controller is used as a control of devices operation status, remote control, part of control and supervision of industrial automation equipment of low and medium level of technological advancement.

MAX H04 is one of the few controllers that allow you to connect it and use it without the programming elements. Thanks to the special configuration program it can be used by anyone who does not want to know the languages and the complicated procedures of PLC programming.



controller software cycle	10msec
power supply	9÷30V DC
digital inputs	4 (30V; 0.2A)
analog inputs/digital	4 (0/4÷20mA/0÷10V)
digital outputs OC	4 (50V; 0.2A)
relay outputs	3×NO/NC (<5A)
ports	SD, microUSB, SIM, RS-485
communication protocol	MODBUS RTU
recorder internal memory	1.3MB
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	110×79×40mm
mounting	screws to the ground or on TH-35 rail
protection level	IP20

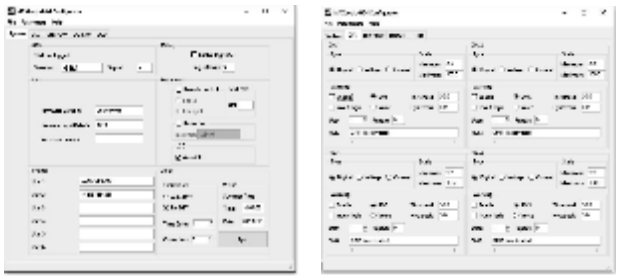
FUNCTIONS

CONFIGURATION MENU
Graphic and text menu that allows you to set the controller functions, configure the type of inputs, set a specific function for the outputs, present phone numbers to which the notifications are to be sent, set access lock and present the executory parameters for implementation of specific tasks.
IVR VOICE MENU (play *.wav audio files)
It allows for a remote control at a standard voice call mode using DTMF system function (selecting option by pressing the desired button on the phone keypad).
RECORDER
Stand-alone recorder records data in one of three modes:
* Interval mode - data are read at regular, fixed intervals;
* Event mode - the data are fixed only when any change is made in the logical state of inputs/outputs
* User mode - data are recorded according to the format specified in the application ForthLogic language.
The data is stored in non-volatile internal memory or on an SD card as a text file.
Data is written in series in text form: 13:04:39|19/03|18.4 13.8|353 0000 0000 0000 | 01010100|0100|110

H04 Configurator

FUNCTIONS

* control outputs via SMS commands
* query about the status of inputs and outputs via SMS commands
* SMS messages to the user's phone about activation of digital inputs
* SMS messages to the user's phone about exceeding the defined threshold on analog input
* definition of the content of the output SMS (up to 160 characters)
* optional setting of the number of minutes after which an SMS message is repeated in the case of continuous maintenance of input status
* control with the output depending on the assigned inputs:
  LEVEL option - mapping of the state (IN 1 -> OUT 1, IN 0 -> OUT 0);
  PULSE option - temporary switching on of the outputs for a set time after activation of inputs
* function of a bi-state regulator based on the definitions of analog input scale, threshold and output assigned to it
* scaling to the actual measured values of the analog input measuring range
* selection of the signal option (high state 1 or low state 0) at the input that triggers the SMS message



SOFTWARE TOOLS

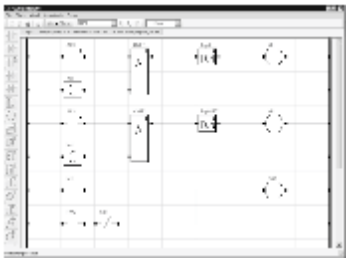
Hardware and programming called "forth-system" is responsible for the execution of tasks and the interpretation of the program in **ForthLogic** language. The computational model of the ForthLogic language consists of stacks, global variables, dictionary, input buffer and output buffer. ForthLogic language can describe the processes running in parallel and operates in a multitasking environment.

Interactive programming and application development environment for MAX controllers in ForthLogic language consists of the **Notepead++** text editor, **PuTTY** terminal program and the **ForthLogic Programmer** software that provides two-way communication between the PC and the MAX controller. This set allows you to create scripts in ForthLogic language, program MAX controllers and communicate with the controller in terminal mode.

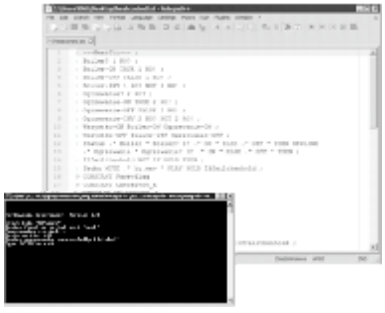
MAXLadderSOFT program allows you to easily swap the “relay” scheme for a programming language of the controller.
The program allows for:
* creating and editing applications using the language ladder diagrams [LAD]
* validating the design scheme
* direct communication between controller an computer
* uploading the application to the memory of the controller.

Direct operation with the system of the controller is called **the dialog mode**.
There are two types of dialog operation dialogue: terminal and remote.
Terminal mode - with a **HYPERTERMINAL**-type program (MAX-PC connection through USB cable). Terminal mode is primarily used to learn programming, solving programming tasks or solving the existing problems in the operation of the controller.
Remote mode - only for controllers with GSM module - control with your phone via SMS. In this mode, the phone screen fulfills similar functions as a terminal window on your computer monitor. Remote mode is obviously used for remote control of devices connected to the controller.

HyperTerminal



MAX-LadderSOFT



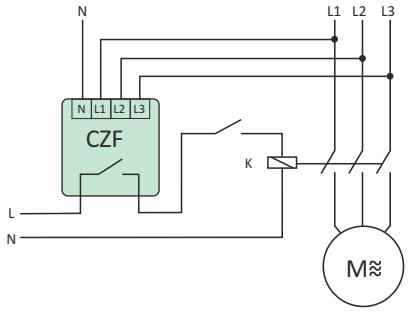
Notepad++PuTTY
ForthLogic Programer

21. PHASE CONTROL RELAYS

21.1. THREE-PHASE MONITORS

PURPOSE

Three phase monitors serve to protect the three-phase electric motors supplied from three-phase mains, against phase collapse in at least one phase or against phase-to-phase voltage asymmetry, threatening to damage the motor.

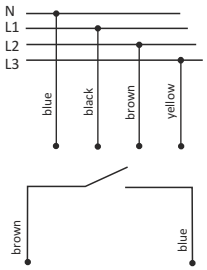


WITH FIXED ACTUATION THRESHOLD VOLTAGE ASYMMETRY

FUNCTIONING

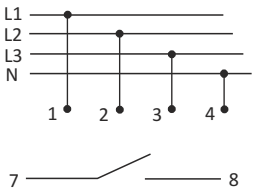
Phase collapse in at least one phase or voltage unbalance between phases above fixed actuation threshold causes switching-OFF the motor. The motor switching-OFF occurs with delay, which prevents any accidental motor disconnecting at temporary voltage drop. The reconnection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis).
At occurrence of these disturbances, it is not possible to set a motor in motion.

CZF



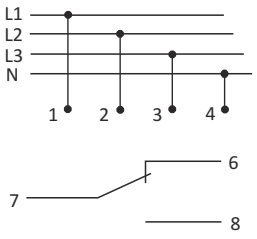
power supply	3×400/230V+N
contact	separated 1×NO
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	45V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	4×1mm²; 2×0.75mm², l=0.5m
working temperature	-25÷40°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

CZF-B



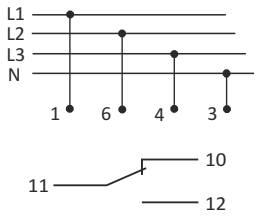
power supply	3×400/230V+N
contact	separated 1×NO
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF-BS



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF-310



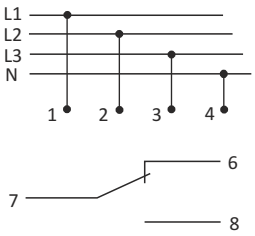
power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

WITH ADJUSTABLE ACTUATION THRESHOLD AT VOLTAGE ASYMMETRY

FUNCTIONING

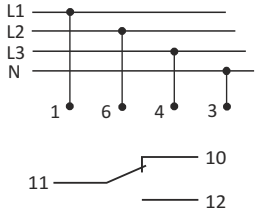
Phase collapse in at least one phase or voltage unbalance between phases above set value causes switching-OFF the motor. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The reconnection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion.

CZF-BR



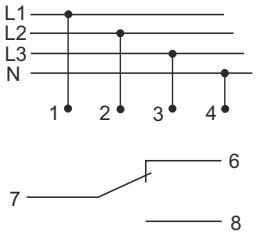
power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF-311



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	0.56W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

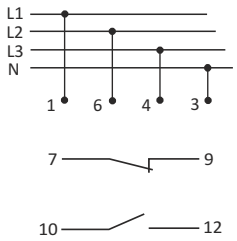
CZF-BT WITH ADJUSTABLE ACTUATION TIME 0.5÷15 sec



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	0,5÷5sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF-312 MONITOR

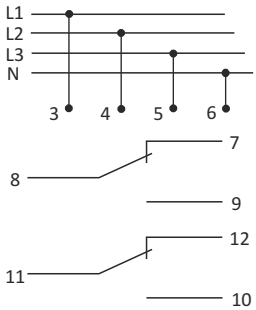
WITHOUT ACTION DELAY [0.2 SEC]



power supply	3×400/230V+N
contact	separated 1×NO; 1×NC
load current	2×[<5A]
signalling of supply	3×LED
effective voltage unbalance	40÷55V~
voltage hysteresis	5V~
switching OFF delay	0.2sec
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

CZF-331

WITH TWO SEPARATED CONTACTS [2×NO/NC]



power supply	3×400/230V+N
contact	separated 2×NO/NC
load current	2×[<8A]
signalling of supply	3×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1,2W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

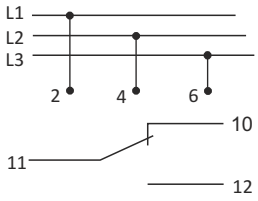
The use of two make-and-brake contacts of the relay allow you to connect an additional device or the controlled system and visual or sound signaling system that indicates the actuation of the relay, which means switching off the motor.

CZF-333

WITHOUT NEUTRAL WIRE

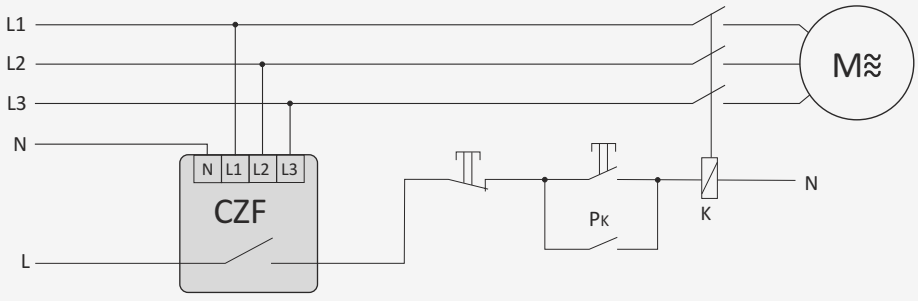
Prevents against symmetrical and asymetrical voltage drop

In case the voltage asymmetry above set value between phases causes the switching-OFF the motor. The switching-OFF the motor also occurs in case of phase-to-phase voltage drop below 320V. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The reconnection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion.



power supply	3×400V
contact	separated 1×NO/NC
load current	<10A
signalling of supply	3×LED
effective voltage unbalance	20÷50V~
activation interphase voltage	<320V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

PRACTICAL SOLUTIONS



Example of connection example of control that prevents automatic return of the power of the motor

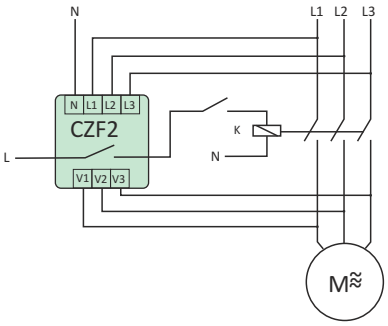
21.2. THREE-PHASE MONITORS WITH CHECKING STATE OF CONTACTOR CONTACTS

PURPOSE

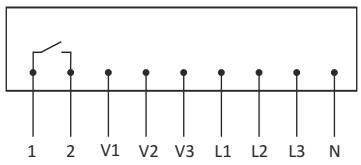
Three phase monitor serves to protect the three-phase electric motors supplied from three-phase mains, against phase collapse in at least one phase or against phase-to-phase voltage asymmetry or against damage of contacts threatening to damage the motor.

FUNCTIONING

Phase collapse in at least one, optional phase or voltage unbalance between phase fixed actuation threshold causes switching-OFF the motor. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The reconnection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion. Shining of red diode LED along with simultaneous disconnecting the apparatus permanently, indicates contactor contacts damage. Reactivation of the apparatus is possible (after contact repair), after disconnecting from supply all three phases (fuses) and then, after switching-ON anew.



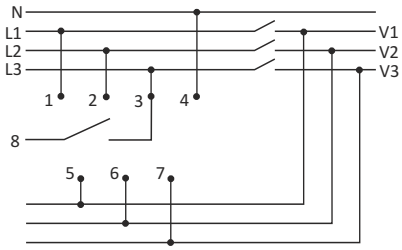
CZF2



power supply	3×400/230V+N
contact	separated 1×NO
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	45V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	95×60×25mm
mounting	two screws to substrate
protection level	IP20

CZF2-B

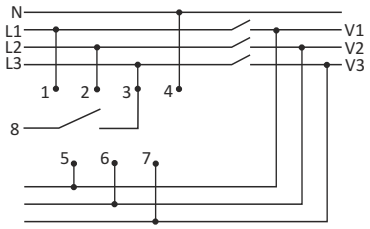
WITH 1×NO CONTACT CONNECTED TO POWER SUPPLY VOLTAGE



power supply	3×400V/230+N
contact	1×NO
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF2-BR

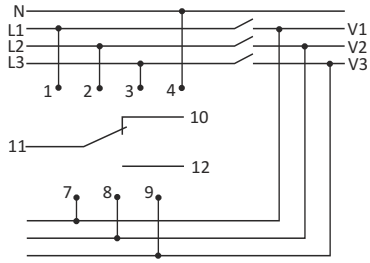
WITH 1×NO CONTACT CONNECTED TO POWER SUPPLY VOLTAGE



power supply	3×400/230V+N
contact	1×NO
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

CZF-332

WITH 1×NO/NC CONTACT CONNECTED TO POWER SUPPLY VOLTAGE

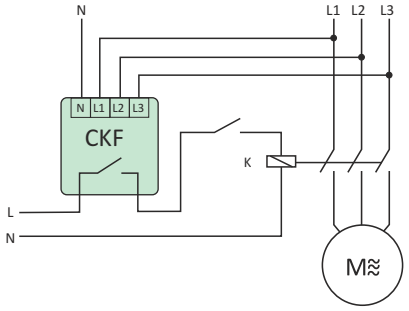


power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

21.3. THREE-PHASE ASYMMETRY AND SEQUENCE MONITORS

PURPOSE

Three phase and sequence monitor is designed to protect tree-phase electric motors against voltage drop in at least one phase or voltage asymmetry between phases, which could damage the motor, with additional protection of motor rotation direction in case of phase change before the monitor.

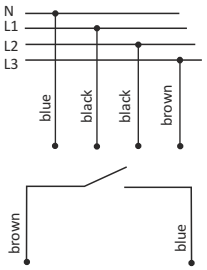


FUNCTIONING

Voltage collapse in any phase or voltage asymmetry between phases above fixed actuation threshold causes switching-OFF the motor. The motor switching-OFF occurs after delay of 4 sec, which prevents accidental motor switching-OFF caused by instantaneous voltage drop. Switching the motor ON anew occurs automatically when the voltage increases of 5V~ above activation voltage (i.e. about value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set motor in motion. In case of change of phase sequence, before the monitor, which causes change of motor rotation direction (in relation to that primarily set) is signaled by shining red diode LED along with impossibility of switching-ON the motor. The reconnection is possible after the return to correct phase sequence.

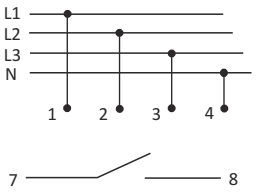
WITH FIXED ACTUATION THRESHOLD VOLTAGE ASYMMETRY

CKF



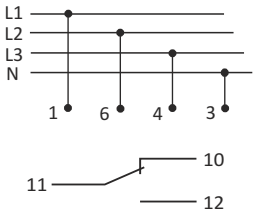
power supply	3×400V/230+N
contact	separated 1×NO
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	45V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	OMY 4×1mm²; 2×0.75mm², l=0.45m
working temperature	-25÷40°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

CKF-B



power supply	3×400/230V+N
contact	separated 1×NO
load current (AC-1)	<10A
signalling of supply	2×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

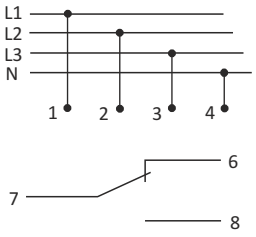
CKF-316



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	55V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

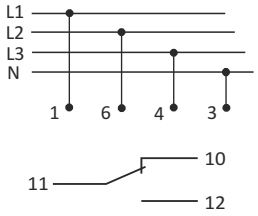
WITH ADJUSTABLE ACTUATION THRESHOLD VOLTAGE ASYMMETRY

CKF-BR



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

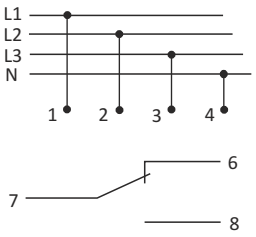
CKF-317



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	4sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

CKF-BT

WITH ADJUSTABLE ACTUATION TIME 0.5÷5 sec



power supply	3×400/230V+N
contact	separated 1×NO/NC
load current	<10A
signalling of supply	2×LED
effective voltage unbalance	40÷80V~
voltage hysteresis	5V~
switching OFF delay	0.5÷5sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

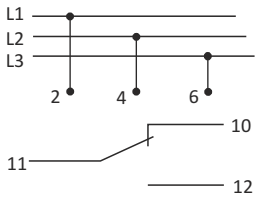
WITHOUT NEUTRAL WIRE [3×400V]

PREVENTS AGAINST SYMMETRICAL AND ASYMETRICAL VOLTAGE DROP

CKF-337

WITH LOWER VOLTAGE ACTUATION THRESHOLD [<320V]

Motor will be turned off also in case of symmetrical drop of interphase voltages in all three phases below 320 V.

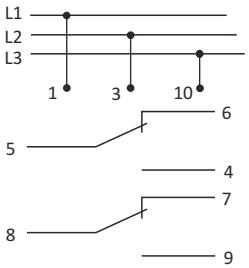


power supply	3×400V
contact	separated 1×NO/NC
load current	<10A
signalling of supply	4×LED
effective voltage unbalance	20÷60V~
activation voltage	<320V~
voltage hysteresis	5V~
time of switching off delay - adjustable	0.2÷5sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

CKF-318

WITH LOWER [<320V] AND UPPER [>480V] VOLTAGE ACTUATION THRESHOLD

Motor will be turned off also in case of symmetrical drop of interphase voltages in all three phases below 320 V or rise of the voltage above 480 V on any phase.

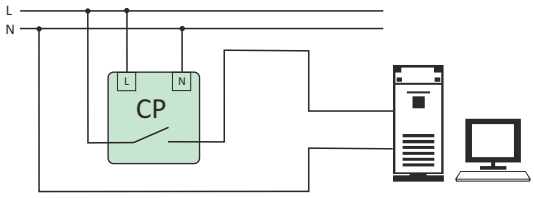


power supply	3×400V
contact	2×separated 1×NO/NC
load current	8A
signalling of supply	2×LED
effective voltage unbalance	20÷80V~
activation voltage min/max	<320V~ / >480V~
voltage hysteresis	5V~
switching-off delay with asymmetry and loss	1÷10sec
repeated switching-on delay with asymmetry and loss	2÷360sec
activation time for min/max voltages	5sec / 0.5sec
power consumption	1.6W
terminal	2.5mm² screw terminals
working temperature	-25÷40°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

22. VOLTAGE RELAYS

PURPOSE

Voltage relays serves to voltage control in single or three phase mains and to protect receiver against the effects of voltage collapse or increase beyond set values.

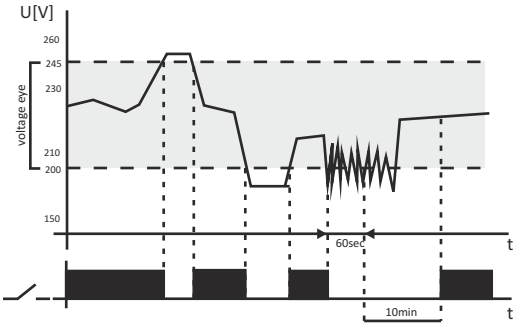


ATTENTION!

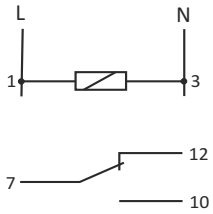
All types of CP can be supplied with a voltage up to 450V~. This ensures the effective protection of the receiver even in case of a voltage increase beyond allowable standards. Also, in case of supply polarity exchange or when „zero" is switched off (for three-phase types) the relay will not be destroyed („burned").

FUNCTIONING

Lower voltage value (U1) and upper voltage value (U2) are set by means of potentiometers. It is so called eye of voltage, in limits of which can occur changes of phases voltages that do not cause activation of relay. Change of phase voltage on one of phases above or below set voltage tresholds will cause activation of relay. Reactivation follows automatically return of correct voltage value.



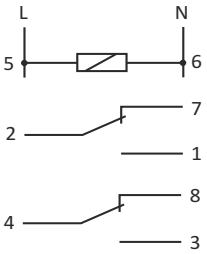
CP-709 WITHOUT TIME-BLOCKADE
CP-710 WITH TIME-BLOCKADE



power supply	50÷450V AC
load current	<16A
contact	separated 1×NO/NC
signalling of supply	4×LED
voltage activation threshold	
lower U1	150÷210V
upper U2	230÷260V
return voltage hysteresis	
for U1	5V
for U2	5V
activation time	
for U1	1.5sec
for U2	0.1sec
return time	
for U1	1.5sec
for U2	1.5sec
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

CP-710: Because of unstable voltage in mains and frequent changes of supply voltage beyond the set thresholds of „eye of voltage" (at least 10 times per 1 minute), relay blocks itself for 10 minutes. This prevents against too frequent, cyclic switching-ON and OFF of the connected receiver.

CP-721 PROGRAMMABLE



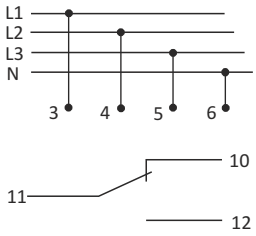
power supply	150÷450V AC
load current (AC-1)	2×[8A]
contact	separated 2×NO/NC
voltage activation threshold / skip	
lower UL	150÷210V / 5V
upper UH	230÷260V / 5V
return voltage hysteresis for UL/UH	5V
activation time / skip	
for UL	2÷10sec / 1sec
for UH	0.1÷1sec / 0.1sec
return time for UL/UH	2sec÷9.5min.
setting accuracy	1V
measurement accuracy	±1V
display	3×segment LED 5×9mm
contact signalling activation	yellow RED
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

- setting voltage window (thresholds U1 and U2)
- separate setting response times for exceeding the limits U1 and U2
- setting the time to return
- continuous indication of the voltage
- indication of the correct voltage and contact closure

THREE-PHASES TYPE

CP-730 WITH TIME-BLOCKADE



power supply	3×(50÷450V)+N
load current	<10A
contact	separated 1×NO/NC
signalling of supply	4×LED
voltage activation threshold	
lower U1	150÷210V
upper U2	230÷260V
return voltage hysteresis	
for U1	5V
for U2	5V
activation time	
for U1 - adjustable	0.5÷10sec
for U2	0.1sec
return time	
for U1	1.5sec
for U2	1.5sec
power consumption	0.4W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

Because of unstable voltage in mains and frequent changes of supply voltage beyond the set thresholds of „eye of voltage" (at least 10 times per 1 minute), relay blocks itself for 10 minutes. This prevents against too frequent, cyclic switching-ON and OFF of the connected receiver.

UNDER VOLTAGE

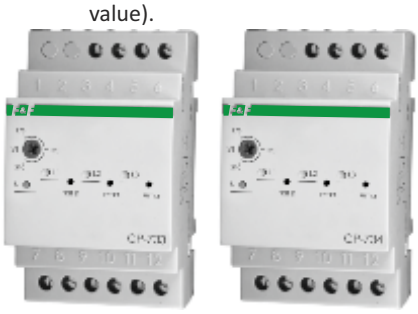
CP-733 3×[1×NC] contacts

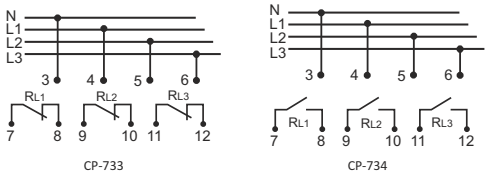
CP-734 3×[1×NO] contacts

FUNCTIONING

CP-733: A voltage relay is used to control voltage in a 3-phase network and secure a receiver against voltage drops below a preset value. Voltage decay in a phase or its drop below a preset activation threshold results in the shortage of the relay contact for this phase. The contact will be automatically released after the voltage in the phase is reinstated or its increase is 5V over the preset threshold (i.e. the voltage hysteresis value).

CP-734: A voltage relay is used to control voltage in a 3-phase network and secure a receiver against voltage drops below a preset value. Voltage decay in a phase or its drop below a preset activation threshold results in the opened of the relay contact for this phase. The contact will be automatically released after the voltage in the phase is reinstated or its increase is 5V over the preset threshold (i.e. the voltage hysteresis value).





power supply	3×(50÷450V)+N
load current	3×[<8A]
contacts	
CP-733	separated 3×[1×NO]
CP-734	separated 3×[1×NC]
signalling of supply	4×LED
activation voltage - adjustable	170÷210V
return voltage hysteresis	5V
activation time	0.5sec
return time	1.5sec
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

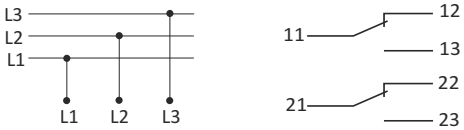
CP-500 POWER SUPPLY 3×500V. WITHOUT NEUTRAL WIRE

PROTECTING FUNCTIONS

- Protection against phase collapse
- Protection against of phase change order
- Protection against phase asymmetry
- Protection against crossing over voltage 580V
- Protection against decline below voltage 420V

FUNCTIONING

With the correct network voltage contacts remain closed. Operation of any security opens the sensor's contacts. Closure of the contacts will automatically after return the correct network parameters.

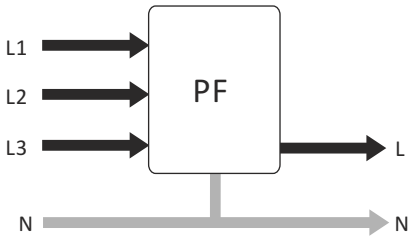


power supply	3×500V
load current	2×[<8A]
contact	separated 2×NO/NC
state signalling	4×LED
effective unbalance - adjustable	20÷80V
activation time	
at effective unbalance - adjustable	1÷10sec
threshold voltage/activation time	
upper	580V / 0.5sec
lower	420V / 5sec
return voltage hysteresis	5V
return time - adjustable	1÷15sec
power consumption	0.7W
contact terminal 1 and 2	2.5mm² screw terminals
L1, L2, L3 terminal	4.0mm² screw terminals
working temperature	-25÷50°C
dimensions	4 modules (70mm)
weight	250g
mounting	on TH-35 rail
protection level	IP20

23. AUTOMATIC PHASE SWITCHES

PURPOSE

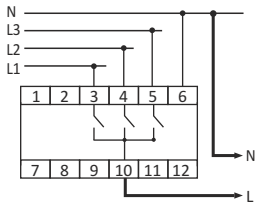
Automatic phase switches serve to maintain continuity of power supply to single-phase receivers in the event of power phase decay or a drop in its parameters below standard values.
They are exemplify one-phase automatic switching system. They are especially suitable where is required the continuity of correct power supply parameters, for example: refrigeration, airconditioning, computer networks and telecommunications, cable television, alarm systems, etc.



PF-431 WITH „PRIORITY" PHASE

FUNCTIONING

Three-phase voltage (3×230V+N) is supplied to the input of the switch. Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is supplied to the output of the switch. The electronic system of the switch controls voltage values of the phases supplied in such a way as to ensure that output voltage is not lower than 195V. The phase that has correct parameters is directed to the output of the switch. The L1 phase is the priority phase, i.e. if its parameters are correct, this phase will be always switched to the output. If the voltage parameters of the L1 phase are not correct or if voltage decay occurs in this phase, the electronic system will switch the L2 phase to the output (provided that its parameters are correct). In case of a simultaneous lack of correct voltages in the L1 and L2 phases, the L3 phase will be switched to the output. When the correct supply voltage returns to the L1 phase, the electronic system will switch this phase to the output.



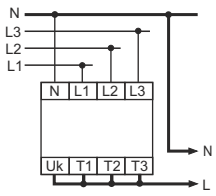
supply voltage	3×230V+N
output voltage	230V AC
load current (AC-1)*	<16A
activation threshold (L1,L2)	<195V
activation threshold (L3)	<190V
hysteresis	5V
voltage measurement error	±1%
switching time	0.3sec
signalling input voltage	3×LED
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

* The actual permissible overload depends on the nature of the receivers. In case of powering large home appliances, heating, lightning (LED meta halogen, ESL bulbs) it is recommended to use the PF-441 switch with additional contactors.

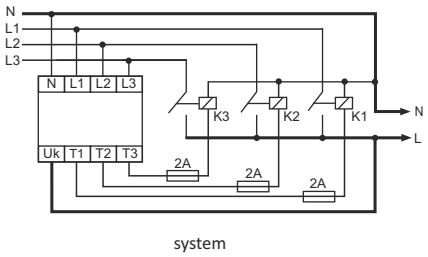
PF-441 FOR CO-OPERATING WITH CONTACTORS. WITH „PRIORITY" PHASE. WITH LOWER (195V) AND HIGHER (250V) ACTIVATION THRESHOLD

FUNCTIONING

The directly connected switch is used for supplying the single-phase circuit whose current-load does not exceed 16A. For the circuits that have a current-load higher that 16A, a configuration is used that consists of a switch and three contactors that have a properly selected current-carrying capacity. Three-phase voltage (3×230V+N) is supplied to the input of the switch (L1, L2, L3, N). Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is directed to the output of the switch (T1, T2, T3). The electronic system of the switch controls voltage values of the phases supplied. The phase that has correct parameters is switched to the output of the switch. The L1 phase is the priority phase, i.e. if its parameters are correct, this phase will be always switched to the output. If the voltage parameters of the L1 phase are not correct or if voltage decay occurs in this phase, the electronic system will switch the L2 phase to the output (provided that its parameters are correct). In case of a simultaneous lack of correct voltages in the L1 and L2 phases, the L3 phase will be switched to the output. When the correct supply voltage returns to the L1 phase, the electronic system will switch this phase to the output. The switch-over time (required for voltage to occur at the output) after the decay of a currently activated phase is from 0.5 to 0.8 sec. (during this time the receivers are not supplied). Uk input is used for controlling the voltages activated. The system enables the activation of only one phase. In this way the simultaneous switching of voltages of two phases to the output is prevented. Such simultaneous switching of voltages might lead to a phase-to-phase fault. Also, the defect of the contactor (for example, a break in the coil circuit, suspending or burning out of the working contactor) will cause the switching of the receiver to another phase despite the fact that the voltage in a given phase is correct. If the contacts of the contactor are permanently closed, the system will not switch to another contactor despite the fact that the voltage in this phase is incorrect. After the activation of supply voltage (at least one phase), the system examines the correctness of voltages supplied for 2 seconds and only after that time the system switches the phase to the output.



direct system connection



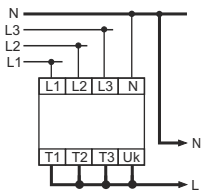
system with contactors

supply voltage	3×230V+N
output voltage	230V AC
load current	
without contactors	<16A
with contactors	up to max capacity of the contacts
activation threshold	
lower	195V
upper - adjustable	250V
hysteresis	5V
voltage measurement error	±1%
switching time	0.5÷0.8sec
working temperature	-25÷50°C
power indication	green LED
phase signalling	3×yellow RED
terminal	2.5mm² screw terminals
dimensions	4 modules (70mm)
mounting	on TH-35 rail
protection level	IP20

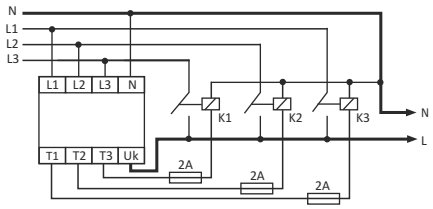
PF-451 FOR CO-OPERATING WITH CONTACTORS. WITHOUT „PRIORITY" PHASE WITH ADJUSTABLE LOWER (150÷210V) AND HIGHER (230÷260V) ACTIVATION THRESHOLD

FUNCTIONING

The directly connected switch is used for supplying the single-phase circuit whose current-load does not exceed 16A. For the circuits that have a current-load higher that 16A, a configuration is used that consists of a switch and three contactors that have a properly selected current-carrying capacity. Three-phase voltage (3×230V+N) is supplied to the input of the switch (L1, L2, L3, N). Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is directed to the output of the switch (T1, T2, T3). The electronic system of the switch controls voltage values of the phases supplied. The phase that has correct parameters is switched to the output of the switch. Phase switching sequence is not specified the phase that has the best parameters is always switched to the output. Switching to another phase that has correct parameters occurs only after a drop in values of parameters of the currently used phase. The switch-over time (required for voltage to occur at the output) after the decay of a currently activated phase is from 0.5 to 0.8 sec (during this time the receivers are not supplied). Uk input is used for controlling the voltages activated. The system enables the activation of only one phase. In this way the simultaneous switching of voltages of two phases to the output is prevented. Such simultaneous switching of voltages might lead to a phase-to-phase fault. Also, the defect of the contactor (for example: a break in the coil circuit, suspending or burning out of the working contactor) will cause the switching of the receiver to another phase despite the fact that the voltage in a given phase is correct. If the contacts of the contactor are permanently closed, the system will not switch to another contactor despite the fact that the voltage in this phase is incorrect. After the activation of supply voltage (at least one phase), the system examines the correctness of voltages supplied for 2 seconds and only after that time the system switches the phase to the output.



direct system connection



system with contactors

supply voltage	3×230V+N
output voltage	230V AC
load current	
direct system connection	<16A
system with contactors	up to max. capacity of the contacts
activation threshold	
lower - adjustable	150V÷210V
upper - adjustable	230÷260V
hysteresis	5V
voltage measurement error	±1%
switching time	0.5÷0.8sec
power consumption	≤1W
working temperature	-25÷50°C
power indication	green LED
phase signalling	3×yellow RED
terminal	2.5mm² screw terminals
dimensions	5 modules (85mm)
mounting	on TH-35 rail
protection level	IP20

PF-452 OUTPUT VOLTAGE PHASE WITH ADJUSTABLE LOWER (150÷210V) AND HIGHER (230÷260V) ACTIVATION THRESHOLD AND ACTIVATION TIME (2÷10 sec)

Three-phase voltage (3×230V + N) is supplied at the input of the switch (L1, L2, L3, N). Two-phase voltage is directed to the output of the switch (R1, R2). The electronic system of the switch controls voltage values of the supplied phases. The two phases with the correct parameters are directed to the outputs. Phase switching order is not specified – phases with the best parameters are always directed to the outputs. If the parameters of one phase start to decrease, system will switch to the next good phase.

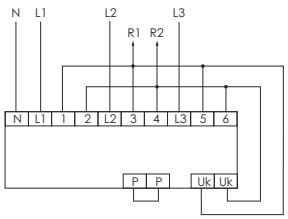
Function A (no PP jumper): If only one phase of the supply voltage will have good parameters, it will be connected to both the R1 and R2 outputs.

Function B (PP jumper): If only one phase of the supply voltage will have good parameters, it will be connected only to the R1 output.

The switch can be used, for example, in the following cases:

* 400 V AC single-phase power supply (Function A) is required - receiver connected between R1 and R2 terminals;
* priority controller (Function B) – if, due to the load, it is not possible to simultaneously connect all devices to one phase, then single-phase receivers with a key role will be connected to the R1 output and powered if at least one phase is operational. Secondary receivers will be connected to the R2 output and will work only with at least two good power supply phases.

The switching time (voltage at the output) after the loss of a currently activated phase ranges from 0.5 to 0.8 sec (during this time the receivers are not powered). Uk input is used for control the applied voltages. System allows to activate only one phase to the outputs to prevent from simultaneous supplying voltages of two phases to the output which might lead to interphase short-circuit.



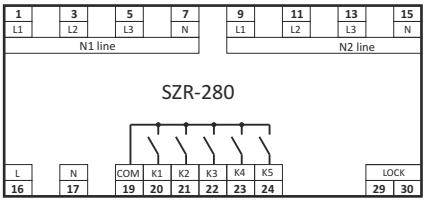
supply voltage	3×[50÷450V]+N
output voltage	
A function	400V AC
B function	2×230V+N
load current	16A
activation threshold	
lower - adjustable	150V÷210V
upper - adjustable	230÷270V
hysteresis	5V
activation time - adjustable	2÷10sec
voltage measurement error	±1%
switching time	0.5÷0.8sec
working temperature	-25÷50°C
power indication	green LED
phase signalling	3×yellow RED
output signalling	2×red LED
terminal	2.5mm² screw terminals
dimensions	5 modules (85mm)
mounting	on TH-35 rail
protection level	IP20

24. AUTOMATIC TRANSFER SWITCHING EQUIPMENT

PURPOSE

Automatic transfer switching equipment is used to control the work performance and accuracy of power lines and automatic switching power supply facility sources in the event of power line parameters decrease or total loss of voltage on the line.

SZR-280 / SZR-280 12V

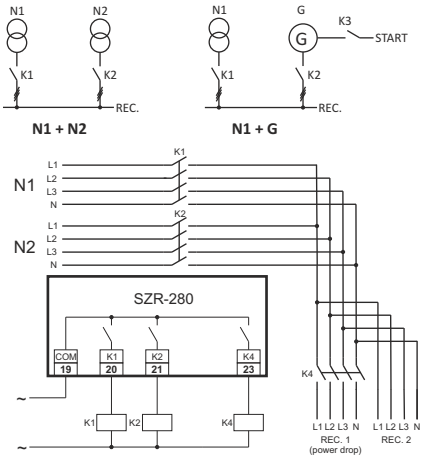


network	3-f 4-wire
power supply	
supply voltage	
SZR-280	85÷264V AC
SZR-280 12V	12V AC/DC
power consumption	<5VA
input voltage measured	
rated voltage	230V
measuring range	80÷300V
frequency	45÷50Hz
accuracy	1% of full scale + 1 digit
relay outputs	
contacts	5×[1×NO]
overload	<8A
state signalling	7×LED
working temperature	10÷50˚C
terminal	2.5mm² screw terminals
dimensions	100×75×110mm
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

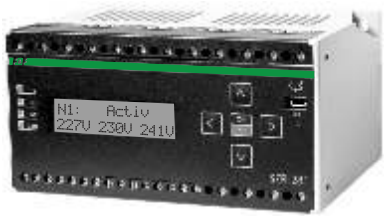
* Simultaneous control of two power lines
* Measured values TrueRMS
* Galvanic separation of measuring inputs supply lines
* Contactors control
* Support for an emergency generator exhaust
* Working in automatic mode, with the possibility of determining the priority line
* Power Dump is achieved through separation of the receiving line into two parts, with possibility to freely define of the power dump cases
* An independent determination of voltage range for each of the line for which line qualified as good, and the voltage hysteresis determination of the line qualifications
* The definition of eligibility as a good line, and the time of qualification as a bad line.
* Accelerated classification as a bad line in case of total loss of voltage on the line
* The definition of time-controlled switching on and off contactors
* Ability to connect to an external safety circuit lock the controller work
* Configure the driver through a PC using a dedicated application
* Events registration with the possibility of export of the registration file to your PC

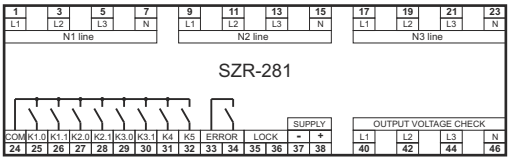
WORK MODES



Connecting system - example

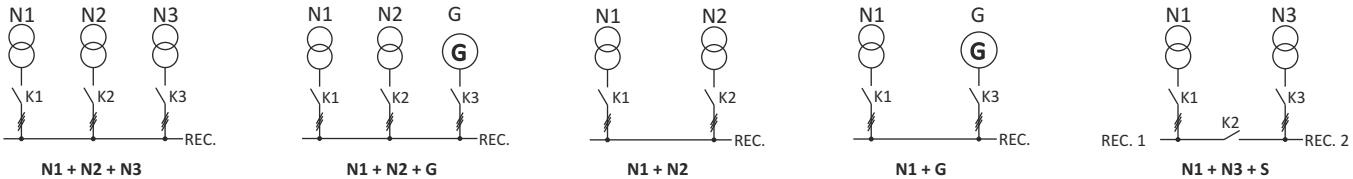
SZR-281





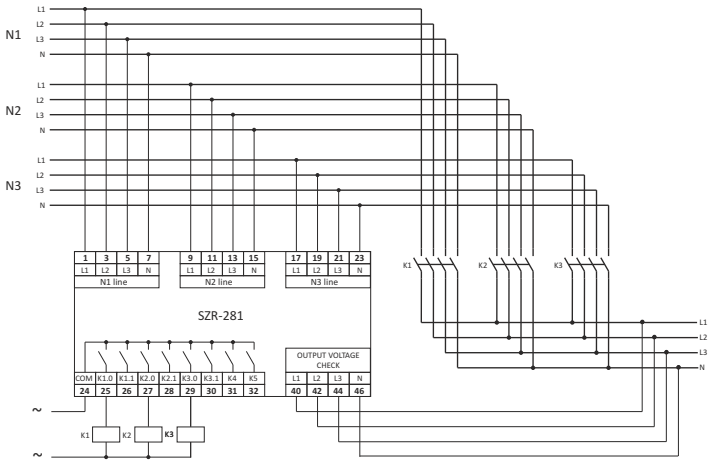
network	3-f 4-wire
power supply	
supply voltage	85÷264V AC
reserve voltage	16÷27V DC
power consumption (main/reserve)	<5VA / <10W
input voltage measured	
rated voltage	230V
measuring range	80÷300V
frequency	45÷50Hz
accuracy	1% of full scale + 1 digit
relay outputs	
contacts	8×[1×NO] + 1×[1×NO](ALARM)
overload	<8A / <2A(ALARM)
state signalling	4×LED
working temperature	10÷50˚C
terminal	2.5mm² screw terminals
dimensions	150×75×110mm
mounting	on TH-35 rail
protection level	IP20

WORK MODES



FUNCTIONS

* Simultaneous control of three power lines
* Measured TrueRMS value
* Galvanic separation of measuring inputs lines supply
* Control voltage presence on the receiving line
* Controlling contactors or motorized connectors
* Support for an emergency exhaust generator
* Working in automatic mode, with the possibility of determining the priority line
* Power Dump is achieved through separation of the receiving line into two parts, with possibility to freely define of the power dump cases
* An independent determination of voltage range for each of the line for which line qualified as good, and the voltage hysteresis determination of the line qualifications
* The definition of eligibility as a good line, and the time of qualification as a bad line.
* Accelerated classification as a bad line in case of total loss of voltage on the line
* The definition of time-controlled switching on and off contactors / motor connector
* Ability to connect to an external safety circuit lock the controller work
* Setting and monitoring of the driver through the front panel controller with LCD display and keypad
* Setting and monitoring of the controller through a PC using a dedicated application
* Event registration with the possibility of export of the registration file to your PC
* Signalling errors achieved through contact and buzzer alarm
* Ability to controller supplying by reserve voltage 24V DC
* Settings controller access lock by a PIN code

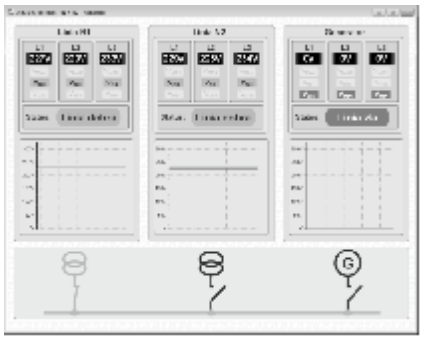


Connection scheme for N1 + N2 + N3

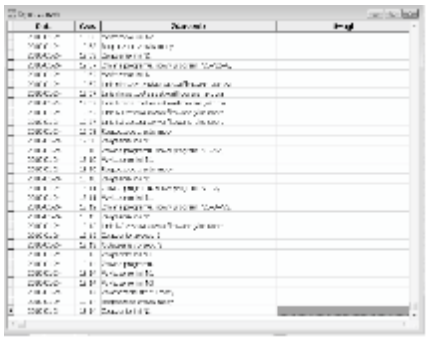
APPLICATION

Application support controller ATSE works in Windows 2000/XP/Vista/7 system and meets the minimum hardware requirements for these systems + monitor resolution min. 1024×768 pixels.

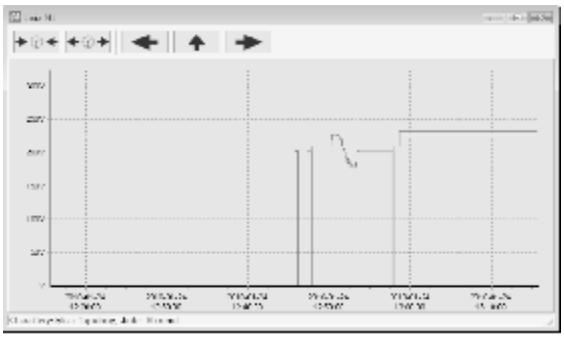
MAIN PROGRAM FUNCTIONS



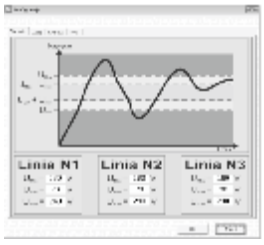
Program.
Display information window with the currently executed program.



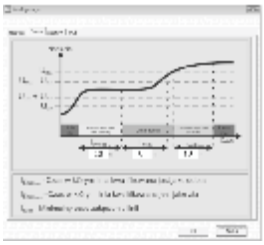
Register.
Display windos registry events.



Monitor.
Current voltage values on the inputs lines of the controller and browsing history.

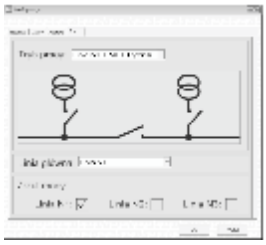


Configuration: Voltage
Setting of the parameters defining the limits of voltage minimum and maximum on each power supply lines, and the width of the hysteresis zone.



Configuration: Time
Setting of the duration of the qualification as a line of good and bad, and the minimum time for which the power line is attached.

Configuration: Devices
Setting the parameters associated with the types and characteristics of the devices connected to the controller (motor contactors or switches), sometimes switching on and off the devices, and the time interval between one except the device and attaching a second one.



Configuration: Working mode
Working mode program controller selection, choice of main line, and the line selection, which is implemented power dump.

System configuration:
- output voltage control
- the LCD backlight
- the sound of the siren
- activation of the log registration

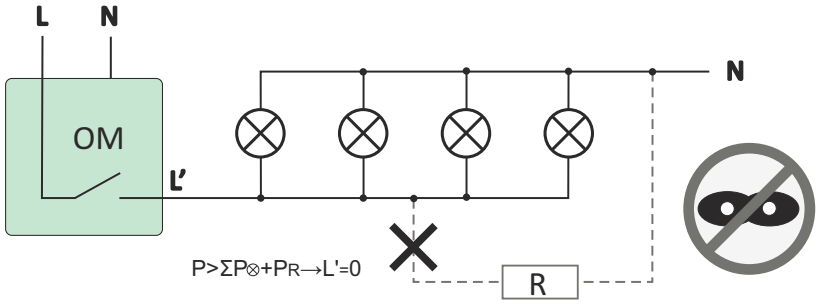
25. POWER CONSUMPTIONS LIMITERS

PURPOSE

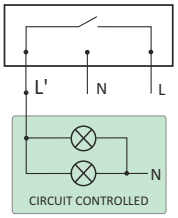
Power consumption limiters are devised for the automatic disconnection of power from the circuit of single-phase wiring systems once the rated power consumption of the receivers incorporated into the system is exceeded.

FUNCTIONING

The limiter enables the user to supply power to the circuit if the total consumed power applied to the receivers constituting the system is lower than the preset value on the limiter's scale. Once the rated power consumption threshold in the controlled circuit is exceeded, the element is automatically disconnected from the power source. The supply is reinstated automatically once the preset time lapses. If the value of power consumption remains over the rated input, the power supply to the circuit is cut off again.

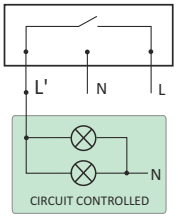


OM-1 WITH A CONSTANT TIME OF RETURN



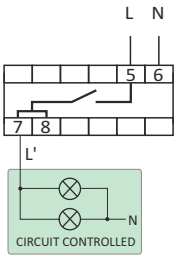
power supply	230V AC
load current	<16A
power limit	200÷2000VA
switching ON delay	1.5÷2sec
return supply hysteresis	2%
return supply time	30sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

OM-2 WITH ADJUSTABLE TIME OF RETURN



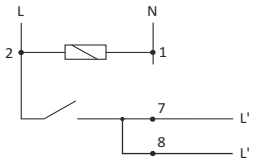
power supply	230V AC
load current	<16A
power limit	200÷2000VA
switching ON delay	1.5÷2sec
return supply hysteresis	2%
return supply time	4÷150sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	50×67×26mm
mounting	two screws to substrate
protection level	IP20

OM-631 WITH A CONSTANT TIME OF RETURN

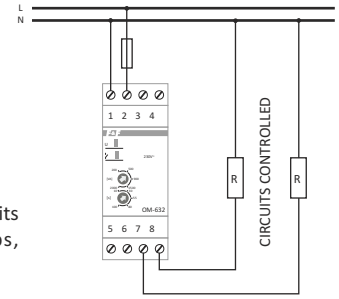


power supply	230V AC
load current	<16A
power limit	200÷1000VA
switching ON delay	1.5÷2sec
return supply hysteresis	2%
return supply time	30sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

OM-632 FOR CIRCUITS WITH CONVERTERS

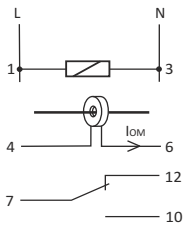


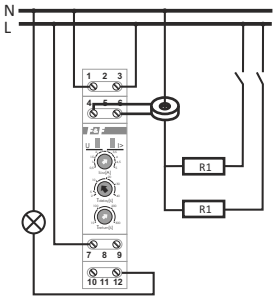
Limiter adapted for the protection of circuits with converters, e.g. fluorescent lamps, transformers.



power supply	230V AC
contact	1×NO
load current	
for cosϕ=1	<16A
for cosϕ≠1	<4A
power limit	200÷2000VA
switching ON delay	1÷2sec
return hysteresis	2%
return supply time	10÷100sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

OM-611 TO WORK WITH A CURRENT TRANSFORMER



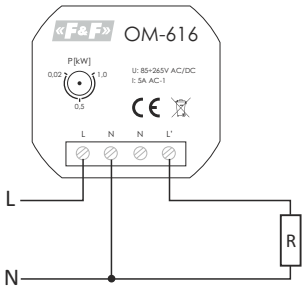


power supply	230V AC
load current	<8A
contact	separated 1×NO/NC
activation threshold - adjustable	0,5÷5A
switching ON delay - adjustable	2÷40sec
return supply hysteresis	2%
return supply time - adjustable	15÷300sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

The relay is adapted to cooperate with current transformer whose primary circuit is connected to the circuit to be measured, and output terminals for measuring the OM, which allows for control circuits of any load and the actual setting of the relay activation threshold higher than 5A (I_{OM}). Range of measured current dependence on the transmission transformer for example, from 5A to 50A with the transmission ratio of 10:1 for the transformer 50/5A.

OM-616 WITH VOLTAGE RELAY FUNCTION

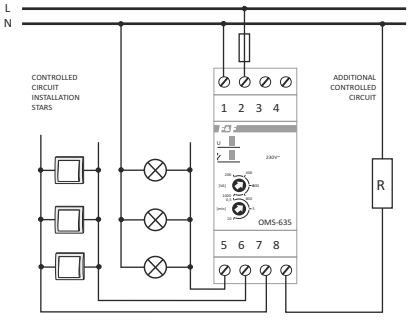
NEW !



power supply	85÷265V AC
load current	<5A
contact	separated 1×NO/NC
POWER	
power activation threshold - adjustable	0.02÷1kW
activation time	4sec
return time	30sec
VOLTAGE	
activation threshold	
lower UL	150V
upper UH	270V
activation time	
lower	10sec
upper	0.3sec
power consumption	0.8W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=20mm
mounting	in flush mounted Ø60
protection level	IP20

Power limiter designed for direct control of power sockets. Useful in public buildings, hotels, dormitories, hospitals, etc. It allows you to limit the power consumption of a single socket to small values. Additional function of the voltage relay is the disconnection of the output when the supply voltage exceeds 270 V or falls below 150 V.

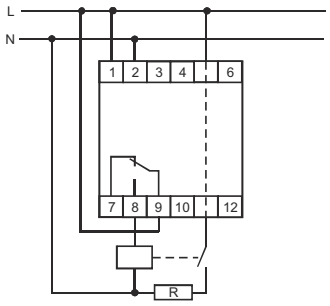
OMS-635 WITH STAIRCASE TIMER



power supply	230V AC
load current	<16A
switch-on time lighting - adjustable	0.5÷10min.
power limit	200÷1000VA
switching ON delay	1.5÷2sec
return supply hysteresis	2%
return supply time	30sec
terminal	2.5mm² screw terminals
power consumption	0.8W
working temperature	-25÷50°C
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

The OMS-635 power consumption limiter allows the user to maintain lighting in halls, staircases or other places active for a specified time when it will then turn off automatically. The user may also preset the automatic disconnection of power supply to a single-phase wiring system if the rated power input to the receivers in a given circuit is exceeded.

OM-633 WITH FUNCTION VOLTAGE RELAY



supply voltage	230V AC
contact	separated 1×NO/NC
overload	<16A
POWER	
activation threshold - adjustable	1÷10kW
activation time -adjustable	1÷300sec
return time - adjustable	4÷600sec
VOLTAGE	
activation threshold	
lower UL	150÷210V
upper UH	230÷260V
activation time	
lower	5sec
upper	0.3sec
diameter hole	5mm
working temperature	-25÷50°C
dimensions	3 modules (52mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

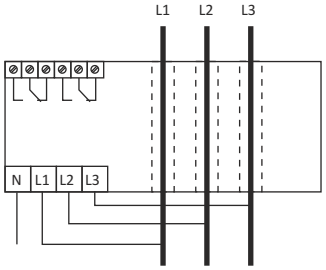
* adjustable power threshold 1÷10 kW
* protection against supply voltage reduction UL (150÷210 V)
* protection against supply voltage increase UH (230÷260 V)
* switching counter with automatic power-off of the system after exceeding a fixed number of actuations
* automatic power lock of the system for 10 min. if power level is exceeded 5 times
* automatic power-off when the power consumption is 8-fold higher than the set threshold
* automatic power-off when the power consumption is greater than 16 kW
* adjustable response time (1 sec ÷ 3 min.)
* adjustable restart time (4 sec ÷ 6 min.)

OM-630 THREE-PHASE DIRECT MEASUREMENT UP TO 50 kW

FUNCTIONS

* measurement of three-phase active power
* three variants of calculation power (for different types of load)
* control of asymmetry, phase sequence and the presence of circuit protection
* function relay priority
* a function of three-phase voltage relay
* time lock limiter due to frequent exceedances of the threshold set
* alarm limit value is exceeded capacity
* regulation of activation and return time

supply voltage	3×[50÷450V+N]
contact	separated 2×[1×NO/NC]
overload	2×8A
POWER	
activation threshold - adjustable	5÷50kW
setting precision	0.5kW
activation time Toff - adjustable	1÷240sec
return time Ton - adjustable	2÷3600sec
VOLTAGE	
activation threshold	
lower	<160V
upper	>260V
activation time	
lower	5sec
upper	0.,1sec
measurement accuracy	
voltage 50÷300V	<2%
current 3÷100	<3%
diameter hole transformer	10mm
power consumption	≤1.5V
working temperature	-25÷50°C
dimensions	6 modules (105mm)
mounting	on TH-35 rail
protection level	IP20



internal circuits of current transformers

FUNCTIONING

The OM-630 relay analyzes the power consumption of the devices connected to the receiving line on the basis of continuous measurements of voltages connected to terminals L1, L2, L3 and N as well as the currents flowing through the built-in current relays. When the power consumed by the receivers exceeds the value set by the user than after the Ton time the K1 relay and load will be disconnected. After the Toff time the K1 relay will reconnect. If the power consumption is still exceeded, then after the Ton time the load will be disconnected again. This sequence can be repeated six times, after which the load will be disconnected for 10 minutes. After that interval the sequence starts from the beginning.
In addition, the limiter is equipped with the power supply voltage control function and when the voltage drops below 160 V, or exceeds 260 V, then the limiter will switch off the K1 relay and disconnect the receivers.

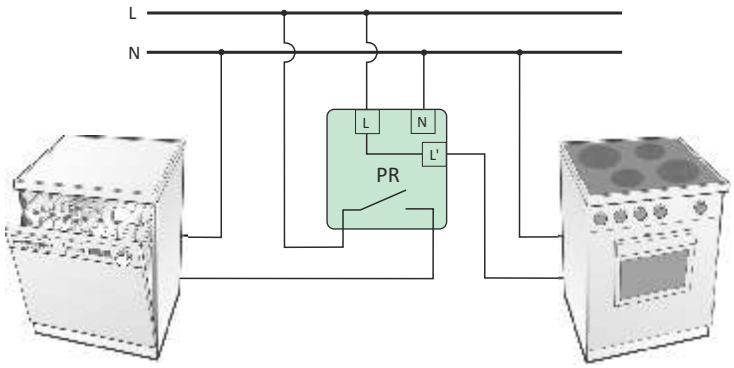
26. PRIORITY RELAYS

PURPOSE

Priority relays are designed to control the value of current drawn by electric receivers and their control units in cases where their simultaneous work could result in circuit overload or current overload protection activation.

FUNCTIONING

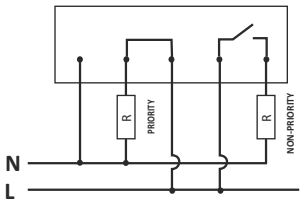
The potentiometer sets the value of drawn current in the priority circuit, above which the receiver cuts off the non-primary circuit. A drop in current consumption in the priority circuit below the set threshold value will result in an automatic activation of the non-priority circuit. In cases where the priority receiver is already activated, the priority relay will prevent the activation of the non-priority receiver.



ATTENTION!

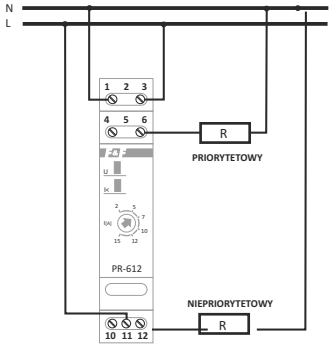
Circuits equipped with master relays require over-current security devices with increased actuation time, in order to prevent them operating before actuation of the relay.

PR-602 2÷15A SETTING RANGE



power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contactor
priority receivers current	<15A
contact	separated 1×NO
switching current	2÷15A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0.4W
working temperature	-25÷50°C
dimensions	50×67×26mm
terminal	2.5mm² screw terminals
mounting	two screws to substrate
protection level	IP20

PR-612 2÷15A SETTING RANGE

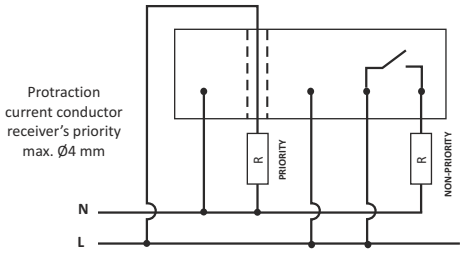


power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contactor
priority receivers current	<15A
contact	separated 1×NO/NC
switching current	2÷15A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

WITH THE RECEIVER'S CURRENT CORD SECTION

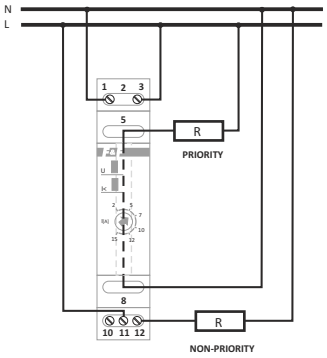
For priority circuits with a load capacity higher than 16 A use the relays with the pass-through channel for the current wire of the receiver (max Ø=4 mm), which is galvanically isolated from the measuring system of the relay.

PR-603 SETTING RANGE 2÷15A



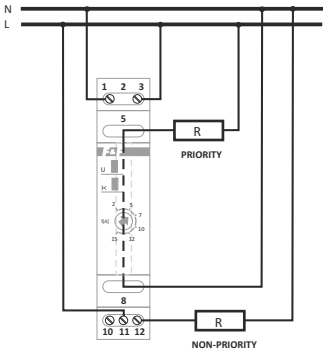
power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contactor
priority receivers current	limited cross-section threaded wire (max Ø=4mm)
contact	separated 1×NO
switching current	2÷15A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0,4W
working temperature	-25÷50°C
dimensions	50×67×26mm
terminal	2.5mm² screw terminals
mounting	two screws to substrate
protection level	IP20

PR-613 SETTING RANGE 2÷15A



power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contractor
priority receivers current	limited cross-section threaded wire (max Ø=4mm)
contact	separated 1×NO/NC <16A
switching current	2÷15A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PR-615 SETTING RANGE 4÷30A



power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contractor
priority receivers current	limited cross-section threaded wire (max Ø=4mm)
contact	separated 1×NO/NC <16A
switching current	4÷30A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

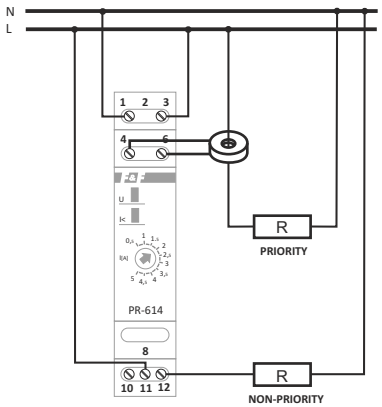
ATTENTION!

Priority receiver current can be higher than 15A. It is only restricted by the receiver's current cord section (galvanic separated from the measurement system) revved through the relay's throughway channel.

TO CO-OPERATION WITH A CURRENT TRANSFORMER

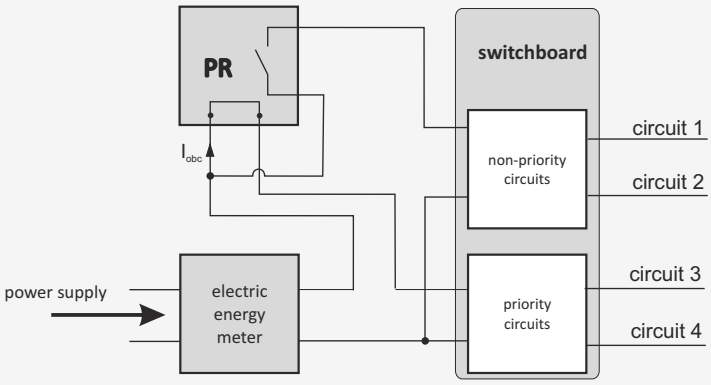
PR-614

The relay is designed to work with the current transformer with secondary current 5A. Transformer primary circuit is included in the priority receiver circuit, and secondary to the measurement relay terminals.
Example: For the receiver a priority for a maximum load of 140A we use the parameters of current transformer 150/5A. Torque is 30 at setting values on a scale equal to 2A relay will work with the actual value of current equal to 60A (2A×30=60A).



power supply	230V AC
non-priority receivers current	<16A or higher with the use of a contactor
measurement input current 4-6	<5A
contact	separated 1×NO/NC
switching current	0.5÷5A
return hysteresis	10%
switching delay	0.1sec
return delay	0.1sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

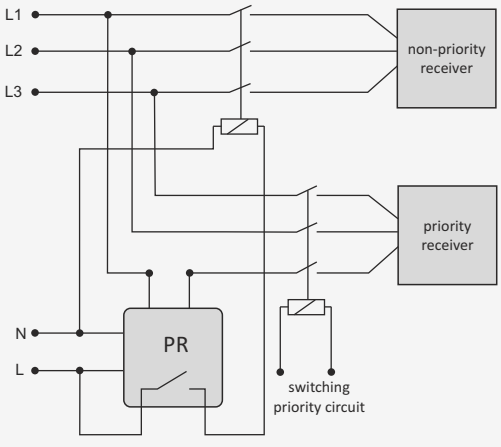
PRACTICAL SOLUTIONS



Protection against exceeding the limit of the contractual capacity

PRACTICAL SOLUTIONS

All PR can be used for three-phase grid and three-phase receivers. In case of symmetrical receivers it is enough to connect only one PR relay to any phase. For a non-symmetrical use one relay per each of the phases with an accordingly set activation threshold that depends on the load of the given phase.



Use of PR in a symmetrical system of three-phase receiver

27. CURRENT RELAYS

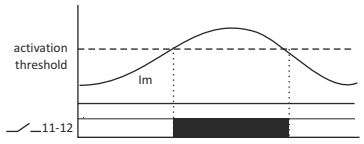
PURPOSE

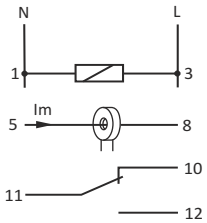
Current relays are used to control the flow of current in the circuit measured with the function switch contact in case of exceeding the value of current intensity above set thresholds.

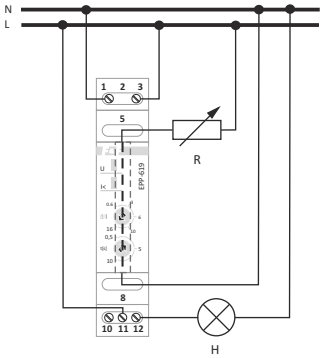
EPP-619 WITH RECEIVER'S CURRENT CORD SECTION

FUNCTIONING

Adjustable potentiometer value is the measured intensity of the current circuit, above which the contact is closed (pos. 11-12). Intensity of the current decline in value below the set threshold will automatically open contact (item 11-10).





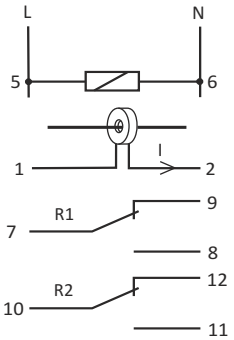


power supply	230V AC
contact	separated 1×NO/NC
load current	<16A
current measuring circuit Im	limited cross-section of the cable (max Ø=4mm)
switching current - adjustable	0.6÷16A
return hysteresis	10%
activation time - adjustable	0.5÷10sec
return time	0.5sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

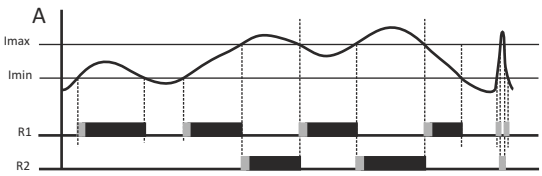
EPP-620 FOUR FUNCTIONS. WITH ADJUSTABLE LOWER AND UPPER ACTUATION THRESHOLD

FUNCTIONING

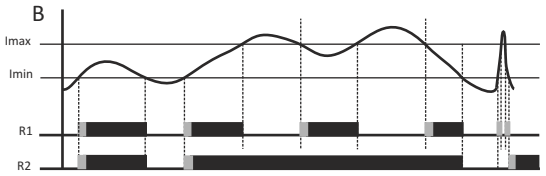
The relay is designed to work with the current transformer with secondary current 5A. Transformer's primary circuit is included in the circuit being measured, and secondary to the terminals of the measuring relay. Potentiometers are set thresholds for current - the lower Imin and upper Imax. Excess over the measured intensity of the current closes the appropriate contacts in accordance with the desired work function. Contact closure is delayed setting potentiometers T1 (for contact R1) and T2 (for contact R2).



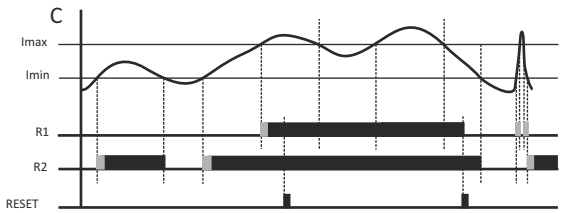
power supply	230V AC
contact	2× separated [1×NO/NC]
R1 and R2 load current	2×8A
1-2 current measuring input	<5A
switching current - adjustable	
Imin	0.02÷1A
Imax	0.5÷5A
return hysteresis	10%
T1 and T2 activation time - adjustable	0÷20sec
return time	0.5sec
power consumption	0.4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20



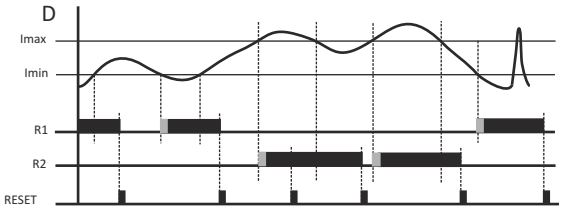
After crossing the Imin, contact R1 will close. After crossing the threshold of Imax contact R2 will close and R1 contact will be opened.



After crossing the Imin contacts R1 and R2 will close. After crossing the threshold of Imax R1 contact will open and R2 contact is closed.



After crossing the Imin the R2 contact will be closed. After crossing the threshold of Imax the R1 contact will be closed. Contact R1 is locked until you press the RESET button. If value exceeding Imax, the R1 contact doesn't react to the RESET button.



After crossing the Imin the R1 contact will be closed. After crossing the threshold of Imax the R2 contact will be and R1 contact is opened. Contact R1 and R2 are locked until you press the RESET button. If a value exceeding Imax, the contact R2 doesn't react to RESET.

EPM-621 POWER UPTAKE DIRECTION (DRAWN/RETURNED) RELAY

NEW !

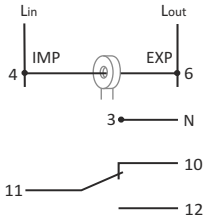
PURPOSE

EPM-621 is a bi-directional active electricity meter for single-phase network. It is used for signaling the exceeding of set level of power drawn from the network, returned to the network, or in both directions.

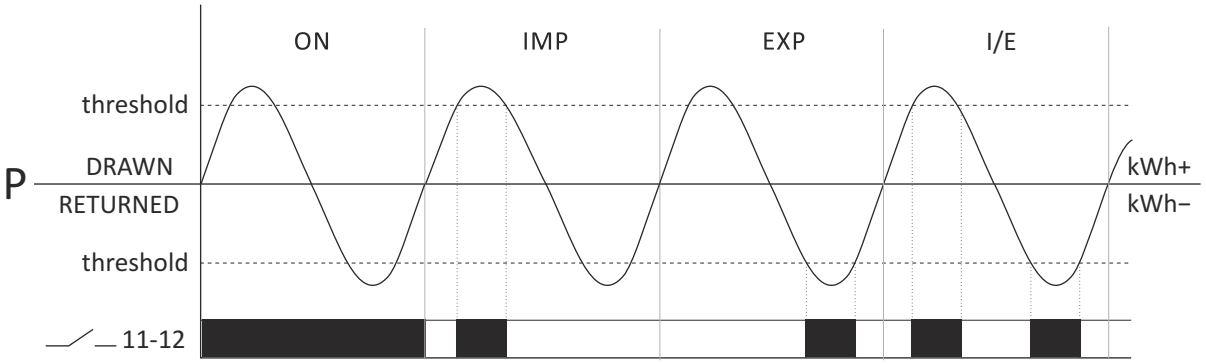
FUNCTIONING

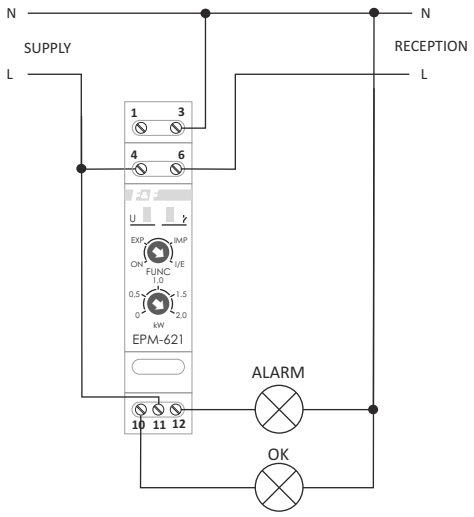
Operation mode and activation threshold value are set using the switches. The relay has 4 modes of operation:
Mode selection:
* ON - test mode (output relay activation)
* EXP - control of power returned to the network (flow direction Receipt -> Source)
* IMP - control of the power drawn from the network (flow direction Source -> Receipt)
* I/E - power control regardless of the direction of the flow

After exceeding the preset value of the power the contact will be closed (pos. 11-12). Power drop below the set threshold will automatically open contact (pos. 11-10).



power supply	80÷265V AC
contact	separated 1×NO/NC
load current	<16A
current measuring circuit Im	<16A
measuring range	0÷2kW
return hysteresis	5%
activation time	1sec
return time	1sec
power consumption	0.8W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20





28. MICROPROCESSOR-BASED RELAYS FOR ELECTRIC MOTORS

EPS-D

PURPOSE

The EPS-D is intended as a safety device for 3-phase electric motors. It is extremely efficient for expensive applications where reliability is essential, like for pumps, hydrophores, elevators, transporters, hoists, fans, centrifuges, compressors, etc.

FUNCTIONING

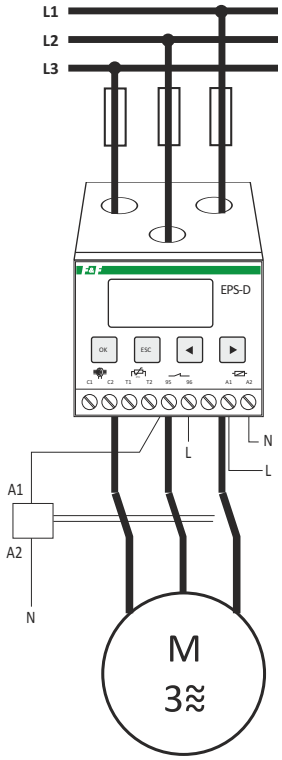
The relay controls loads for all phases. Based on the values preset by the user, as well as the actual current consumed by the motor, the operation of the motor is analysed by the relay's CPU. By comparing the operation of the motor in question with model characteristics stored in the CPU, the device detects all defects very quickly and accurately, and immediately switches off the motor.

SECURITY FEATURES

* thermal protection
* protection against idle operation and dry run (undercurrent protection)
* protection against mechanical overload
* protection against fan stall
* protection against frequent restarts
* protection against phase collapse
* protection against phase sequence switch
* protection against load unbalance
* protection against earth fault

OPTIONAL SECURITY FEATURES

* GAINST SHOCK (an additional Ferranti transformer enables efficient protection within the range of 30 mA 500 mA.
  Response time: approx. 100 msec).



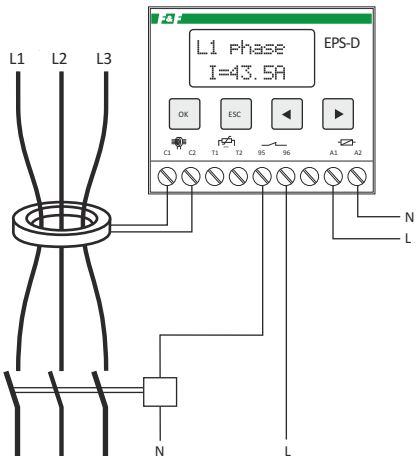
ADDITIONAL FEATURES

* motor load preview
* message concerning the cause of protection activation
* motor's thermal memory

The relay's LCD screen shows an actual current value for a single, selected phase. This is available in absolute (A) or relative (%) values in relation to the set current value In. additionally, the device displays the scope of the measured current by means of characters (I > 105% In), (I < 95% In), (95% In I 105% In). The relay measures the real current value up to and including the 7th harmonic. The measurement accuracy is 1%.

Version	Setting range
5A	1÷5A
20A	5÷25A
100A	20÷100A

to cooperating
with current transformer



power supply	160÷242V 50/60 Hz
main circuits insulation voltage	690 V~
contact overload (AC-15)	2A
effective current unbalance	>30%
delay at phase decay and unbalance	4sec
cable diameter max	Ø14
terminal	2.5mm² screw terminals
dimensions	72×59×88mm
weight	385g
mounting	on TH-35 rail
protection level	IP20

29. FUSE MODULES

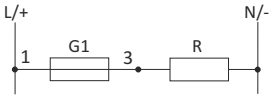
PURPOSE

Fuse modules serve as a security device for electric receivers against current increase over the nominal current value for the secured receiver.

FUNCTIONING

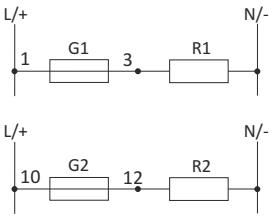
Fuse actuation (blowing of fuse link) is signalled by a red LED.

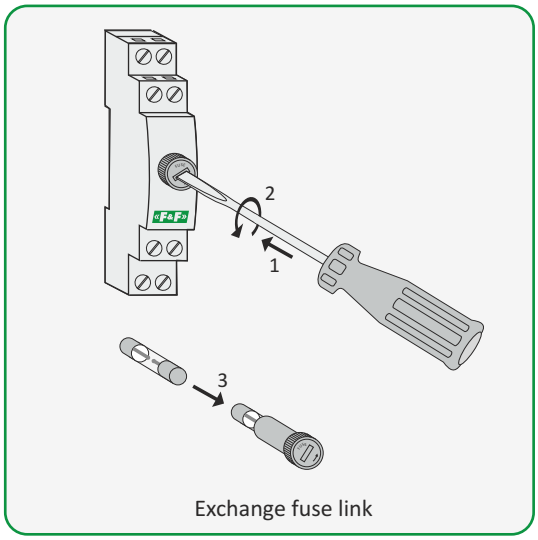
BZ-1 One-socket



Fuse link
Ø5×20

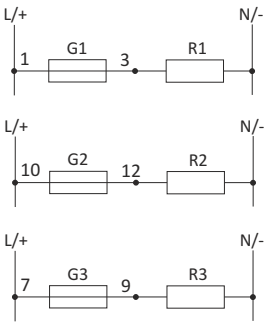
BZ-2 Two-socket





Exchange fuse link

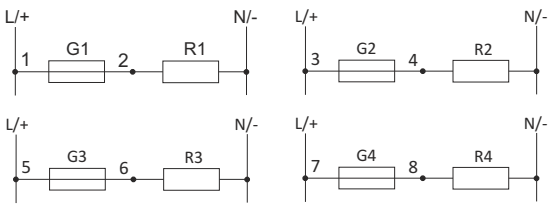
BZ-3 Three-socket



ATTENTION!

The product range of F&F fuses are fast (S) and delayed (T) with values in the field of 0.1A ÷ 6.3A.

BZ-4 Four-socket



fuse	fuse link Ø5×20mm
voltage	250V AC/DC
current	<6.3A
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	
BZ-1, BZ-2, BZ-3	1 module (18mm)
BZ-4	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

30. ELECTRIC SUPPLIERS AND TRANSFORMERS

ZS-1 ÷ ZS-6 12W TRANSFORMER-BASED

Type	Output voltage	Current
ZS-1	5V DC	2A
ZS-2	12V DC	1A
ZS-3	18V DC	0.66A
ZS-4	24V DC	0.5A
ZS-5	15V DC	0.8A
ZS-6	48V DC	0.25A

input voltage	230V AC
output power	12W
pulsation	<3mV RMS
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	6 modules (105mm)
weight	550g
mounting	on TH-35 rail
protection level	IP20

With long-term overload a power failure will occur at the output due to the triggering of thermal fuse inside the stabilizer. After cooling, the power unit will automatically resume working.

ZI-20, ZI-21 12W PULSE

Type	Output voltage	Current
ZI-20	12V DC	1.0A
ZI-21	24V DC	0.5A

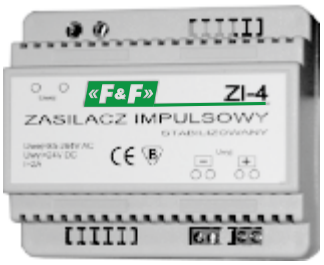
input voltage	100÷264V AC
output power	12W
current limit	Imax=110% Iout
minimum overload	0%
keying frequency	70kHz
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
weight	80g
mounting	on TH-35 rail
protection level	IP20

ZI-22, ZI-24 30W PULSE

Type	Output voltage	Current
ZI-22	12V DC	2.5A
ZI-24	24V DC	1.25A

input voltage	100÷264V AC
output power	30W
current limit	Imax=110% Iout
minimum overload	0%
keying frequency	70kHz
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
weight	190g
mounting	on TH-35 rail
protection level	IP20

ZI-1 ÷ ZI-6 50W PULSE



Type	Output voltage	Current
ZI-1	5V DC	10A
ZI-2	12V DC	4A
ZI-3	18V DC	3A
ZI-4	24V DC	2A
ZI-5	15V DC	3.3A
ZI-6	48V DC	1A

input voltage	85÷264V AC
output power	50W
current limit	Imax=110% Iout.
minimum overload	0%
keying frequency	70kHz
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	6 modules (105mm)
weight	190g
mounting	on TH-35 rail
protection level	IP20

ZT-1 ÷ ZT-4 TRANSFORMER-BASED WITH PULSE STABILIZER

Type	Output voltage	Current
ZT-1	5V DC	3A
ZT-2	12V DC	2A
ZT-4	24V DC	1A

input voltage Uin	180÷264V AC
output power	25W
current limit	Imax=110% Iout.
minimum overload	0%
keying frequency	52kHz
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	6 modules (105mm)
weight	742g
mounting	on TH-35 rail
protection level	IP20

ZI-61-12
ZI-61-24 60W PULSE

NEW!

Type	Output voltage	Current
ZI-61-12	12V DC	5A
ZI-61-24	24V DC	2.5A

input voltage	180÷264V AC
output power	60W
efficiency	87%
starting current	40A (230V AC)
leakage current	1mA (230V AC)
stabilization of the output voltage	
at the change of the output voltage	±1%
at the change of the output current	±1%
voltage adjustment range	
ZI-61-12	10.8÷13.8V
ZI-61-24	21.6÷28.0V
pulsation and noises	
ZI-61-12	240mVp-p
ZI-61-24	360mVp-p
overload	120÷180% Iout
overvoltage protection threshold	
ZI-61-12	18÷23V
ZI-61-24	36÷45V
thermal protection threshold	135÷165°C
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	4.5 module (78mm)
weight	270g
mounting	on TH-35 rail
protection level	IP20

PROTECTION

* short circuit - in the case of an overload or short circuit the output voltage is automatically disconnected. The power supply cyclically attempts to switch on the power and at the moment the cause of the protection activation vanishes the rated power voltage is restored.
* overvoltage - cut off the output voltage. Back to normal operation is possible after switching off and subsequent restoration of the power supply;
* thermal - cut off the output voltage. When the temperature falls to a safe value the output voltage is restored.

ZI-100-12
ZI-100-24 100W PULSE

NEW!

Type	Output voltage	Current
ZI-100-12	12V DC	8.3A
ZI-100-24	24V DC	4.15A

input voltage	180÷264V AC
output power	100W
efficiency	88%
starting current	40A (230V AC)
leakage current	1mA (230V AC)
stabilization of the output voltage	
at the change of the output voltage	±1%
at the change of the output current	±1%
voltage adjustment range	
ZI-100-12	10.8÷13.8V
ZI-100-24	21.6÷28.0V
pulsation and noises	
ZI-100-12	240mVp-p
ZI-100-24	360mVp-p
overload	110÷160% Iout
overvoltage protection threshold	
ZI-100-12	18÷23V
ZI-100-24	30÷40V
thermal protection threshold	135÷165°C
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	6 modules (100mm)
weight	310g
mounting	on TH-35 rail
protection level	IP20

PROTECTION

* short circuit - in the case of an overload or short circuit the output voltage is automatically disconnected. The power supply cyclically attempts to switch on the power and at the moment the cause of the protection activation vanishes the rated power voltage is restored;
* overvoltage - cut off the output voltage. Back to normal operation is possible after switching off and subsequent restoration of the power supply;
* thermal - cut off the output voltage. When the temperature falls to a safe value the output voltage is restored

ZI-75-12 / ZI-120-12 / ZI-240-12 PULSE INDUSTRIAL POWER SUPPLIES

input voltage	
ZI-75-12	100÷240V AC
ZI-120-12	100÷240V AC
ZI-240-12	180÷264V AC
frequency	50÷60Hz
output voltage	12V DC
current overload	150%/3min.
minimum overload	0%
keying frequency	100kHz
input/output breakdown voltage	3kV
power indication	green LED
signalling overload/overvoltage	red LED
working temperature	-10÷70°C
cooling	gravitational
terminal	4.0mm² screw terminals
mounting	on TH-35 rail
protection level	IP20

Type	Power [W]	Current [A]	Dimensions [mm]	Weight [g]
ZI-75-12	75	6.25	130×57×115	530
ZI-120-12	120	10.0	130×67×115	670
ZI-240-12	240	20.0	130×127×115	960

DC OK green LED indicates the correctness of the output power. The power supply has an internal short circuit, overload, overvoltage and temperature protection.

ZI-60-24 / ZI-120-24 / ZI-240-24 PULSE INDUSTRIAL POWER SUPPLIES

Type	Power [W]	Current [A]	Regulacja wyj. [V]	Efficiency [%]	Dimensions [mm]	Weight [g]
ZI-60-24	60	2.5	22÷27V	84	130×50×90	485
ZI-120-24	120	5.0	22÷28V	87	130×75×90	630
ZI-240-24	240	10.0	22÷28V	86	130×110×90	1040

input voltage	90÷264V AC/120÷370V DC
frequency	47÷63Hz
starting current	<35A
leakage current	<3.5mA/240V AC
output voltage	24V DC
voltage adjustment range	22÷28V DC
voltage tolerance	±1%
current overload	150%/3min.
minimum overload	0%
efficiency	86%
keying frequency	100kHz
input/output breakdown voltage	3kV
input/PE breakdown voltage	1.5kV
output/PE breakdown voltage	0.5kV
isolation resistance	100MΩ/500V DC
short-circuit/overload/overvoltage /temperature protection	
power indication	green LED
signalling overload/overvoltage	red LED
working temperature	-10÷70°C
humidity (non-condensing)	95%RH
MTBF	>188000h 25°C
vibration	10÷500Hz, 2G 10min./1cycle 60min. (x,y,z)
cooling	gravitational
terminal	4.0mm² screw terminals
dimensions	130×75×90 mm
mounting	on TH-35 rail
protection level	IP20

The power supply has an adjustment knob [Adjust] for adjusting the output voltage in the range 22÷27 V. Green LED DC OK indicates the correctness of the power supply at the output. Red LED indicates current overload or overvoltage at the outputs. The power supply has an internal short-circuit, overload, overvoltage and temperature protection.

ZI 10-12P PULSE, FOR FLUSH-MOUNTED BOX

NEW !

input voltage	180÷264V AC
output voltage	12V DC
output power	10W
efficiency	82%
starting current	40A (230V AC)
leakage current	1mA (230V AC)
stabilization of the output voltage	
at the change of the output voltage	±2%
at the change of the output current	±3%
overload	140÷160% Iout
thermal protection threshold	135÷150°C
working temperature	-20÷35°C
terminal	2.5mm² screw terminals
dimensions	Ø54 (□48×43mm), h=25mm
mounting	in flush mounted Ø60
protection level	IP20

PROTECTION

* overload - in the case of an overload or short circuit the output voltage is automatically disconnected. The power supply cyclically attempts to switch on the power and at the moment the cause of the protection activation vanishes the rated power voltage is restored;
* thermal - cut off the output voltage. When the temperature falls to a safe value the output voltage is restored.

ZI-11 ÷ ZI-14 PULSE STABILIZER

Type	Input voltage	Output voltage	Current
ZI-11	8÷28V AC / 12÷37V DC	5V DC	3A
ZI-12	12÷28V AC / 16÷37V DC	12V DC	3A
ZI-13	18÷28V AC / 22÷37V DC	18V DC	3A
ZI-14	24÷28V AC / 28÷37V DC	24V DC	3A

input voltage	10÷28V AC/DC
output current	3A
current limit	Imax=110% Iout
minimum overload	0%
keying frequency	52kHz
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
weight	150g
mounting	on TH-35 rail
protection level	IP20

TR-08 / TR-12 / TR-24 MAINS TRANSFORMER

PURPOSE

Application: power supply of electrical and electronic devices which do not require a stable and properly filtered supply voltage, regardless of mains voltage fluctuations.

Type	Output voltage	Current	Power
TR-08	8V	1A	8VA
TR-12	12V	0.66A	8VA
TR-24	24V	0.5A	12VA

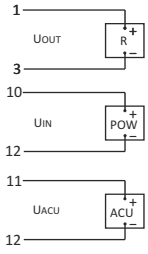
input voltage	230V AC
efficiency	85%
working temperature	-10÷40°C
terminal	2.5mm² screw terminals
dimensions	
TR-08	2 modules (35mm)
TR-12	3 modules (52.5mm)
TR-24	3 modules (52.5mm)
weight	
TR-08	271g
TR-12	325g
TR-24	433g
mounting	on TH-35 rail
protection level	IP20

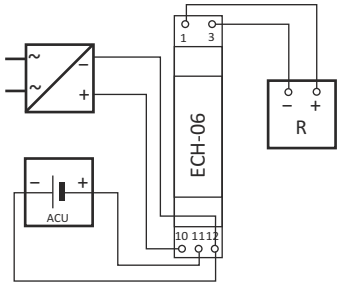
ATTENTION!

The transformer system is enabled PTC thermistor overcurrent protection.

ECH-06 RESERVE DC POWER MODULE (with battery charger 1.3 ÷ 7.2 Ah)

ECH-06 module along with an external gel battery with a nominal voltage of 12 V is the secondary power supply for receivers with a supply voltage in the range of 9÷30 V DC.





supply voltage / charging Uin	18÷30V DC
output voltage Uout	(Uin 0.5V DC / Uacu 0.5V DC)
output load current Uout	<3A
supported battery capacity	1.3÷7.2Ah
battery voltage max	13.8V DC
charging current	<0.35 A
power supply cut-off threshold	<10.5V DC
power consumption	<1W
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

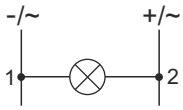
31. POWERS SUPPLY AND MULTIMETERS

SIGNAL LAMPS

LK-712 ONE-PHASE

PURPOSE

Designed to optically signal the presence of voltage in a electrical circuit.



Type	Colours of LED
LK-712 G	1×green LED
LK-712 Y	1×yellow LED
LK-712 R	1×red LED
LK-712 B	1×blue LED

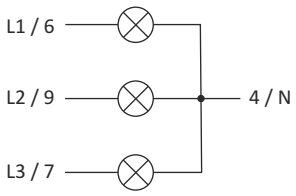
power supply (made in one range only)	5÷10V AC/DC
	10÷30V AC/DC
	30÷130V AC/DC
	130÷260V AC/DC
signalling of supply	1×LED Ø5
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

Order labelling method: LK-712 B 30÷130V — supply voltage; colour of LED

LK-713 THREE-PHASES

PURPOSE

Designed to optically signal the presence of voltage in the three-phase electrical network.
The presence of voltage in a phase is signalled by the green LED in the circuit of each phase.



Type	Colours of LED
LK-713 G	3×green LED
LK-713 Y	3×yellow LED
LK-713 R	3×red LED
LK-713 K	yellow-red-green LEDs

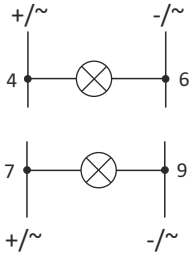
power supply	3×230V+N
rated current	1.7mA
power consumption	1.1W
voltage signalling	3×LED Ø5
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

Order labelling method: LK-713 K — colour of LEDs

LK-714 TWO ABILITY TYPE

PURPOSE

Designed to optically signal the ability of receivers, for example: work - break, opened - closed, ect.
It has two separated signal circuit: green LED and red LED.



power supply (made in one range only)	5÷10V AC/DC
	10÷30V AC/DC
	30÷130V AC/DC
	130÷260V AC/DC
states control	1×green LED Ø5
	1×red LED Ø5
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

Order labelling method: LK-714 130÷260V — supply voltage

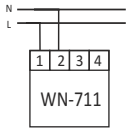
VOLTAGE INDICATORS

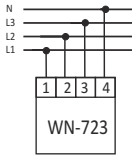
PURPOSE

Voltage indicators are devised to continually measure the value of the voltage in a single-phase or three-phase network.

SŁUPKOWE

WN-711 ONE-PHASE INDICATOR
WN-723 THREE-PHASE INDICATOR

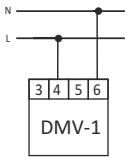


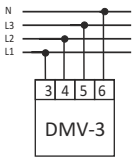


power supply	
WN-711	230V AC
WN-723	3×250V+N
voltage indicator	
WN-711	11×LED
WN-723	3×(11×LED)
indicator range	205÷245V
scale	5V
reading accuracy	2.5V
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	
WN-711	1 module (18mm)
WN-723	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

DIGITAL

DMV-1 DMV-1 TrueRMS ONE-PHASE INDICATOR
DMV-3 DMV-3 TrueRMS THREE-PHASE INDICATOR





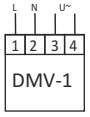
power supply	100÷300V AC
supply frequency	45÷55Hz
indicator range	100÷300V
indication accuracy	
DMV-1	1%
DMV-3	1%
DMV-1 True RMS	0.5%
DMV-3 True RMS	0.5%
display for one phase	3×segment LED 10×6mm
power consumption	4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

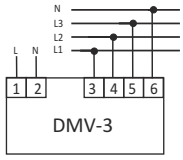
FUNCTIONS

* phase voltage measurement
* measuring circuit is also a device supplying circuit
* indicators with **True RMS** marking, equipped with RMS value converter, give proper voltage value for deflected runs

DIGITAL PANEL

DMV-1T ONE-PHASE INDICATOR
DMV-3T THREE-PHASE INDICATOR





power supply	230V AC
indicator range	
DMV-1T	12÷600V
DMV-3T	3×12÷400V
indication accuracy	1%
display	
DMV-1T	4×segment LED 14×8mm
DMV-3T	3× (4×segment LED 14×8mm)
power consumption	3W
working temperature	-5÷50°C
terminal	1.5mm² screw terminals
dimensions	
DMV-1T	72×72×92mm
DMV-3T	96×96×92mm
mounting hole	
DMV-1T	66×66mm
DMV-3T	92×92mm
protection level	IP20

CURRENT INTENSITY INDICATORS

PURPOSE

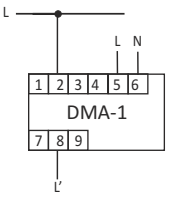
Current intensity indicators are devised to continually measure the value of the current in a circuits of single-phase or three-phase network.

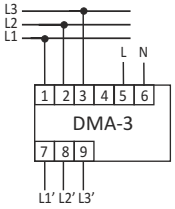
DIGITAL

DMA-1 DMA-1 True RMS ONE-PHASE INDICATOR

DMA-3 DMA-3 True RMS THREE-PHASE INDICATOR

* independent current measurement for each phase
* indicators with **True RMS** marking, equipped with RMS value converter, give proper voltage value for deflected runs





power supply	100÷300V AC
supply frequency	45÷55Hz
current max	
direct measurement	20A
indirect measurement	5A
max temporary overload	40A (<1sec)
indication accuracy	
DMA-1	1%
DMA-3	1%
DMA-1 True RMS	0.5%
DMA-3 True RMS	0.5%
display for one phase	3×segment LED 10×6mm
power consumption	4W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

DMA indicators are intended for current transformers with a rated secondary current of 5A. The current range for these transformers is from 25 to 1000/5 A.
The primary value of the transformer's current specifies the maximum measured current and the actual current value displayed by the indicator.
The DMA-1 20A and DMA-3 20A are intended for direct measurements (without transformers applied) within the range of 0÷20 A.

Order labelling method:

INDIRECT MEASUREMENT (with transformers applied)

DMA- [X] [Y] /5A [Z]

- [Z]: True RMS
- [Y]: Primary value of the transformer's current: 25, 30, 40, 50, 70, 75, 80, 100, 120, 125, 150, 160, 200, 250, 300, 400, 500, 600, 700, 750, 800, 900, 1000.
- [X]: One-phase: 1; Three phase: 3

Example:
* DMA-1 150/5A a one-phase device for 50/5A transformer, measurement range at 0÷50A, no TrueRMS;
* DMA-3 150/5 A TrueRMS a three-phase for 3×150/5A transformers, measurement range at 3×0÷150 A, incl. TrueRMS.

DIRECT MEASUREMENT (without transformers)

DMA- [X] 20A [Z]

- [Z]: True RMS
- [X]: One-phase: 1; Three phase: 3

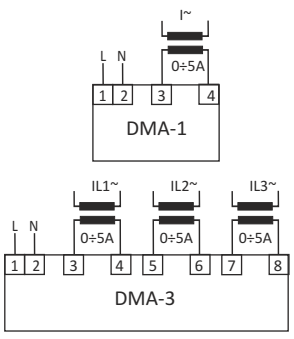
Example:
* DMA-1 20A - one-phase up to 20A, measurement range 0÷20A, without TrueRMS
* DMA-3 20A TrueRMS - three-phase up to 20A, measurement range 3×0÷20A, with TrueRMS

DIGITAL PANEL

DMA-1T ONE-PHASE INDICATOR

DMA-3T THREE-PHASE INDICATOR

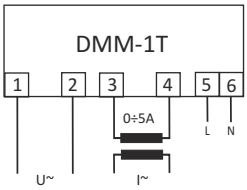
* direct measurement 0÷5A
* indirect measurement using current transformers
* setting indicator to proper current transformer values using three buttons on the indicator's front
* indirect measurement using current transformers in standard current work with 1÷9000/5A range.



power supply	230V AC
current of direct measure for single phase max	5A
current of indirect measure max	depended on applied current transformer
possible type of current transformer to connect	1÷9000/5A
indication accuracy	1%
display	
DMA-1T	4×segment LED 14×8mm
DMA-3T	3× (4×segment LED 14×8mm)
power consumption	3W
working temperature	-5÷50°C
terminal	1.5mm² screw terminals
dimensions	
DMA-1T	72×72×92mm
DMA-3T	96×96×92mm
mounting hole	
DMV-1T	66×66mm
DMV-3T	92×92mm
protection level	IP20

MULTI-FUNCTION DIGITAL INDICATORS NETWORK PARAMETERS VALUES

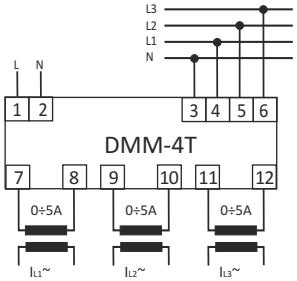
DMM-1T ONE-PHASE TYPE



power supply	230V AC
current of direct measure max for one phase	5A
current of indirect measure max	depended on applied current transformer
possible type of current transformer to connect	1÷9000/5A
voltage range measured	12÷400V AC
frequency range measured	10÷100Hz
indication accuracy	1%±1digit
display	3× (4×segment LED 8×14mm)
power consumption	3VA
working temperature	-5÷50°C
terminal	1.5mm² screw terminals
dimensions	96×96×92mm
mounting hole	92×92mm
protection level	IP20

* independent current measurement for each phase
* direct measurement 0÷5A
* indirect measurement using current transformers in standard current work with 1÷9000/5A range
* setting indicator to proper current transformer values using three buttons on the indicator's front
* phase voltage and phase to phase voltage measurement
* phase frequency measurement

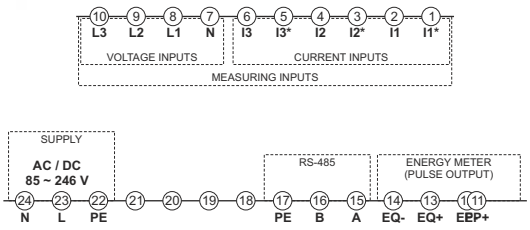
DMM-4T THREE-PHASE TYPE



power supply	230V AC
current of direct measure max for one phase	5A
current of indirect measure max	depended on applied current transformer
possible type of current transformer to connect	1÷9000/5A
voltage range measured	12÷400V AC
frequency range measured	10÷100Hz
indication accuracy	1%±1digit
display	4×segment LED 5×9mm
power consumption	3VA
working temperature	-5÷50°C
terminal	1.5mm² screw terminals
dimensions	96×96×92mm
mounting hole	92×92mm
protection level	IP20

* independent current measurement for each phase
* direct measurement 0÷5A
* indirect measurement using current transformers in standard current work with 1÷9000/5A range
* setting indicator to proper current transformer values using three buttons on the indicator's front
* phase voltage and phase to phase voltage measurement
* phase frequency measurement
* selection of indicated voltage and frequency values for a single phase using button on indicator's front

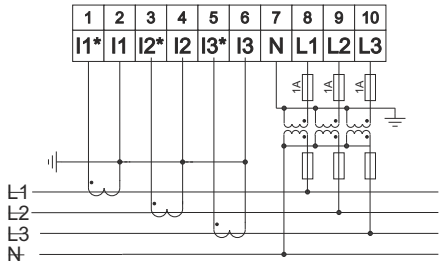
DMM-5T THREE-PHASE NETWORK ANALYZER with MODBUS RTU communication FOUR-QUADRANT ELECTRICITY MEASUREMENT



power supply	85÷264V AC/DC
voltage measurement	
rated voltage	400V AC (L-N); 693V AC (L-L)
frequency	45÷55Hz
network	three-phase, 3- or 4-wire
measuring range	3÷120% Un
current measurement	
rated current	5A
measuring range	0.5÷120% In
communication protocol	
interface	RS-485
protocole	MODBUS RTU
speed	2400/4800/9600/19200/38400bpsec
display	monochrome LCD
power consumption	<8VA
working temperature	-20÷60°C
terminal	1.5mm² screw terminals
dimensions	95×95×85mm
mounting hole	90×90mm
protection level	IP20

FUNCTIONS

* Direct or indirect measurement of the phase currents
* Direct or indirect (>230/400V) measurement of phase and interphase voltages
* Frequency measurement.
* Measurement of active, reactive and apparent power
* Minimum and maximum values
* Measurement of the power factors
* Four-quadrant measurement of both drawn and returned energy
* Measurement of electric energy in 4 tariffs
* Monthly energy settlement
* Pulse output of OC (open collector) type for energy indicators
* Communication with external devices via RS-485 port and MODBUS RTU protocol



32. INVERTERS AND SOFTSTARTS

PURPOSE

Inverters are electronic group of frequency converters are designed for smooth speed control of asynchronous three-phase motors.

FA-1LX / FA-3HX

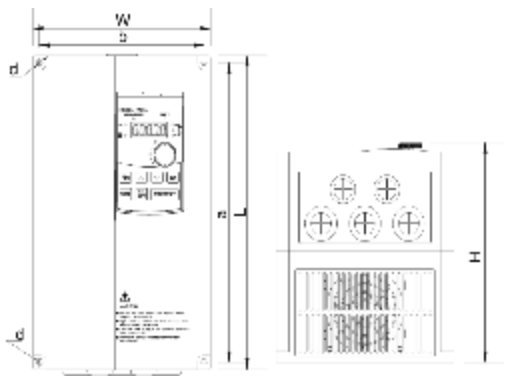
NEW !

KEY FUNCTIONS

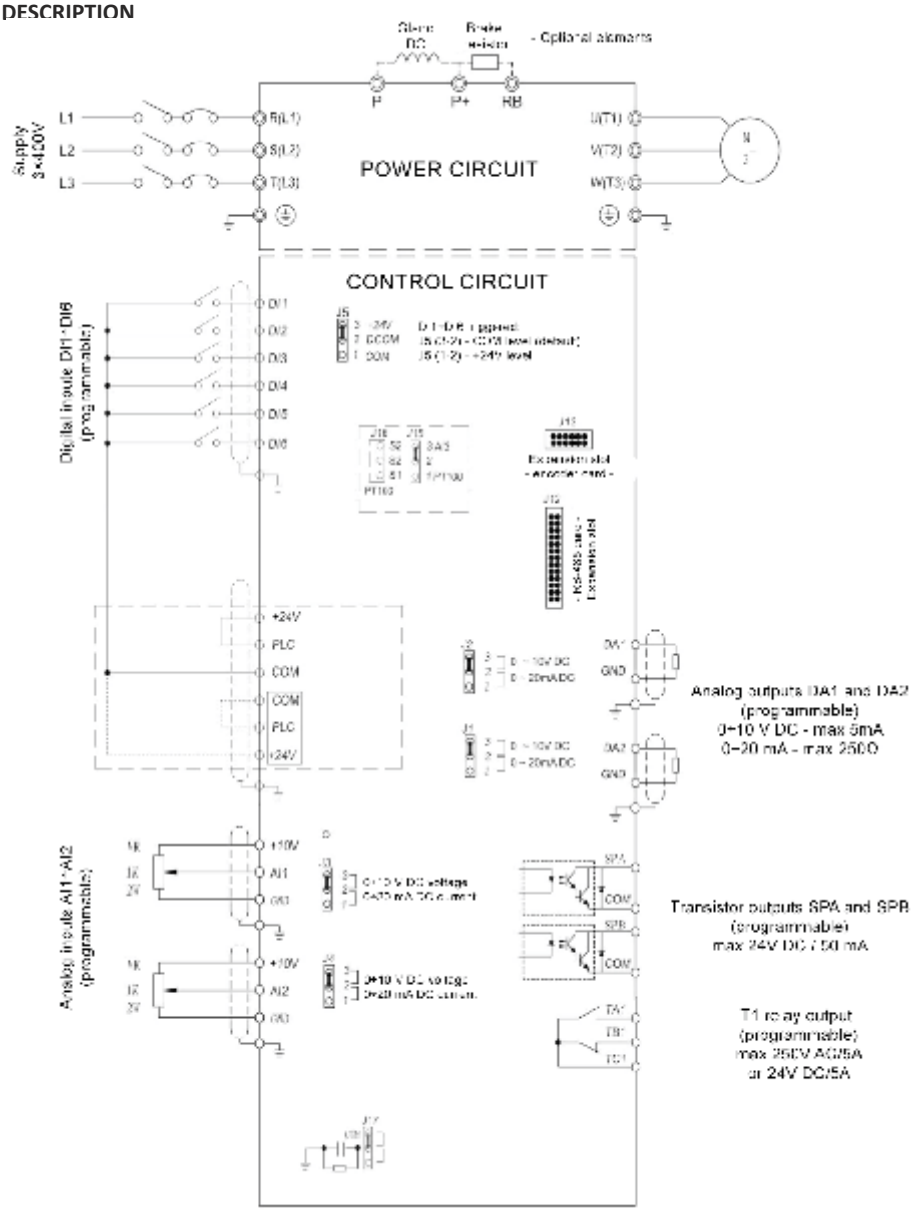
* The design of the inverter is based on a powerful 32-bit DSP processor and ensures fast and effective implementation of advanced algorithms of asynchronous three-phase motor control.
* Ability to work in a speed control mode or torque control mode.
* Motor control based on vector control (both sensorless and speed-loop feedback) and control based on the freely programmable V/F characteristics.
* Automatic slip compensation and a large starting torque (up to 180% at a frequency of 0.25 Hz).
* Multi-function control panel connected to the inverter on a "hot-plug" basis with the ability of simultaneous storage of up to four sets of parameter settings and function to easily transfer settings from one inverter to another.
* PLC mode - the ability to program up to seven steps executed once or periodically by the inverter. For each of the steps, you can determine the speed, acceleration time, and duration.
* Great flexibility for programming the inputs and outputs of the inverter, both analog and digital.
* Built-in RS-485 communication module with Modbus RTU protocol support that allows you to plug the inverter into industrial grids and to remotely control, monitor and configure the inverter

TYPES

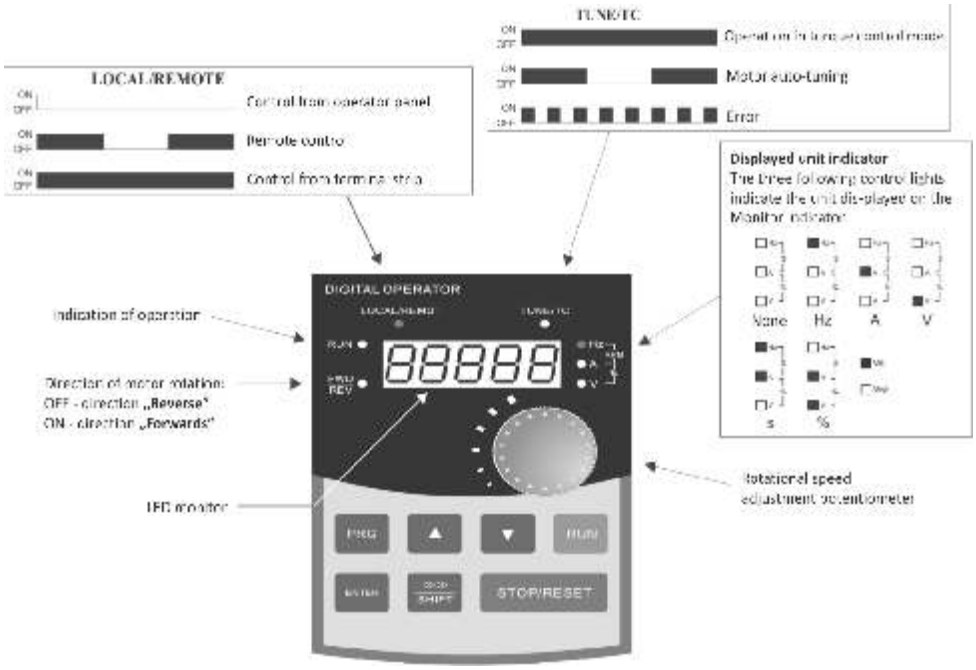
Inverter type	Input voltage V	Input current A	Output voltage V	Output current A	Motor power max kW	Length L mm	Width W mm	Height H mm
FA-1LX007	1×230	8.2	3×230	4	0.75	185	120	165
FA-1LX015	1×230	14.0	3×230	7	1.5	185	120	165
FA-1LX022	1×230	23.0	3×230	10	2.2	220	150	182
FA-1LX040	1×230	35.0	3×230	16	4.0	285	180	200
FA-3HX007	3×400	4.3	3×400	2.5	0.75	185	120	165
FA-3HX015	3×400	5.0	3×400	3.8	1.5	185	120	165
FA-3HX022	3×400	5.8	3×400	5.1	2.2	185	120	165
FA-3HX040	3×400	10.5	3×400	9.0	4.0	220	150	182
FA-3HX055	3×400	14.6	3×400	13	5.5	220	150	185
FA-3HX075	3×400	20.5	3×400	17	7.5	285	180	200



INPUTS/OUTPUTS DESCRIPTION



CONTROL PANEL



SPECIFICATIONS

Function		Technical data
Power supply	**FA-1LX**	1-phase
	Voltage and frequency	1× 230 V (±10%), 50/60 Hz (±5%)
	Output voltage	3× 230 V (for 230 V supply)
	FA-3HX	3-phases
	Voltage and frequency	3× 400 V (±10%), 50/60Hz (±5%)
	Output voltage	3× 400 V (for 400 V supply)
	Output frequency	0.00÷3200 Hz (U/f control) 0.00÷300.0 Hz (vector control)
	V/F Control characteristics	1) Constant torque characteristics 2) Characteristics of the reduced torque 3) Characteristics of the torque set by the user 4) Vector control (sensor and sensorless)
	Starting torque	18.0% for 0.50 Hz
	The dynamics of speed control	1: 100
	The stability of the output speed	±0.5%
	Torque boost	In this mode V/F control - automatic or user definied
	Acceleration / deceleration	Linear or by programmed curve S Maximum acceleration and braking - 6500 sec
	Accuracy frequency reference	Digital frequency reference: 0,01 Hz (f≤100Hz), 0,1 Hz (>100 Hz); Analog frequency reference: 1% of maximum frequency
	Overload	1) 150% rated current for 1 minute 2) 200% rated current for 0.1 sec
	Motor slip compensation	In this mode V/F control can automatically compensate for the slip
Security	Security of inverter	1) Before too high or too low supply voltage 2) Prior to exceeding the maximum current 3) Before the load is too high 4) Before losing speed and stall 5) Within the current to ground 6) Prior to excessive overheating inverter 7) In addition, the inverter is protected against communication errors or incorrect feedback signal
	Safety switch	Can be programmed as input or button on the safety switch causing immediate image voltage of the inverter output
	Security settings	Possibility to secure the set the inverter to use a PIN
	Error deleting	You can set both automatic and manual reset errors
Braking	DC braking and using an external braking resistor	
IO	6 digital inputs	1) Trigger inputs for both low level (COM) and high (+24V) 2) A large freedom of programming functions.Among other things, running back and forth, trying to run back and forth, safety switch, reset, multi-speed control, motor potentiometer, change of acceleration and deceleration, pulse input and more.
	2 analog inputs	1) They can workboth as input voltage (0÷10 V) and input current 0÷20mA (software, you can set the range of 4÷20 mA) 2) The analog inputs can be used to ask frequency and time, and to cooperate with PID controller
	2 analog outputs	1) They can workboth as a voltage output (0÷10 V) and output current 0÷20mA 2) Analog outputs can be programmed to indicate: a. Set point and actual frequency b. Voltage output current c. DC voltage on the track d. Temperatures IGBT power amplifier e. Power output f. Engine speed g. Drive torque
	2 transistor outputs	1) Fast pulse outputs (max. frequency 100 kHz) Possible signalling: a. Desired frequency b. Actual frequency c. The current values d. Output voltages e. DC voltage on the track f. Temperatures power amplifier g. Output power h. Engine speed i. Output torque 2) Overload of transistor - max. 20 mA / 27 V

IO	2 transistor outputs	1) Fast pulse outputs (max. frequency 100 kHz) Possible signalling: a. Desired frequency b. Actual frequency c. The current values d. Output voltages e. DC voltage on the track f. Temperatures power amplifier g. Output power h. Engine speed i. Output torque 2) Overload of transistor - max 20 mA / 27 V
	1 relay output	1) Overload of contacts 5 A/250 V AC or 5A/ 30 V DC 2) Extensive programming output function (signalling 34 different states of the inverter)
Speed control	1) Wide range speed refernce, including taking into account different combinations of digital inputs, analog inputs, potentiometer and buttons on the control panel, pulse inputs and motor potentiometer 2) Multi-speed - the possibility of 16 different speed and eight times the acceleration/deceleration 3) PLC mode - can define a sequence of eight steps that will be performed by the inverter. For each step, you can determine the motor speed, acceleration/deceleration and duration step. You can also specify whether the sequence is executed only once or will be repeated in a loop.	
PID	Bulit-in PID increases the ability of the drive to match process requirements. Both the reference and the feedback signal may be placed in one of the following sources: 1) Control panel (buttons or potentiometer) 2) Analog inputs 3) Digital inputs 4) Input pulse	
Environ-mental conditions	Working temperature	-10°C ÷ 40°C. If the temperature exceeds 40°C, the maximum output current is reduced by 1% with each additional °C
	Storage	-20÷65°C
	Humidity	Below 90%, without humidity condensation
	Height	0÷1000 m
	Assembly	Installation in a vertical position inside the cabinet with good ventilation to the mounting plate made of non-combustible material. Mounting must also protect the inverter from direct sunlight, dust moisture and corrosive or explosive gases.
	Ventilation	Cooling by natural and forced air flow

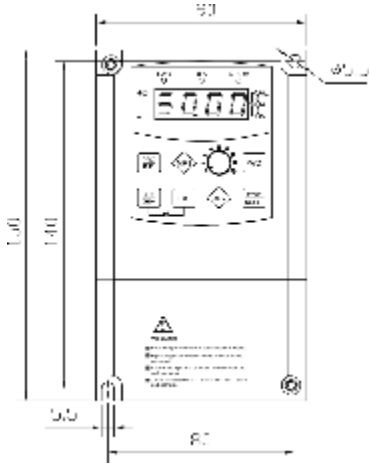
FA-1L...P

KEY FUNCTIONS

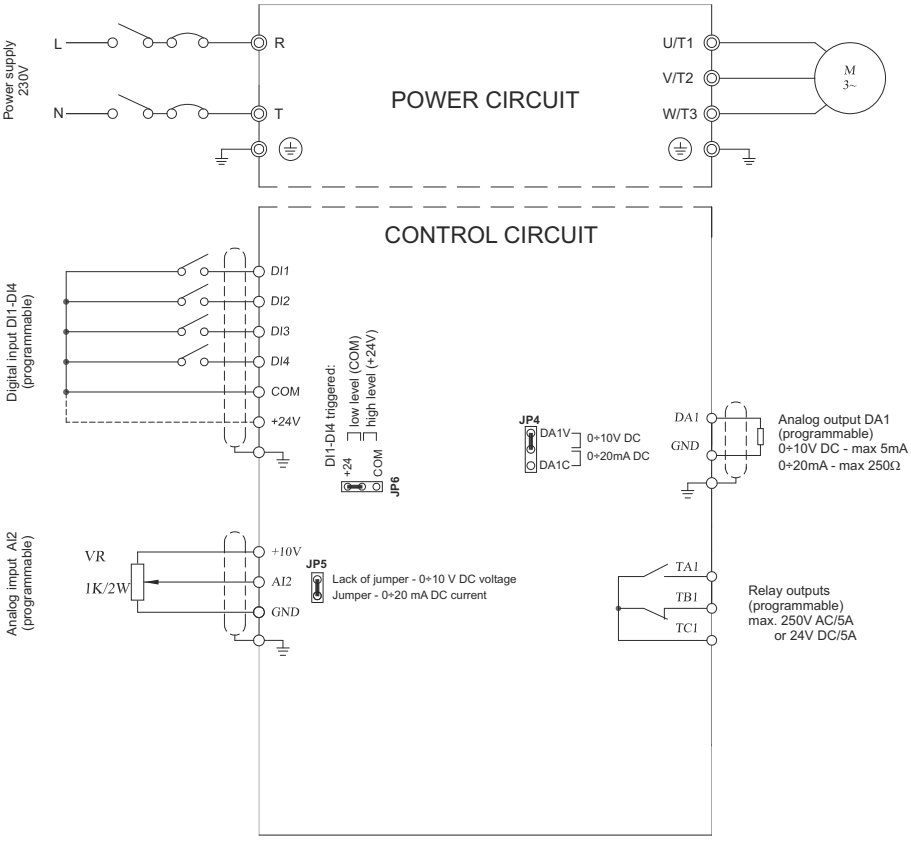
* The design of efficient inverter-based 32-bit DSP processor ensures fast and effective implementation of advanced control algorithms, asynchronous three-phase motor
* Ability to work in speed control mode or torque control mode.
* Motor control based on vector control (both sensorless and with speed-feedback loop), and control based on the freely programmable V/F.
* Automatic slip compensation, and a large starting torque (up to 180% at a frequency of 0.25Hz).
* Multi-function control panel
* Mode PLC - programmable up to seven steps performed once or periodically by the inverter. For each step, you can determine the speed, acceleration and duration.

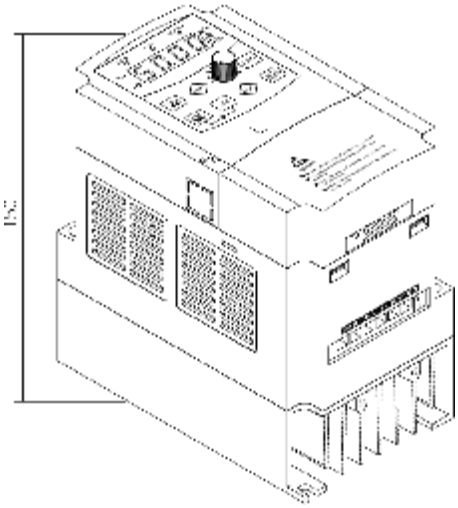
TYPES

Inverter type	Input voltage V	Input current A	Output voltage V	Output current A	Motor power max kW
FA-1L007P	1×230V	9A	3×230V	4A	0.75kW
FA-1L015P	1×230V	17.5A	3×230V	7A	1.5kW



IN/OUT DESCRIPTION





SPECIFICATIONS

Function		Technical data	
Power supply	Voltage and frequency	1×230V, 50/60 Hz	
	Output voltage	3× 230 V (for 230 V supply)	
	Output frequency	0.00÷320.0 Hz	
	V/F control characteristic	1) Constant torque characteristics 2) Characteristics of the reduced torque (3 types) 3) Characteristics of the torque set by the user (8 points) 4) Vector control (sensorless or closed-loop)	
		V/F control	Sensorless vector control
	Starting torque	18.0% for 0.50 Hz	18.0% for 0.50 Hz
	The dynamics of speed control	1: 100	1: 200
	The stability of the output speed	±0.5%	±0.2%
	Torque boost	In this mode V/F control - automatic or user definied	
	Acceleration/deceleration	Linear or by programmed curve S Maximum acceleration and braking - 3200 sec	
	Accuracy frequency reference	Digital frequency reference: 0.01 Hz (f≤100Hz), 0.1 Hz (>100 Hz); Analog frequency reference: 1% of maximum frequency	
	Overload	1) 150% rated current for 1 minute 2) 200% rated current for 0.1 sec	
	Motor slip compensation	In this mode V/F control can automatically compensate for the slip	
Security	Security of inverter	1) Before too high or too low supply voltage 2) Prior to exceeding the maximum current 3) Before the load is too high 4) Before losing speed and stall 5) Within the current to ground 6) Prior to excessive overheating inverter 7) In addition, the inverter is protected against communication errors or incorrect feedback signal	
	Safety switch	Can be programmed as input or button on the safety switch causing immediate image voltage of the inverter output	
	Security settings	Possibility to secure the set the inverter to use a PIN	
	Error deleting	You can set both automatic and manual reset errors	
Braking	DC braking		
IO	4 digital inputs	1) Trigger inputs for both low level (COM) and high (+24V) 2) A large freedom of programming functions - it is possilble to assign to the terminals 68 different functions. Among other things, running back and forth, trying to run back and forth, safety switch, reset, multi-speed control, motor potentiometer, change of acceleration and deceleration, pulse input and more.	
	1 analog input	1) They can workboth as input voltage (0÷10 V) and input current 0÷20mA (software, you can set the range of 4÷20 mA) 2) The analog inputs can be used to ask frequency and time, and to cooperate with PID controller	
	1 analog output	1) They can workboth as a voltage output (0÷10 V) and output current 0÷20 mA 2) Analog outputs can be programmed to indicate: a. Set point and actual frequency b. Voltage and output current c. DC voltage d. Temperatures IGBT power amplifier e. Power output f. Engine speeds g. Torque drive	
	2 transistor outputs	1) Overload of contacts 5 A/250 V AC or 5 A/30 V DC 2) Extensive programming output function (signalling 34 different states of the inverter)	

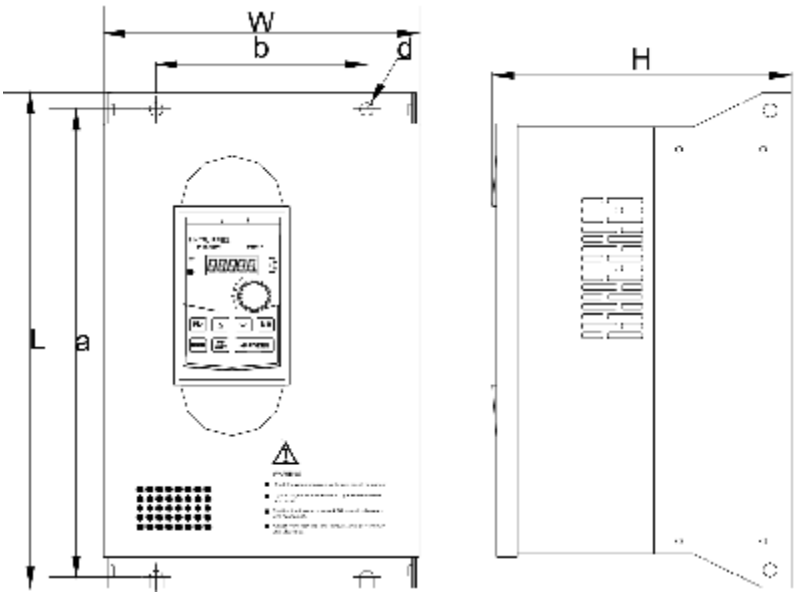
FA-3X...

KEY FUNCTIONS

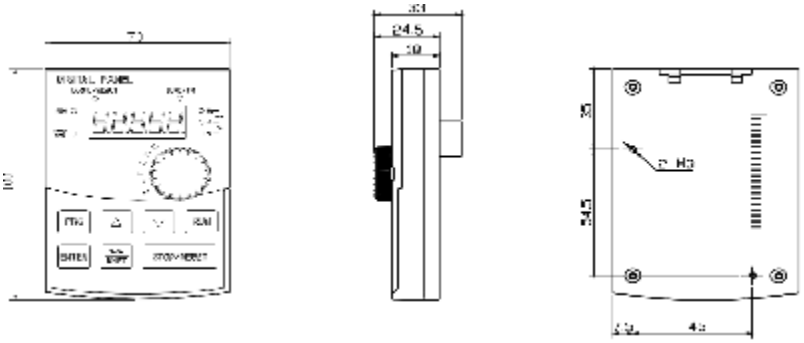
* The design of the inverter is based on a powerful 32-bit DSP processor for fast and effective implementation of advanced control algorithms for asynchronous three-phase motor.
* Option to work in speed control mode or driving torque control mode.
* Motor control based on the sensorless vector control and control by freely programmable V/F characteristic.
* Automatic slip compensation and a large starting driving torque (even up to 180% at a frequency of 0.5 Hz).
* PLC mode – option to program up to sixteen steps carried out once or periodically by the inverter.
  For each of the steps, you can determine the speed, acceleration time and duration.
* High programming freedom for inverter inputs and outputs, both analog and digital.

TYPY

Inverter type	Input voltage V	Input current A	Output voltage V	Output current A	Motor power max kW	Length L mm	Width W mm	Heigth H mm
FA-3X110	3×400V	26A	3×400V	25A	11kW	360	220	210
FA-3X150	3×400V	35A	3×400V	32A	15kW	360	220	210
FA-3X220	3×400V	47A	3×400V	45A	22kW	435	225	242

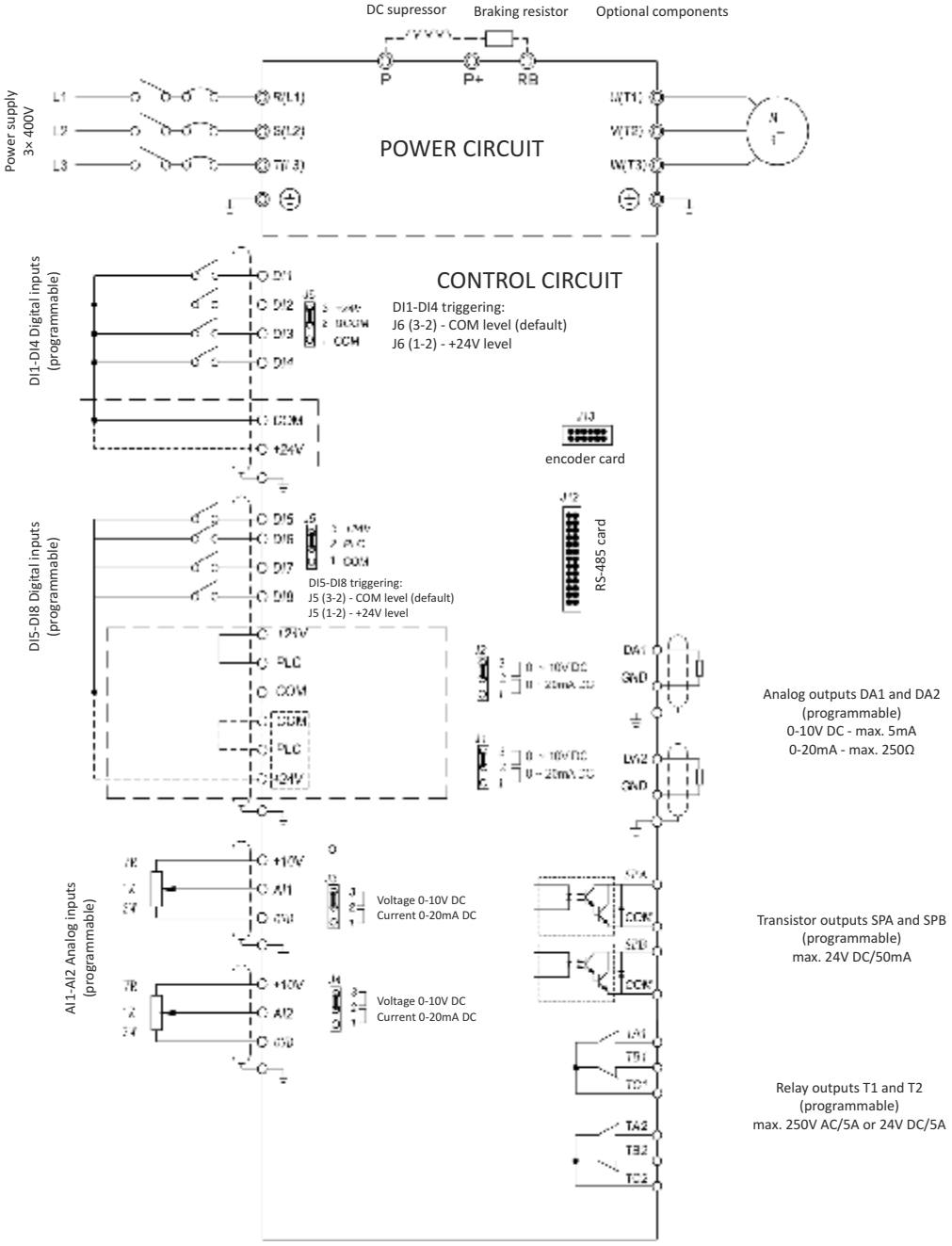


CONTROL PANEL



Control panel is detachable from the main body of the inverter.
This allows for external mounting on the cabinet door for quick access to settings and adjust the parameters of the inverter.

IN/OUT DESCRIPTION



SPECIFICATIONS

Function		Technical data
Power supply	Voltage and frequency	3× 380÷415V (±10%), 50/60Hz (±5%)
	Output voltage	3× 380÷400V (for zasilania 400V)
	Output frequency	0.00÷3200 Hz (U/f control) 0.00÷300 Hz (vector control)
	V/F control characteristic	1) Constant torque characteristics 2) Reduced torque characteristics 3) Torque characteristics set by the user 4) Vector control (sensor and sensorless)
	Starting torque	180% for 0.50 Hz
	Speed control dynamics	1: 100
	Output speed stability	±0.5%
	Torque boost	In V/F control mode – automatic or defined by the user
	Acceleration/deceleration	Linear characteristic or in accordance to program curve S. Maximum acceleration and deceleration: 6500 sec
	Accuracy frequency reference	Digital frequency reference: 0,01Hz (f≤100Hz), 0,1Hz (>100Hz); Analog frequency reference: 1% of maximum frequency
	Overload	1) 150% rating current for 1 minute 2) 200% rating current for 0.1 sec
	Motor slip compensation	In V/F control mode, motor slip can be compensated automatically
Protection	Inverter protection	1) Against too high and too low power voltage 2) Against exceeding the maximum current 3) Against too high load 4) Against the loss of speed and motor stall 5) Against current outflow to ground 6) Against inverter overheating 7) Inverter is additionally protected against communication errors and incorrect feedback signal
	Safety switch	Input or button can be programmed as a safety switch that will immediately cut off the voltage from the outputs of the inverter
	Settings protection	Inverter settings can be protected with PIN number
	Error deleting	Errors can be cleared both manually and automatically
Braking	Deceleration using DC and the external braking resistor	
IO	8 digital inputs	1) Inputs activation with both low (COM) and high level (+24 V) 2) High programming freedom of various functions: forward and backward gear, trial forward and backward gear, safety switch, reset, multi-speed control, motopotentiometer, acceleration and deceleration time change, pulse input and other
	3 analog inputs	1) They can work both as input voltage (0÷10 V) and current inputs (0÷20 mA) (4÷20 mA range can also be programmed) 2) Analog inputs can be used for, among other things, frequency and torque setting and working with PID regulator.
	2 analog outputs	1) They can work both as input voltage (0÷10 V) and current inputs (0÷20 mA) 2) Analog outputs can be programmed to indicate: a. preset and current frequency b. output voltage c. voltage on DC bus d. temperature of IGBT terminal power e. output power f. motor rotational speed g. torque

	2 transistor outputs	1) Fast pulse outputs (max frequency: 100 kHz). Indications: a. preset frequency b. current frequency c. electric current value d. output voltage e. voltage on DC bus f. temperature of terminal power g. output power h. motor rotational speed i. torque 2) Transistor load - max 20 mA/27 V
	1 relay output	1) Contact load 5 A/250 V AC or 5 A/30 V DC 2) High freedom of output functions programming (indication of 34 different inverter states)
Speed adjustment	1) Wide range of speed settings, including combinations of digital inputs, analog inputs, potentiometer and keys on control panel, pulse inputs and motopotentiometer 2) Multi-speed - user can set 16 different speeds and eight times of acceleration/deceleration 3) PLC mode - user can define sequences of up to eight steps that will be automatically executed by the inverter. For each step user can define motor speed, acceleration/deceleration time and the duration of the step, as well as whether the sequence is to be executed once or in a loop.	
PID	Built-in PID regulator increases the ability to match the drive operation to the requirements of the technological process. Preset value and feedback signal can be entered from one of the following sources: 1) Control panel (keys or potentiometer) 2) Analog inputs 3) Digital inputs 4) Pulse input	
Environmental conditions	Working temperature	-10°C ÷ 40°C. If the temperature exceeds 40°C, then maximum output current is reduced by 1% with each additional °C
	Storage	-20÷65°C
	Humidity	Below 90%, without humidity condensation
	Height	0÷1000 m
	Assembly	Installation in a vertical position inside the control cabinet with good ventilation and on the mounting plate made of non-combustible material. Mounting method must also protect the inverter from direct sunlight, dust, humidity and corrosive or explosive gases.
	Ventilation	Cooling by natural and forced air flow

PURPOSE

Inverters of the FA-1F series are designed to control single-phase AC motors with auxiliary starting capacitor.

FA-1F004 ÷ FA-1F022

KEY FUNCTIONS

* ability to change the direction of the motor rotation;
* ability to adjust the rotational speed in the range of 0 to 400 Hz;
* high torque at low rotational speeds;
* great freedom of programming inputs and outputs, both digital and analog;
* PLC mode - the ability to program up to seven operations performed once or cyclically by the inverter. For each of the steps, you can determine speed, acceleration/deceleration time and duration;
* multi-function operator panel with the ability of dismantling and connecting on the outsideof the inverter.

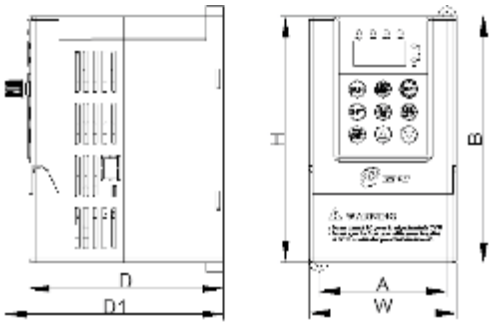
FA-1F004

WARNING!

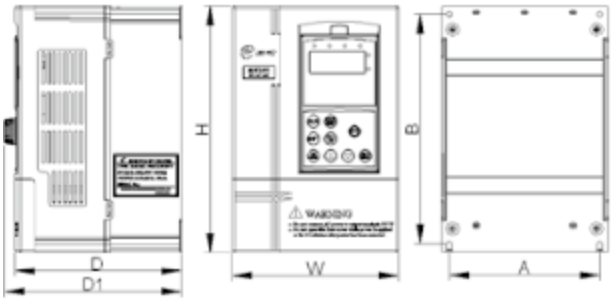
Before connecting the single-phase motor, it is necessary to change the internal wiring to eliminate the starting capacitor.

Typical scheme of single-phase motor with starting capacitor

Modified wiring of the engine



FA-1F004, FA-1F007, FA-1F015 inverters

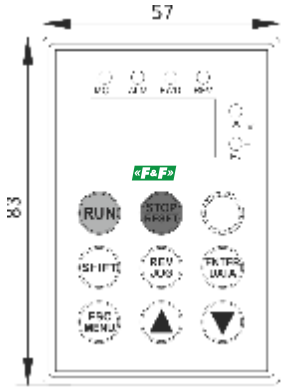


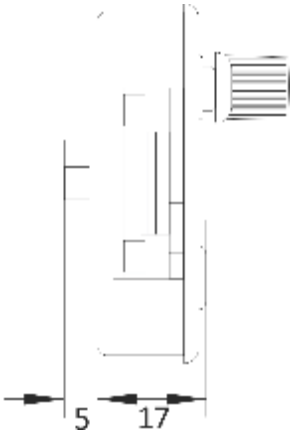
FA-1F022 inverter

TYPES

Inverter type	Input voltage V	Power input kVA	Output voltage V	Output current A	Motor power max kW	Height H mm	Width W mm	Depth D mm
FA-1F004	1×230V	1.1	1×230V	4A	0.4kW	141.5	85	112.5
FA-1F007	1×230V	1.8	1×230V	7A	0.7kW	141.5	85	112.5
FA-1F015	1×230V	2.8	1×230V	10A	1.5kW	141.5	85	112.5
FA-1F022	1×230V	3.8	1×230V	16A	2.2kW	230	155	155

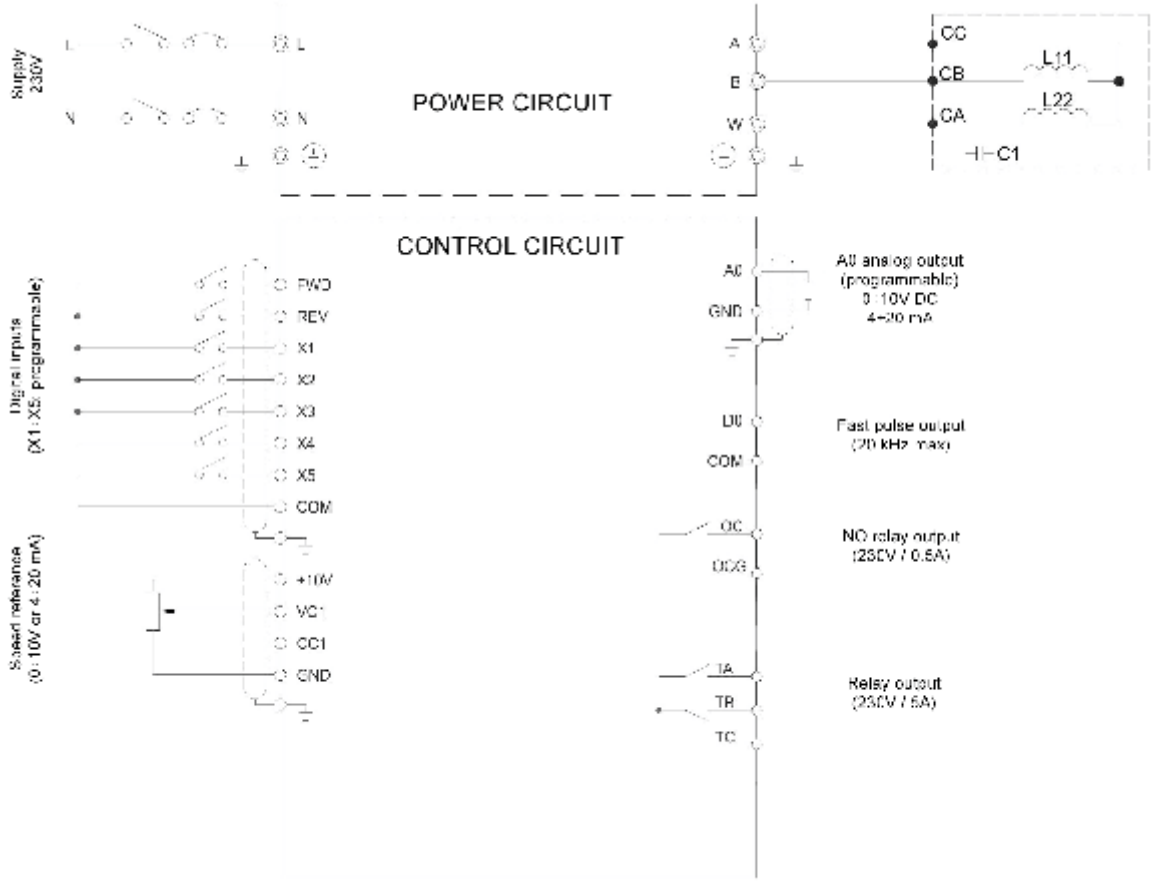
CONTROL PANEL





Control panel is detachable from the main body of the inverter. This allows for external mounting on a switchboard door for quick access to settings and adjustment of the parameters of the inverter.

IN/OUT DESCRIPTION



SPECIFICATIONS

Function		Technical data
Power supply	Voltage and frequency	1× 230V (±10%), 50/60Hz (±5%)
	Output voltage	230V
	Output frequency	0.00÷400 Hz
	V/F control characteristic	1) Constant torque characteristics 2) Reduced torque characteristics 3) SVPWM vector control
	Starting torque	100% for 0.50 Hz
	Speed control dynamics	1: 100
	Speed control dynamics	±0.5%
	Torque boost	Automatic or defined by the user (0.1÷20%)
	Acceleration/deceleration	Linear characteristic or in accordance to program curve S
	Accuracy frequency reference	Digital frequency reference: 0.01Hz Analog frequency reference: 1% of maximum frequency
	Overload	1) 150% rating current for 1 minute 2) 200% rating current for 0.5 sec
Protection	Inverter protection	1) Against too high and too low power voltage 2) Against exceeding the maximum current 3) Against too high load 4) Against inverter overheating
	Safety switch	Input or button can be programmed as a safety switch that will immediately cut off the voltage from the outputs of the inverter
	Settings protection	Inverter settings can be protected with PIN number
Braking	Deceleration using DC and the external braking resistor	
IO	2 digital inputs: FWD and REV	Two digital inputs to which are permanently assigned commands of operating forwards (FWD) and reverse (REV)
	5 digital inputs	1) Universal, programmable digital inputs – ability to assign up to 40 different functions to each input. 2) The X5 input can be configured to operate as a quick pulse input.
	1 analog input	1) They can work both as voltage outputs (0÷10V) and current outputs 4÷20mA (Selectable via a switch on the main board of the inverter). 2) The analog input can be used for setting rotational speed of the motor.
	1 analog output	1) They can work both as voltage outputs (0÷10V) and current outputs 4÷20mA (Selectable via a switch on the main board of the inverter) 2) Analog outputs can be programmed to indicate: a. preset and current frequency b. output current and voltage c. voltage on DC bus d. temperature of IGBT terminal power e. PID regulator setpoint f. values of the feedback of the PID controller

IO	1 fast transistor output	1) Fast pulse outputs (frequency: 20 kHz max). Indications: a. preset and current frequency b. current and output voltage c. voltage on DC bus d. temperature of IGBT terminal power e. PID controller setpoint f. values of the feedback of the PID controller 2) Transistor load – 20 mA / 27 V max
	2 relay outputs 5A	1) The output relay for signaling failure of the inverter 2) Load capacity of contact 5 A/250 V AC or 5 A/30 V DC
	2 relay outputs	1) Universally program relay output for indicating, among other things: a. operation of the drive b. operational readiness of the drive c. reaching the preset frequency d. inverter error e. notification of external error f. operation in PLC mode g. other T contact load - 5A/250 V AC OC contacts load - 0.5A/250 AC
Speed adjustment	1) Wide range of speed settings, including combinations of digital inputs, analog inputs, potentiometer and keys on control panel, pulse inputs and motopotentiometer 2) Multi-speed - user can set 16 different speeds and eight times of acceleration/deceleration 3) PLC mode - user can define sequences of up to eight steps that will be automatically executed by the inverter. For each step user can define motor speed, acceleration/deceleration time and the duration of the step, as well as whether the sequence is to be executed once or in a loop.	
PID	Built-in PID regulator increases the ability to match the drive operation to the requirements of the technological process. Preset value and feedback signal can be entered from one of the following sources: 1) Control panel (keys or potentiometer) 2) Analog input 3) Digital input 4) Pulse input	
Environmental conditions	Working temperature	-10°C ÷ 40°C. If the temperature exceeds 40°C, then maximum output current is reduced by 1% with each additional °C
	Storage	-20÷65°C
	Humidity	Below 90%, without humidity condensation
	Height	0÷1000 m
	Assembly	Installation in a vertical position inside the control cabinet with good ventilation and on the mounting plate made of non-combustible material. Mounting method must also protect the inverter from direct sunlight, dust, humidity and corrosive or explosive gases.
	Ventilation	Cooling by natural and forced air flow

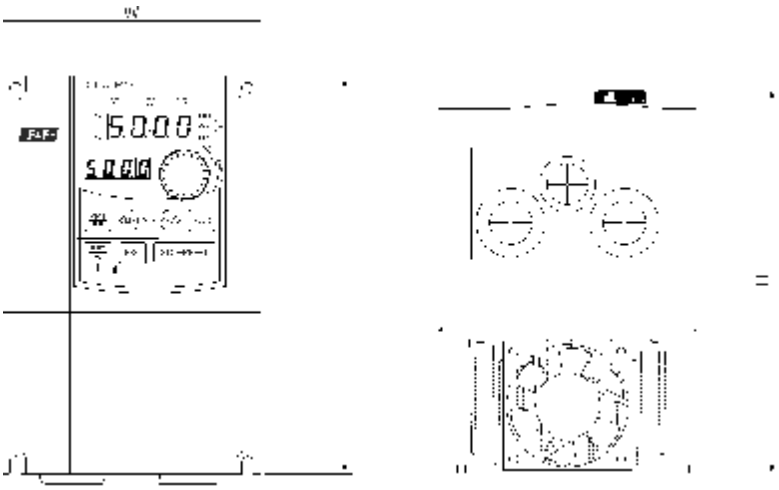
FA-1L... / FA-3H...

KEY FUNCTIONS

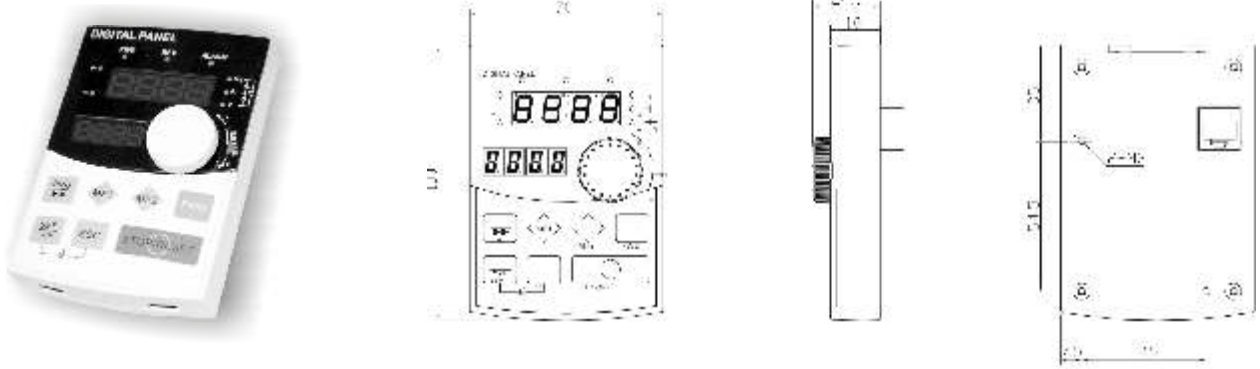
* The design of efficient inverter-based 32-bit DSP processor ensures fast and effective implementation of advanced control algorithms, asynchronous three-phase motor.
* Ability to work in speed control mode or torque control mode
* Motor control based on vector control (both sensorless and with speed-feedback loop), and control based on the freely programmable V / F.
* Autoamatic slip compensation, and a large starting torque (up to 180% at a frequency of 0.25Hz).
* Multi-function control panel connected to the inverter on a "hot-plug" with the possibility of simultaneous storage of up to four sets of parameter settings and feature an easy transfer settings from one inverter to another.
* Mode PLC - programmable up to seven steps performed once or periodically by the inverter. For each step, you can determine the speed, acceleration and duration.
* Large programming freedom inverter inputs and outputs, both analog and digital.
* Built-in RS-485 Modbus RTU protocol support allows plugging the inverter to fieldbus and remote control, monitoring and configuration of the inverter.

TYPES

Inverter type	Input voltage V	Input current A	Output voltage V	Output current A	Motor power max kW	Length L mm	Width W mm	Height H mm
FA-1L007	1×230V	9A	3×230V	4A	0.75kW	185	120	168.5
FA-1L015	1×230V	17.5A	3×230V	7A	1.5kW	185	120	168.5
FA-1L022	1×230V	24A	3×230V	10A	2.2kW	220	150	185.5
FA-1L040	1×230V	36A	3×230V	16A	4.0kW	220	150	185.5
FA-3H007	3×400V	3.3A	3×400V	2.5A	0.75kW	185	120	168.5
FA-3H015	3×400V	5A	3×400V	3.7A	1.5kW	185	120	168.5
FA-3H022	3×400V	7A	3×400V	5A	2.2kW	185	120	168.5
FA-3H040	3×400V	11A	3×400V	8.5A	4.0kW	220	150	185.5
FA-3H055	3×400V	16.5A	3×400V	13A	5.5kW	220	150	185.5
FA-3H075	3×400V	20A	3×400V	16A	7.5kW	285	180	200.0
FA-3H110	3×400V	28A	3×400V	25A	11kW	285	180	200.0

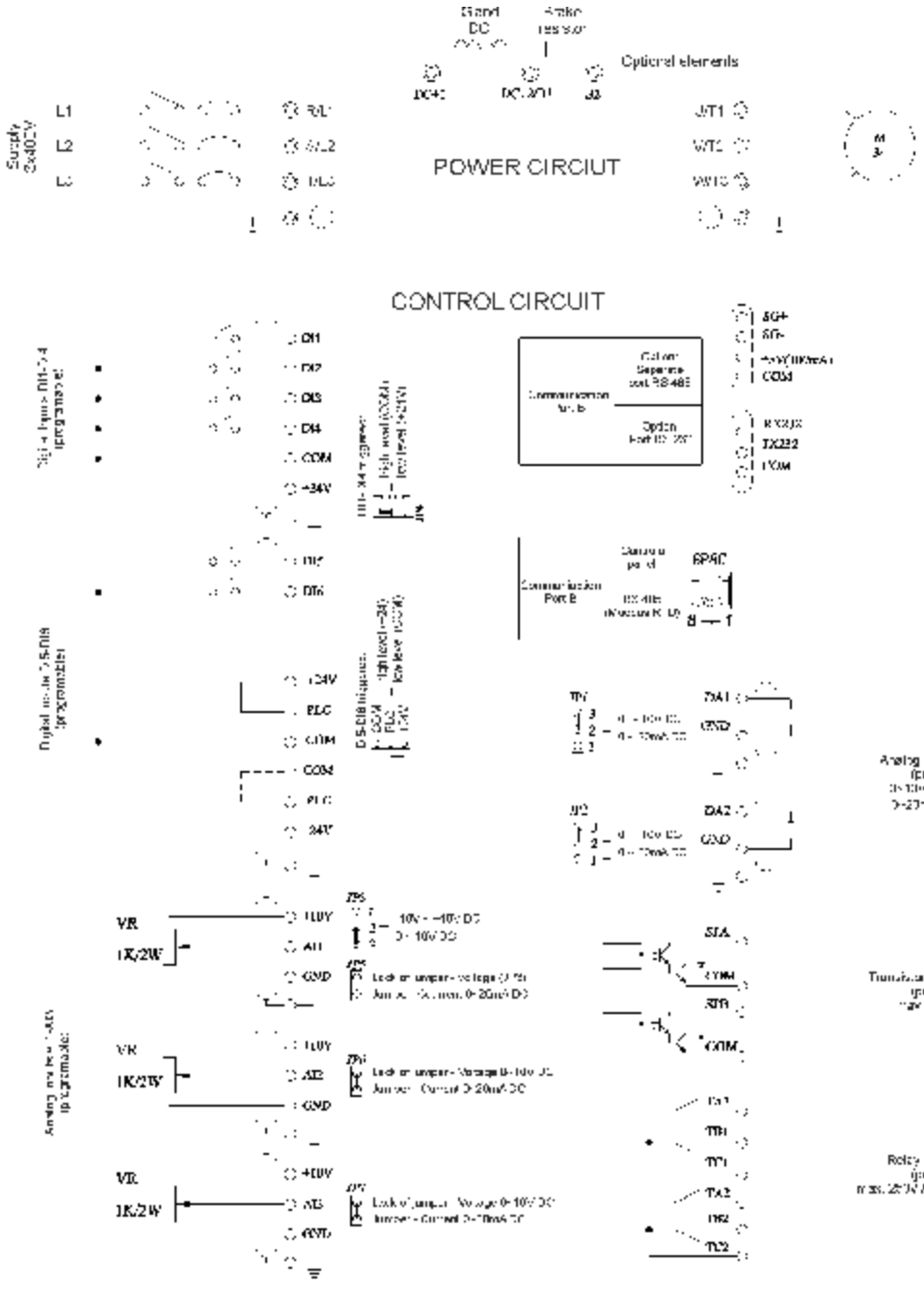


CONTROL PANEL



Control panel is detachable from the main body of the inverter.
This allows for external mounting on the cabinet door for quick access to settings and adjust the parameters of the inverter.

IN/OUT DESCRIPTION



SPECIFICATIONS

Function		Technical data		
Power supply	Voltage and frequency	1× 230V 3× 380 V ÷ 415 V (±15%), 50/60 Hz (±5%)		
	Output voltage	3× 230 V (for 230 V supply) 3× 380 ÷ 400 V (for 400 V supply)		
	Output frequency	0.00÷320.0 Hz		
	V/F control characteristic	1) Constant torque characteristics 2) Characteristics of the reduced torque (3 types) 3) Characteristics of the torque set by the user (8 points) 4) Vector control (sensorless or closed-loop)		
		V/F control	Sensorless vector control	Vector control with feedback
	Starting torque	18.0% for 0.50 Hz	18.0% for 0.50 Hz	18.0% for 0.50 Hz
	The dynamics of speed control	1: 100	1: 200	1: 2000
	The stability of the output speed	±0.5%	±0.2%	±0.02%
	Torque boost	In this mode V/F control - automatic or user definied		
	Acceleration/deceleration	Linear or by programmed curve S Maximum acceleration and braking - 3200 sec		
	Accuracy frequency reference	Digital frequency reference: 0.01 Hz (f≤100Hz), 0.1 Hz (>100 Hz) Analog frequency reference 1% of maximum frequency		
	Overload	1) 150% rated current for 1 minute 2) 200% rated current for 0.1 sec		
	Motor slip compensation	In this mode V/F control can automatically compensate for the slip		
Security	Security of inverter	1) Before too high or too low supply voltage 2) Prior to exceeding the maximum current 3) Before the load is too high 4) Before losing speed and stall 5) Within the current to ground 6) Prior to excessive overheating inverter 7) In addition, the inverter is protected against communication errors or incorrect feedback signal		
	Safety switch	Can be programmed as input or button on the safety switch causing immediate image voltage of the inverter output		
	Security settings	Possibility to secure the set the inverter to use a PIN		
	Error deleting	You can set both automatic and manual reset errors		
Braking	DC braking and using an external braking resistor			
IO	6 digital inputs	1) Trigger inputs for both low level (COM) and high (+24V) 2) A large freedom of programming functions - it is possilble to assign to the terminals 68 different functions. Among other things, running back and forth, trying to run back and forth, safety switch, reset, multi-speed control, motor potentiometer, change of acceleration and deceleration, pulse input and more.		
	3 analog inputs	1) They can workboth as input voltage (0÷10 V) and input current 0÷20mA (software, you can set the range of 4÷20 mA) 2) The analog inputs can be used to ask frequency and time, and to cooperate with PID controller		
	2 analog outputs	1) They can workboth as a voltage output (0÷10 V) and output current 0÷20mA 2) Analog outputs can be programmed to indicate: a. Set point and actual frequency b. Voltage and output current c. DC voltage on the track d. Temperatures IGBT power amplifier e. Power output f. Engine speeds g. Torque drive		
	2 transistor outputs	1) Fast pulse outputs (max. frequency 50 kH) Possible signalling: a. Desired frequency b. Actual frequency c. The current values d. Output Voltages e. DC voltage on the track f. Temperatures power amplifier g. Output power 2) Overload of transistor - max 20 mA/27V		

	2 relay outputs	1) Overload of contact 5 A/250 V AC or 5A/ 30 V DC 2) Extensive programming output function (signalling 34 different states of the inverter)
Communica-tion	Bulit-in RS-485 communication port running Modbus RTU standard (constant speed of 19 200 bpsec). Optional with additional interface RS-485	
Control panel	Multi-function operator panel: 1) Connected to the inverter via a standard RJ45 socket (according to EIA T568A standard) - easy to connect the inverter such as outside the control cabinet 2) Two displays and eight LEDs provide simultaneous transmission of multiple diagnostic information, and facilitate the programming of the inverter 3) Built-in potentiometer for min. easily change the speed of the motor 4) The standard buttons for start, stop and change the direction of motor rotation 5) Two freely programmable buttons MF1 and MF2 which can be assigned to one of 18 functions 6) Extended error diagnostics - with information about the type of error, the time of its occurrence and the inverter parameters when an error occurs 7) Can be stored in the operator panel set four sets of inverters with the ability to easily transfer settings from one inverter to another	
Speed control	1) Wide range speed refernce, including taking into account different combinations of digital inputs, analog inputs, potentiometer and buttons on the control panel, pulse inputs and motor potentiometer 2) Multi-speed - the possibility of 16 different speed and eight times the acceleration/deceleration 3) PLC mode - can define a sequence of seven steps that will be performed by the inverter. For each step, you can determine the motor speed, acceleration/deceleration and duration step. You can also specify whether the sequence is executed only once, or will be repeated in a loop.	
PID	Bulit-in PID increases the ability of the drive to match process requirements. Both the reference and the feedback signal may be placed in one of the following sources: 1) control panel (buttons or potentiometer) 2) RS-485 interface 3) analog inputs 4) digital inputs 5) pulse input	
Motor	1) Ability to define parameters for two independent motors 2) The motor parameters defined by the user: a. frequency b. voltage and rated current c. number of poles d. rated speed 3) Three methods for identification of motor parameters: a. based on the parameters entered by the user b. measurement of the rotor motor is stopped c. measurement engine with rotating rotor	
Environmental conditions	Working temperature	-10°C ÷ 50°C. If the temperature exceeds 40°C, the maximum output current is reduced by 1% with each additional °C
	Storage	-40°C ÷ 70°C
	Humidity	5 ÷ 95%, without humidity condensation
	Height	0 ÷ 2000 m
	Assembly	Installation in a vertical position inside the cabinet with good ventilation to the mounting plate made of non-combustible material. Mounting must also protect the inverter from direct sunlight, dust moisture and corrosive or explosive gases.
	Ventilation	Cooling by natural and forced air

SOFT STARTERS

PURPOSE

Softstarters (SF) are used for performing a safe boot of three-phase asynchronous squirrel-cage motors. The use of soft starter allows to eliminate a star-delta systems, while drastically reducing the peak current during start-up that occurs when booting even heavily-loaded motors (e.g. mills and crushers).

SF-110 ÷ SF-550

KEY FUNCTIONS

* full three-phase control
* six types of boot characteristics
* control of torque, current and power - both during start-up and operation
* electronic protection against motor overload
* motor protection against underload
* overvoltage and undervoltage protection
* control panel with keypad and LED display
* analog output of current control
* programmable relay outputs
* memory of errors
* ability to automatically restart the engine

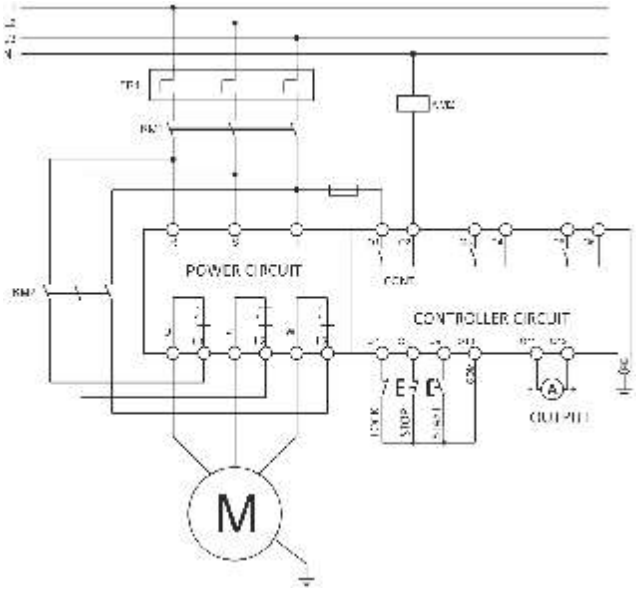
FUNCTIONING

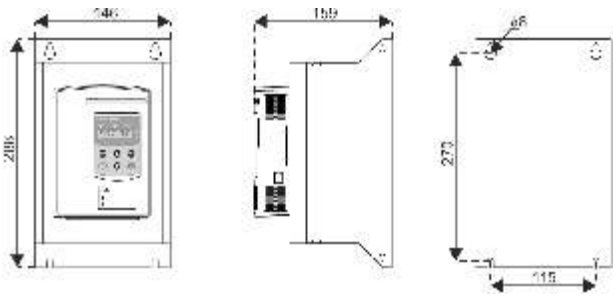
Start-up of the motor is performed on all three phases of the power supply, which prevents asymmetry in network load and uneven load of motor windings. Advanced protection features implemented in the soft starter protect the motor during start-up, operation and deceleration.

TYPES

Device type	Input voltage V	Input current A	Motor power max kW
SF-110	3×400V	22A	11kW
SF-150	3×400V	30A	15kW
SF-180	3×400V	37A	18kW
SF-220	3×400V	44A	22kW
SF-300	3×400V	60A	30kW
SF-370	3×400V	74A	37kW
SF-450	3×400V	90A	45kW
SF-550	3×400V	110A	55kW

Control panel is detachable from the main body of the inverter. This allows for external mounting on switchgear door for quick access to settings and parameters of the soft starter.





SPECIFICATIONS

Power supply	Three-phase, 3× 400V (±15%), frequency 50 Hz	
Motor	Three-phase, asynchronous motor (windings 400V)	
Motor control	Start-up and deceleration - control of all three output phases Work - external bypass contactor required	
Start-up	1) With the maximum current limitation 2) Linear increase in voltage 3) Rapid start and then with maximum current limitation 4) Rapid start and then with a linear increase in voltage 5) Linear increase in current 6) Dual control of voltage and current	
Braking	1) Soft braking 2) Braking with freewheel	
Protection	1) Temperature protection of soft starter 2) Loss of phase voltage 3) Thermal protection of motor 4) Overvoltage and undervoltage 5) Short-circuit protection 6) Against too low load	
Additional features	1) Automatic motor start-up 2) Automatic restart in case of an error 3) Multiple automatic start-up	
Inputs	Control without potentiometer in relation to COM level 1) Start 2) Stop 3) Lock	
Relay outputs	1) Bypass contactor power supply 2) Error indication 3) Programmable - available functions: - operational readiness - motor start - bypass contractor activation - deceleration - motor stop - error - drive lock - operation	
Analog output	The current signal (0÷20 mA) proportional to the value of the motor current	
Control panel	1) four-digit LCD display and LED indicators for: - soft starter programming - status signaling - showing the current, power and motor overload - showing error messages 2) Keyboard to control and configure the soft starter 3) Option to lock or restrict the change of settings	
Working conditions	Operating environment	- Free from dirt and dust (especially conductive) - Ensure proper ventilation of the device - Protected against unauthorized access
	Temperature	-25÷40˚C
	Humidity	Below 90% (without condensation)
	Vibrations	Below 0.5G
	Operating height	Below 3000 m above sea level

33. ELECTRIC ENERGY METERS

PURPOSE

Electricity consumption meters are static (electronic), calibrated electricity consumption indicators used as sub meters for imported active energy of single-phase and three-phase alternating current.

According to directive

MID

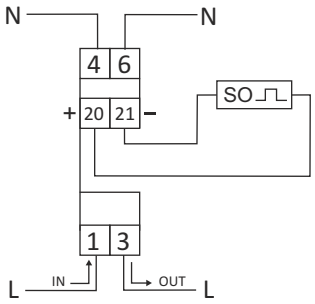
FUNCTIONING

Special electronics system under the influence of current flow and applied voltage generates pulses in proportion to the imported electric energy. The number of pulses is converted to imported energy and its value is shown on the display. Indicators have SO+ - SO- pulse outputs or communication ports with communication protocols. Indicators have the possibility of sealing screens of input terminals to prevent making the indicator bypass.

DIRECT MEASUREMENT TYPE

LE-01

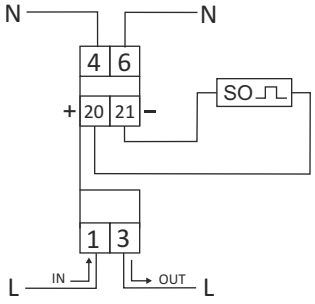
* single-phase
* 45A direct measurement
* according to LVD
* mechanical drum counter
* pulse output SO



reference voltage	230V AC ±30%
base current	5A
maximum current	45A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<8VA; <0.4W
indication range	0÷99999.9kWh
meter constant	(1Wh/pulse) 1000pulses/kWh
read-out signalling	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	<27V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	(1Wh/pulse) 1000pulses/kWh
pulse time SO+ SO-	70msec
working temperature	-20÷65°C
terminal	6mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

LE-01d

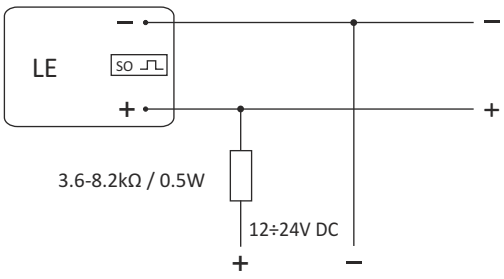
* single-phase
* 45A direct measurement
* according to MID
* display LCD
* pulse output SO



according to MID	2014/32/EU
reference voltage	230V AC ±30%
base current	5A
maximum current	45A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<8VA; <0.4W
indication range	0÷99999.99kWh
meter constant	(1Wh/pulse) 1000pulses/kWh
read-out signalling	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	<27V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	(1Wh/pulse) 1000pulses/kWh
pulse time SO+ SO-	70msec
working temperature	-20÷50°C
terminal	6mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

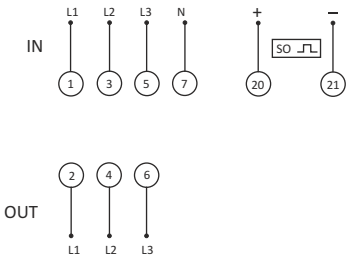
PULSE OUTPUT SUPPLY SYSTEM WITH CONNECTED EXTERNAL COUNTING MACHINE

In order to connect to electricity energy meter counting device has to be connected in parallel to the system power supply 12÷24V DC through resistor 3.6 ÷ 8.2 kΩ/0.5 W current limiting.
Maximum load counting circuit is 27mA .
Changing the polarization of power can damage the meter pulse output.
In the absence of connecting an external counting device is not allowed to connected to the output pulse power system.



LE-02d

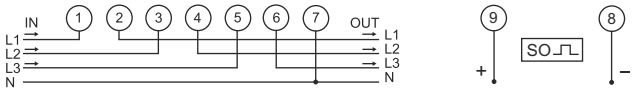
* three-phase
* 3×63A direct measurement
* according to MID
* pulse output SO



according to MID		2014/32/EU
reference voltage		3×230/400V+N
base current		5A
maximum current		63A
minimum current		0.04A
measurement accuracy (according to IEC61036)		1st class
own power consumption		<10VA; <2W
indication range		0÷999999.99kWh
meter constant	(1.25Wh/pulse)	800pulses/kWh
current consumption indication		3×red LED
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(1.25Wh/pulse)	800pulses/kWh
pulse time SO+ SO-		35msec
working temperature		-20÷55°C
terminal		16mm² screw terminals
dimensions		4.5 module (75mm)
mounting		on TH-35 rail
protection level		IP20

LE-03 THREE-PHASE TYPE

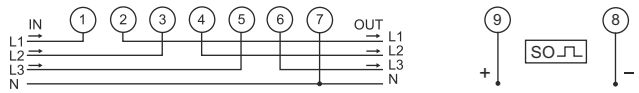
* three-phase
* 3×100A direct measurement
* according to LVD
* mechanical drum counter
* pulse output SO



reference voltage		3×230/400V+N
base current		10A
maximum current		100A
minimum current		0.04A
measurement accuracy (according to IEC61036)		1st class
own power consumption		<10VA; <2W
indication range		999999.9kWh
meter constant	(1.25Wh/pulse)	1000pulses/kWh
current consumption indication		3×red LED
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(1.25Wh/pulse)	800pulses/kWh
pulse time SO+ SO-		34÷80msec
working temperature		-20÷55°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

LE-03d THREE-PHASE TYPE

* three-phase
* 3×100A direct measurement
* according to MID
* display LCD
* pulse output SO



according to MID		2014/32/EU
reference voltage		3×230/400V+N
base current		10A
maximum current		100A
minimum current		0.04A
measurement accuracy (according to IEC61036)		1st class
own power consumption		<10VA; <2W
indication range		999999.9kWh
meter constant	(1.25Wh/pulse)	1000pulses/kWh
current consumption indication		3×red LED
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(1.25Wh/pulse)	800pulses/kWh
pulse time SO+ SO-		34÷80msec
working temperature		-20÷50°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

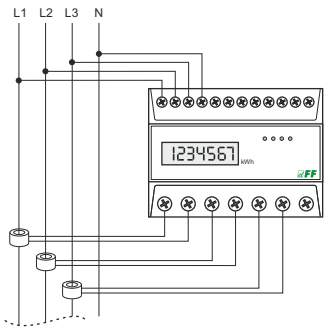
Base current - determines the current value at which the percentage measurement error is close to zero. If the current flowing through the meter is higher than the base current value, then the measurement error is negative, which works to the benefit of the electricity payer. On the other hand, if the current flowing through the meter is lower than the base current value, the percentage measurement error is positive and that acts against the electricity payer. These statements arise from metrological characteristics (percentage measurement error as a function of current), supplied to the user manual of a electricity meter. It is obvious that the meter measures electricity correctly with the meter accuracy class in the whole measurement range.

Maximum current - the maximum current for permanent load of the electricity meter.

Minimum current - the lowest value of the load current, which the meter detects and record.

Marking on the device: 0.25÷5(50)A - position 1 (before the parenthesis): base current of 0.25÷5A;
0.25÷5(50)A - position 2 (in parentheses): maximum current 50A.

INDIRECT MEASUREMENT TYPE



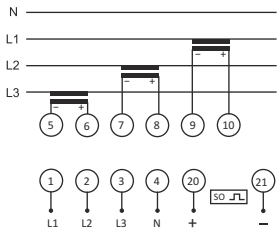
PURPOSE

These meters are intended for current transformers with a secondary current of 5A. Maximum measured current of the system is specified by the value of the primary current while using the current transformer.

Current transformers (page 192)

LE-02d CT TO CO-OPERATION WITH CURRENT TRANSFORMERS

* three-phase
* 3×5A indirect measurement
* 5÷6000/5A transformers
* gear set once with a button
* according to LVD
* pulse output SO



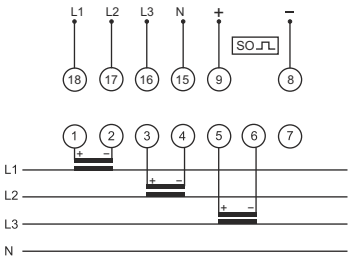
reference voltage	3×230/400V+N
base current	3×1.5A
maximum current	3×6A
secondary current	5A
minimum secondary current	0.04A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<10VA; <2W
number LCD signs	8
meter indicator range	dependent on transmission
meter constant	dependent on transmission
current consumption indication	3×red LED
read-out signalling	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	<30V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	dependent on transmission
pulse time SO+ SO-	35msec
working temperature	-20÷55°C
terminal	16mm² screw terminals
dimensions	4.5 module (75mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONING

The user has the ability to set the index value used gear ratio, which allows you to indicate the actual value taken by the electricity system.
In the memory of indicator are preserved values of primary currents Ip transformers feasible. Choosing the appropriate value in accordance to the values of the connected transformers automatically sets the appropriate factor, according to which computes the actual value of the electricity taken. The LCD displays the actual value of the energy collected in a format depending on the selected gear.
Gear is programmable using the button positioned under the casing of the meter terminals. For safety reasons, the data registration of the gear setting function can be done only once.
CT currents Ip inscribed in memory of the indicator:
5, 20, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000.

LE-03d CT200 / LE-03d CT400 TO CO-OPERATION WITH A DEDICATED CURRENT TRANSFORMERS

* three-phase
* 3×5A indirect measurement
* 200/5A and 400/5A transformers
* factory set gear
* according to LVD
* pulse output SO

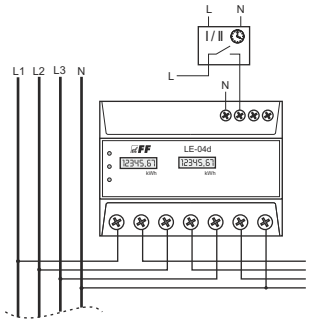


type	
LE-03d CT200	200/5A
LE-03d CT400	400/5A
reference voltage	3×230/400V+N
base current	3×1.5A
maximum current	3×5A
minimum current	0.04A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<10VA; <2W
indication range	9999999kWh
meter constant	(3.33Wh/pulse) 300pulses/kWh
current consumption indication	3×red LED
read-out signalling	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	<30V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	(3,33Wh/pulse) 300pulses/kWh
pulse time SO+ SO-	35msec
working temperature	-20÷50°C
protection level	IP20
terminal	25mm² screw terminals
dimensions	7 modules (122mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONING

In the case of transformers with dedicated operating parameters, the meters display the actual value of the power consumed by the system.

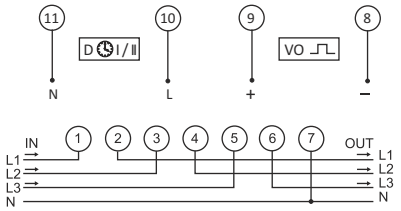
LE-04d TWO-TARIFFS TYPE



PURPOSE

The indicator is designed to measure electricity tariff system.
The values indicated in the power tariffs are separate displays T0 and T1.

* three-phase
* 3×100A direct measurement
* two tariffs
* for external control timer
* according to LVD
* pulse output SO



reference voltage		3×230/400V+N
base current		10A
maximum current		100A
minimum current		0.04A
measurement accuracy (according to IEC61036)		1st class
T0 and T1 display indicator range		0÷99999.99kWh
meter constant	(1.25Wh/pulse)	800pulses/kWh
current consumption indication		3×red LED
T0 and T1 meters signalling		2×red LED
pulse output VO		open collector
connection voltage VO		<24V DC
connection current SO+ SO-		<30mA
constant SO	(1.25Wh/pulse)	800pulses/kWh
pulse time SO+ SO-		30msec
working temperature		-20÷55°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

FUNCTIONING

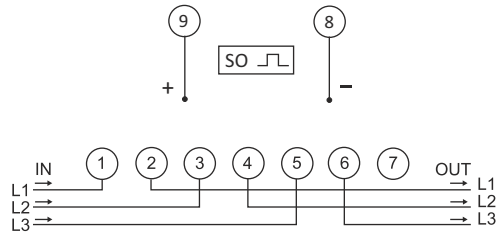
Switching between the tariffs takes place when the control voltage is applied to the input D of the meter. This can done by the external control timer. Meter T0 reads the value of the imported energy in the absence of control voltage at the input D. Meter T1 reads the value of the imported energy from the appearance of the control voltage at the input D until it disappears. Operation of the given meter is indicated by the appropriate LED.

LE-05d WITHOUT NEUTRAL WIRE

FUNCTIONING

The electronic system by the influence of the flowing current and the applied voltage generates pulses in proportion to the electricity consumed. Energy measurement system takes place in Aron system. Indicators have pulse output SO+ - SO-. Indicators are sealable terminal covers input and output bypass to prevent making the index.

* three-phase
* 3×400V reference voltage
* 3×100A direct measurement
* measurement in the Aron system
* according to LVD
* pulse output SO



reference voltage		3×400V
base current		3×10A
maximum current		3×100A
minimum current		0.04A
measurement accuracy (according to IEC61036)		1st class
own power consumption		<10VA; <2W
indication range		999999.9kWh
meter constant	(1.25Wh/pulse)	800pulses/kWh
current consumption indication		2×red LED
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(1.25Wh/pulse)	800pulses/kWh
working temperature		-20÷50°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

AUTOMATIC READING METERS

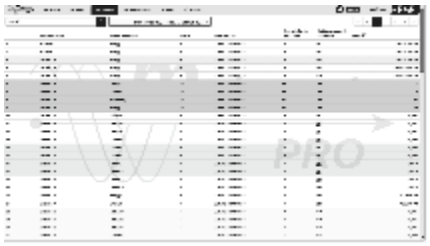
PURPOSE

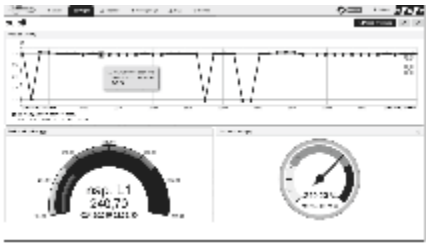
Automatic reading meters are used for indications of the imported electric energy and the parameters of the mains with the possibility of remote reading, storage of data or indications in financial-accounting systems, BMS, SCADA, etc.

FUNCTIONING

Group of the counters along with network communication devices (converters, concentrators, controllers) is managed through special software for recording energy consumption and network parameters. Read and recorded values are consistent with the indications on the display. Communication with meters is carried out in accordance with the designated communication protocol by the communication port. Each counter is identified by a unique address assigned by the user.

REMOTE READING SYSTEM MeternetPRO
(Read more - page 160)

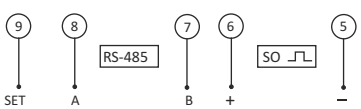


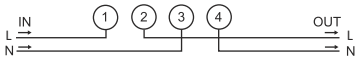


ACTIVE ENERGY METERS WITH MODBUS RTU COMMUNICATION

LE-01M

* single-phase
* 100A direct measurement
* kWh indication
* according to MID
* Modbus RTU protocole
* RS-485 port
* pulse output SO



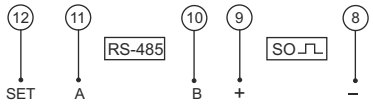


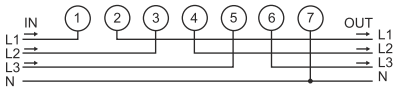
according to MID		2014/32/EU
reference voltage		230V AC ±30%
base current		10A
maximum current		100A
minimum current		0.04A
measurement accuracy	(according to IEC61036)	1st class
own power consumption		<10VA; <2W
indication range		0÷99999.99kWh
meter constant	(0.625Wh/pulse)	1600pulses/kWh
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<27V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(0.625Wh/pulse)	1600pulses/kWh
pulse time SO+ SO-		34÷80msec
port		RS-485
communication protocol		Modbus RTU
working temperature		-20÷55°C
terminal		25mm² screw terminals
dimensions		4.5 module (75mm)
mounting		on TH-35 rail
protection level		IP20

LE-03M

* three-phase
* 3×100A direct measurement
* kWh indication
* according to MID
* protocole Modbus RTU
* RS-485 port
* pulse output SO

according to MID		2014/32/EU
reference voltage		3×230/400V+N
base current		10A
maximum current		100A
minimum current		0.04A
measurement accuracy	(according to IEC61036)	1st class
own power consumption		<10VA; <2W
indication range		0÷999999.9kWh
meter constant	(1.25Wh/pulse)	800pulses/kWh
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-	(1.25Wh/pulse)	800pulses/kWh
pulse time SO+ SO-		34÷80msec
port		RS-485
communication protocol		Modbus RTU
working temperature		-20÷55°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20



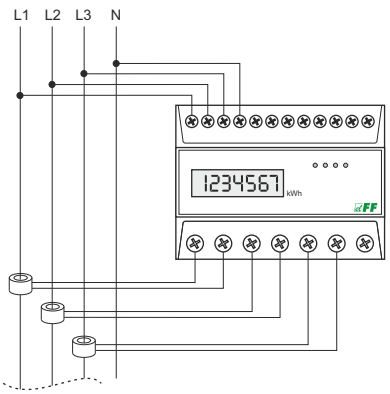


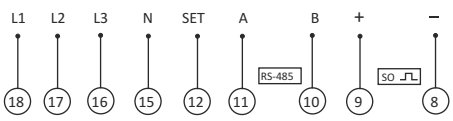
LE-03M CT TO CO-OPERATION WITH CURRENT TRANSFORMERS

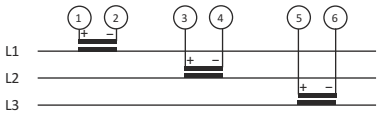
* three-phase
* 3×5A indirect measurement
* 5÷6000/5A transformers
* gear set programmatically according to Modbus RTU
* kWh indication
* according to MID
* Modbus RTU protocole
* RS-485 port
* pulse output SO

according to MID		2014/32/EU
reference voltage		3×230/400V+N
base current		3×1.5A
maximum current		3×5A
minimum current		0.04A
measurement accuracy	(according to IEC61036)	1st class
own power consumption		<10VA; <2W
number LCD signs		7
indicator range		dependent on transmission
meter constant		dependent on transmission
read-out signalling		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		<30V DC
connection current SO+ SO-		<27mA
constant SO+ SO-		dependent on transmission
pulse time SO+ SO-		35msec
port		RS-485
communication protocol		Modbus RTU
working temperature		-20÷55°C
terminal		25mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

CT ratio as a suitable value of registry is programmable using the Modbus RTU protocol command. CT currents Ip inscribed in memory of the indicator: 5, 20, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 750, 800, 1000, 1200, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000.







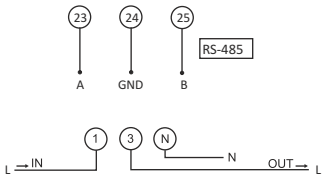
WITH NETWORK PARAMETERS ANALYSIS

FUNCTIONING

They are used for indications and recordings taken of electricity and mains parameters.
Measured by the meter network's parameters are indicated cyclically on the LCD display.
Remote reading all indications is possible via a wired RS-485 communication network standard.

LE-01MP

* single-phase
* 100A direct measurement
* kWh indication/kvar + network parameters
* according to LVD
* Modbus RTU protocole
* RS-485 port
* pulse output SO



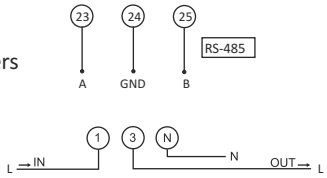
reference voltage	230V AC ±20%
base current	5A
maximum current	100A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<8VA; <0.4W
indication range	0÷99999.99kWh
meter constant (1.0Wh/pulse)	1000pulses/kWh
read-out signalling	red LED
port	RS-485
communication protocol	Modbus RTU
working temperature	-20÷65°C
terminal	25mm² screw terminals
dimensions	1 module (19.5mm)
mounting	on TH-35 rail
protection level	IP20

MEASURED VALUES

Active energy	AE+	[kWh]
Phase voltage	U	[V]
Phase current	I	[A]
Frequency	F	[Hz]
Meter's temperature	T	[°C]

LE-01MR (previously LE-01MQ)

* single-phase
* 100A direct measurement
* kWh indication/kvar + network parameters
* according to LVD
* Modbus RTU protocole
* RS-485 port
* pulse output SO



reference voltage	230V AC ±20%
base current	5A
maximum current	100A
minimum current	0.02A
measurement accuracy (according to IEC61036)	1st class
own power consumption	<8VA; <0.4W
indication range	0÷99999.99kWh
meter constant (1,0Wh/pulse)	1000pulses/kWh
read-out signalling	red LED
port	RS-485
communication protocol	Modbus RTU
working temperature	-20÷65°C
terminal	25mm² screw terminals
dimensions	1 module (19.5mm)
mounting	on TH-35 rail
protection level	IP20

MEASURED VALUES

LE-01MR (previously LE-01MQ):

Active energy	AE+	[kWh]
Reactive energy	RE+	[kvarh]
Phase voltage	U	[V]
Phase current	I	[A]
Frequency	F	[Hz]
Meter's temperature	T	[°C]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	P	[VA]
Power factor	cosϕ	

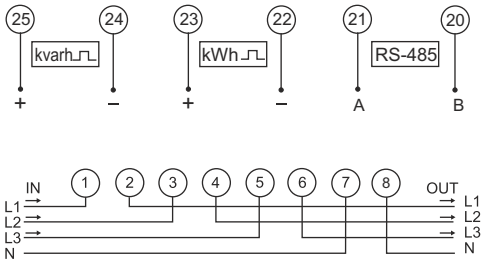
LE-03MP

* three-phase
* 60A direct measurement
* kWh indication/kvar + network parameters
* prepaid
* according to LVD
* Modbus RTU protocole
* RS-485 port
* pulse output SO

reference voltage		3×400V
base current		5A
maximum current		60A
minimum current		0.02A
measurement accuracy (according to IEC61036)		1st class
own power consumption		<10VA; <1.5W
indication range		0÷999999.99kWh
meter constant kWh	(1.25Wh/pulse)	800pulses/kWh
meter constant kvarh	(1,25varh/pulse)	800pulses/kvarh
read-out signalling		2×red LED
pulse output kWh/kvarh		open collector
connection voltage kWh/kvarh		<30V DC
connection current kWh/kvarh		<27mA
constant kWh/kvarh	(1.25Wh/pulse)	800pulses/kWh
pulse time kWh/kvarh		10msec
port		RS-485
communication protocol		Modbus RTU
working temperature		-20÷55°C
terminal		16mm² screw terminals
dimensions		7 modules (122mm)
mounting		on TH-35 rail
protection level		IP20

FUNCTIONS

* The internal relay switching circuits L1, L2, L3
* Manual relay control
* Overcurrent protection - setting the limit load
* Prepaid energy (prepayment) - the value of active energy at which meter disconnects the internal relay.
* Automatic mode - automatic relay auto-off after overcurrent threshold increased and when the set overcurrent and set ON prepaid functions.
* Status - current status of the relay [on/off]



MEASURED VALUES

Active energy	AE+	[kWh]
Reactive energy	RE+	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
L1 phase active power	P1	[W]
L2 phase active power	P2	[W]
L3 phase active power	P3	[W]
L1+L2+L3 active power	P	[W]
L1 phase power factor	cosφ1	
L2 phase power factor	cosφ2	
L3 phase power factor	cosφ3	

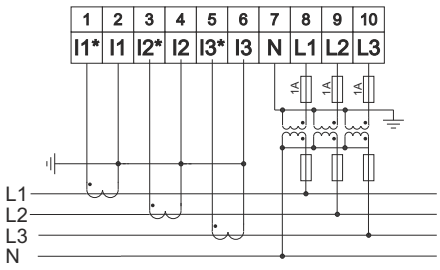
Reading of all measured values and set function parameters is done by using the Modbus RTU protocol.

DMM-5T

THREE-PHASE NETWORK ANALYZER with MODBUS RTU communication
FOUR-QUADRANT ELECTRICITY MEASUREMENT

* Direct or indirect measurement of the phase currents
* Direct or indirect (>230/400V) measurement of phase and interphase voltages
* Measurement of electric energy in 4 tariffs

Read more - page 127.



BI-DIRECTIONAL WITH NETWORK PARAMETERS MEASUREMENT

WITH RS-485 PORT AND MODBUS RTU PROTOCOL

LE-01MQ

NEW !

* single-phase
* bi-directional (4-quadrant)
* 100A direct measurement
* kWh/kVar (drawn/returned)
* indication of network parameters
* compliance with MID
* Modbus RTU protocol
* RS-485 port
* 2 pulse outputs SO
* backlit multi-function LCD display
* protection of the meter's configuration with password

reference voltage	3×230/400V+N
base current	0.25÷5A
maximum current	100A
minimum current measured	0.02A
measured voltage	176÷276V AC
measurement accuracy	1st class
overload	30×Imax/10msec
insulation	4kV/1min; 6kV/1µs
own power consumption	<10VA; <2W
indication range	0÷99999.99kWh
meter constant kWh	1, 10, 100, 1000 pulse/kWh
meter constant kvarh	1, 10, 100, 1000 pulse/kvar
read-out signalling	2×LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	RS-485
communication protocol	Modbus RTU
working temperature	-20÷55°C
terminal	16mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP51

MEASURED VALUES

Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]

Power factor	cosφ
Power requirement	

LE-03MQ

NEW !

* three-phase
* bi-directional (4-quadrant)
* 100A direct measurement
* kWh/kVar (drawn/returned)
* indication of network parameters
* compliance with MID
* Modbus RTU protocol
* RS-485 port
* 2×pulse outputs SO
* backlit multi-function LCD display
* protection of the meter's configuration with password

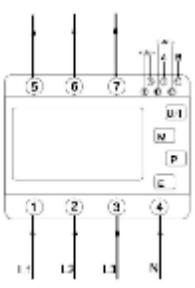
reference voltage	3×230/400V+N
base current	0.5÷10A
maximum current	100A
minimum current measured	0.04A
measured voltage	
L-N	100÷289V AC
L-L	173÷500V AC
measurement accuracy	1st class
overload	30×Imax/10msec
insulation	4kV/1min; 6kV/1µs
own power consumption	<10VA; <2W
indication range	0÷99999.99kWh
meter constant kWh	0.01, 0.1, 10, 100 pulse/kWh
meter constant kvarh	0.01, 0.1, 10, 100 pulse/kvar
read-out signalling	2×LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	RS-485
communication protocol	Modbus RTU
working temperature	-20÷55°C
terminal	25mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP51

MEASURED VALUES

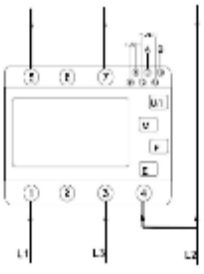
Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]

Power factor	cosφ
Harmonic	THD
Power and current requirement	

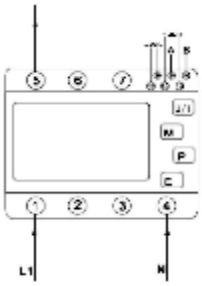
MEASURING SYSTEMS



3×230 V+N - 3-phase 4-wire network



3×400 V - 3-phase 3-wire network (without neutral)



230 V AC - 1-phase 2-wire network

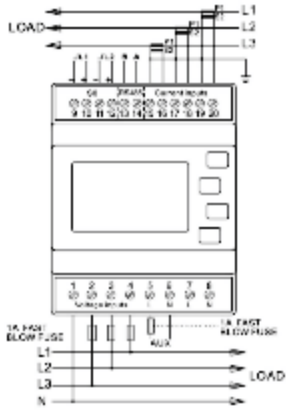
LE-03MQ CT

NEW !

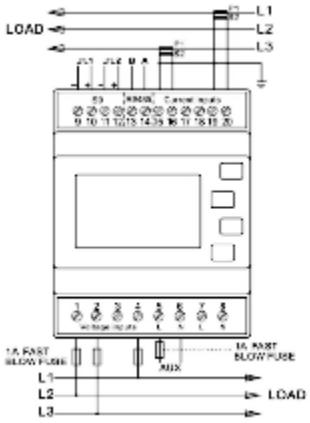
* three-phase
* bi-directional (4-quadrant)
* transformers 1 A or 5 A
* current transformer 1÷9999
* adjustable measuring voltage 100÷500 V
* voltage transformer 1÷9999
* transformer set programmatically according to Modbus RTU
* kWh/kVar (drawn/returned)
* indication of network parameters
* compliance with MID
* Modbus RTU protocol
* RS-485 port
* 2×pulse outputs SO
* backlit multi-function LCD display
* protection of the meter's configuration with password

reference voltage	3×230/400V+N
base current	0.25÷5A
maximum current	6A
minimum current measured	0.02A
measured voltage	
L-N	100÷289V AC
L-L	173÷500V AC
measurement accuracy	1st class
overload	30×Imax/10ms
insulation	4kV/1min; 6kV/1.2µs
own power consumption	<10VA; <2W
indication range	0÷9999999.9kWh
meter constant kWh	0.01, 0.1, 10, 100 pulse/kWh
meter constant kvarh	0.01, 0.1, 10, 100 pulse/kvar
read-out signalling	2×LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	RS-485
communication protocol	Modbus RTU
working temperature	-20÷55°C
terminal	4mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP51

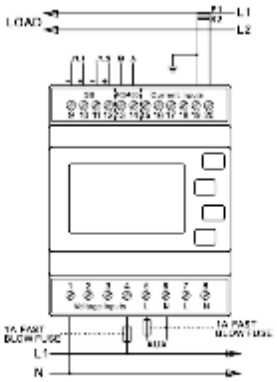
MEASURING SYSTEMS



3×230 V+N
3-phase 4-wire network



3×400 V
3-phase 3-wire network (without neutral)



230 V AC
1-phase 2-wire network

MEASURED VALUES

Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]
Power factor	cosφ	
THD harmonic		
Power and current requirement		

WITH M-Bus PORT AND PROTOCOLE

LE-01MB

NEW !

* single-phase
* bi-directional (4-quadrant)
* 100A direct measurement
* kWh/kVar (drawn/returned)
* indication of network parameters
* compliance with MID
* M-Bus protocole
* 2×pulse outputs SO
* backlit multi-function LCD display
* protection of the meter configuration with password

reference voltage	3×230/400V+N
base current	0.25÷5A
maximum current	100A
minimum current measured	0.02A
measured voltage	176÷276V AC
measurement accuracy	1st class
overload	30×Imax/10msec
insulation	4kV/1min; 6kV/1µs
own power consumption	<10VA; <2W
indication range	0÷99999.99kWh
meter constant kWh	1, 10, 100, 1000 pulse/kWh
meter constant kvarh	1, 10, 100, 1000 pulse/kvar
read-out signalling	2× LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	M-Bus
communication protocol	M-Bus
working temperature	-20÷55°C
terminal	16mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP51

MEASURED VALUES

Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]
Power factor	cosφ	
Power requirement		

LE-03MB

NEW !

* single-phase
* bi-directional (4-quadrant)
* 100A direct measurement
* kWh/kVar (drawn/returned)
* indication of network parameters
* compliance with MID
* M-Bus port and protocol
* 2×pulse outputs SO
* backlit multi-function LCD display
* protection of the meter configuration with password

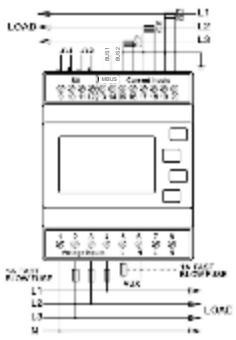
reference voltage	3×230/400V+N
base current	0.5÷10A
maximum current	100A
minimum current measured	0.04A
measured voltage	
L-N	100÷289V AC
L-L	173÷500V AC
measurement accuracy	1st class
overload	30×Imax/10msec
insulation	4kV/1min; 6kV/1µsec
own power consumption	<10VA; <2W
indication range	0÷99999.99kWh
meter constant kWh	0.01, 0.1, 10, 100 pulse/kWh
meter constant kvarh	0.01, 0.1, 10, 100 pulse/kvar
read-out signalling	2×LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	M-Bus
communication protocol	M-Bus
working temperature	-20÷55°C
terminal	25mm² screw terminals
dimensions	4.5 module (76mm)
mounting	on TH-35 rail
protection level	IP51

MEASURED VALUES

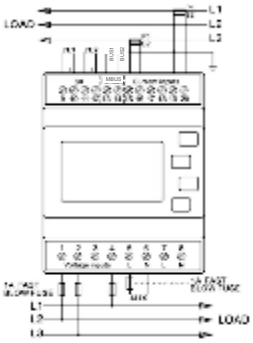
Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]

Power factor	cosφ
Harmonic	THD
Power and current requirement	

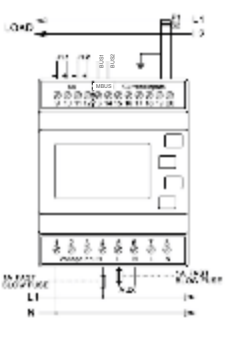
MEASURING SYSTEMS



3×230 V+N
3-phase 4-wire network



3×400 V
3-phase 3-wire network (without neutral)



230 V AC
1-phase 2-wire network

LE-03MB CT

NEW !

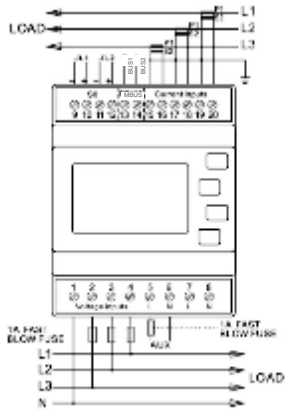
* 3-phase
* bi-directional (4-quadrant)
* transformers 1 A or 5 A
* current transformer 1÷9999
* adjustable measuring voltage 100÷500 V
* voltage transformer 1÷9999
* transformer set programmatically according to the M-BUS
* kWh/kvar indication (drawn/returned)
* indication of network parameters
* compliance with LVD
* port/protocol M-BUS
* 2×pulse outputs SO
* backlit multi-function LCD display
* protection of the meter configuration with password

reference voltage	3×230/400V+N
base current	0.25÷5A
maximum current	6A
minimum current measured	0.02A
measured voltage	
L-N	100÷289V AC
L-L	173÷500V AC
measurement accuracy	1st class
overload	30×Imax/10msec
insulation	4kV/1min; 6kV/1,2µsec
own power consumption	<10VA; <2W
indication range	0÷9999999.9kWh
meter constant kWh	0.01, 0.1, 10, 100 pulse/kWh
meter constant kvarh	0.01, 0.1, 10, 100 pulse/kvar
read-out signalling	2×LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	<30V DC
connection current kWh/kvarh	<27mA
pulse time kWh/kvarh	60, 100, 200msec
port	M-Bus
communication protocol	M-Bus
working temperature	-20÷55°C
terminal	4mm² screw terminals
dimensions	4 modules (72mm)
mounting	on TH-35 rail
protection level	IP51

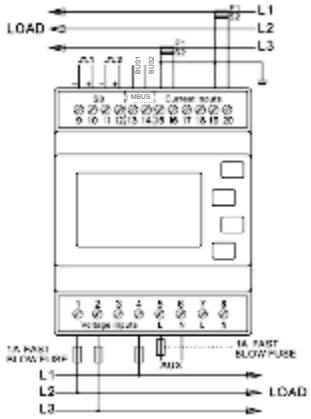
MEASURED VALUES

Active energy drawn/returned	AE+/AE-	[kWh]
Reactive energy drawn/returned	RE+/RE-	[kvarh]
Phase voltage	U1, U2, U3	[V]
Phase current	I1, I2, I3	[A]
Frequency	F	[Hz]
Active power	P	[W]
Reactive power	Q	[var]
Apparent power	S	[VA]
Power factor	cosφ	
Harmonic	THD	
Power and current requirement		

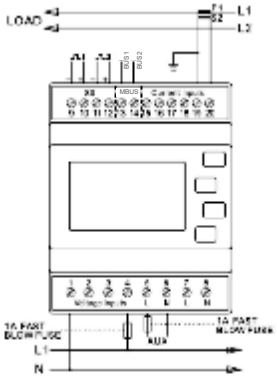
MEASURING SYSTEMS



3×230 V+N
3-phase 4-wire network



3×400 V
3-phase 3-wire network (without neutral)



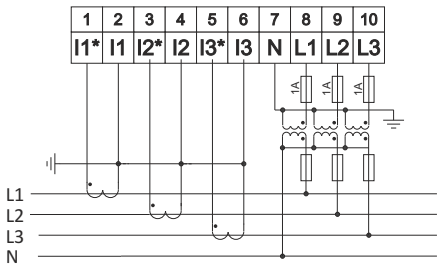
230 V AC
1-phase 2-wire network

DMM-5T

THREE-PHASE NETWORK ANALYZER with MODBUS RTU communication
FOUR-QUADRANT ELECTRICITY MEASUREMENT

* Direct or indirect measurement of the phase currents
* Direct or indirect (>230/400V) measurement of phase and interphase voltages
* Measurement of electric energy in 4 tariffs

Read more - page 127.

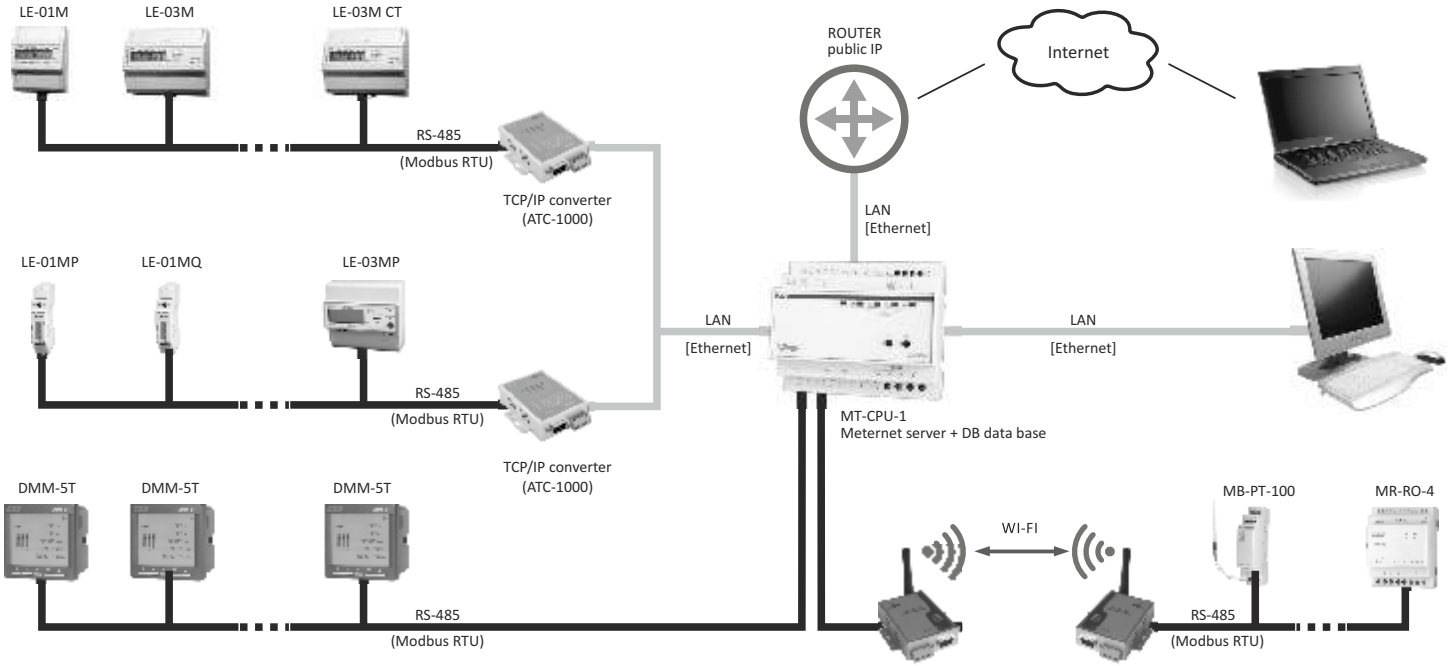


REMOTE READING AND REGISTRATION SYSTEM

Meternet PRO

PURPOSE

The MeternetPRO application enables remote reading of status and indications of the meters, multimeters, measuring transducers, I/O expansion modules and other measuring devices that communicates according to the Modbus RTU protocol. The data exchange between devices and the application is carried out through the RS-485 network or LAN. The program, along with the database is installed on a special server MT-CPU-1, which operates in local network. Software user interface is a web application (web site). Access to the program is available through any web browser. In the case of a LAN with a public IP address, you can configure the program and read the data via the Internet.

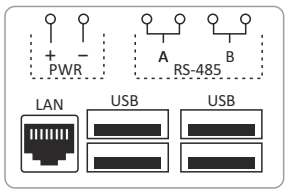


FUNCTIONS

* requires no installation of software on the user's equipment
* status - system productivity preview pane
* dashboard - window of indicators and control panels
* widgets - graphical indicators assigned to the recorded values (dial, bar graphs, trends)
* setup - a simple system settings without any programming skills, setting the name of the device
* easy integration with other devices, such as water meters, gas meters, etc.
* reports - preview of the current and archived recorded values (table of results, graphs), report filters, time ranges
* data export - direct recording to a .csv file, transfer over LAN, import data as a .csv file on the user's computer
* system set point- recording time (min. 1 sec), Modbus and TCP communication parameters
* software module "math" - algebraic transformations of read values
* software module "energy" - subscriber billing of energy consumption

MT-CPU-1 PROGRAMM SERVER + DB DATABASE

System management computer - sends queries to devices, archives data, manages the communication and distribution of data.



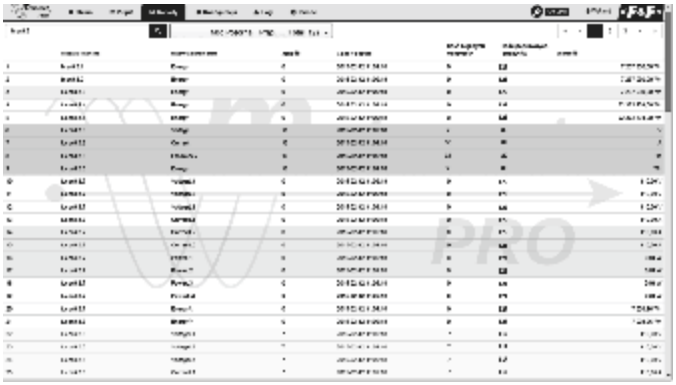
supply voltage	9÷30V DC
ports	
LAN	RJ-45
USB	2.0
RS-485	Modbus RTU
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
internal memory	5GB
RTC clock	YES
battery type	2032 (lithium)
battery life	6 years*
working temperature	-25÷50°C
state signalling	5×LED
terminal	1.5mm² screw terminals
dimensions	5 modules (85mm)
mounting	on TH-35 rail
protection level	IP20

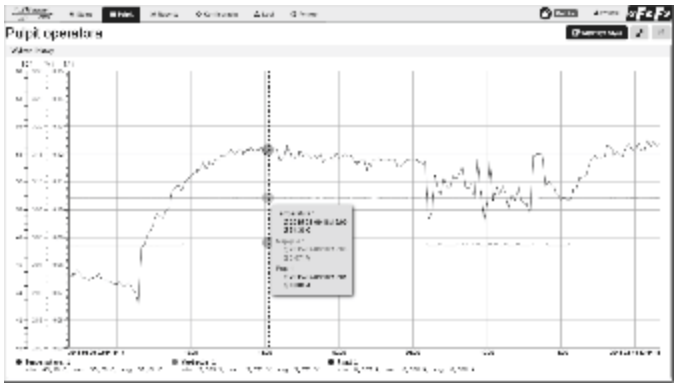
* battery life addicted to weather conditions

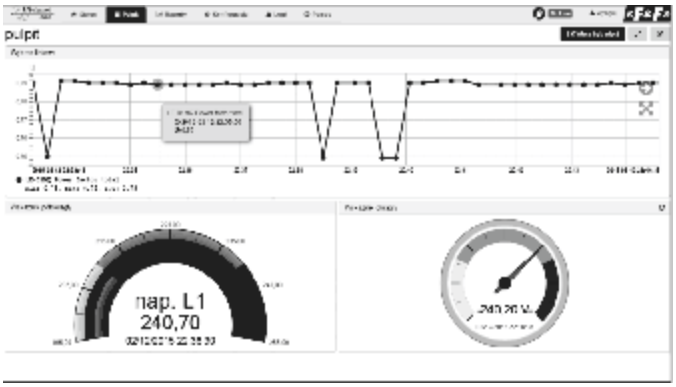
FUNCTIONING

System application along with MT-CPU-1 server is a central unit of the system. It fulfills the role of the Master on the Modbus network. System devices communicate via RS-485 network according to the Modbus RTU standard communication protocol. Data exchange between meters and the application is carried out via RS-485 port that is built-in in the MT-CPU-1 server, a standard RS-485 <-> USB converter or LAN/Ethernet converter. In the case of a LAN with router using a public IP address, you can read the data via the Internet. RS network is made using a two-wire (shielded) signal "twisted pair" cable (UTP, FTP). The read data are archived in the external memory (HDD/SDD, Flash, hosting) connected to the server. Data can be freely shaped according to software features.

PROGRAMM INTERFACE







OPERATING MODES AND LICENSES

LIC-MT-B - basic license. It includes:
- 10 tokens
- dashboard: 1 dashboard + any three indicators (widgets)
- reports: the current tabular, tabular history for a given time point, the history chart for a single parameter for a selected period of time; export of generated reports to a .csv file (.xls) and dump the generated charts to a .jpg file
- mathematics: one virtual parameter with an unlimited number of algebraic transformations on all recorded parameters
- recording: all selected parameters to the system database
- status of the system operation

LIC-MT-D - device license - token. Each device added to the system takes the appropriate number of tokens. As part of the purchased number of tokens you can freely mix different devices in the system. The number of tokens for your device is shown in the current product-pricing summary available on the website meternetpro.pl.

LIC-MT-P - "dashboard" module. Graphical indicators panel of current indications of selected parameters. Version with "dashboard" license allows you to create an unlimited number of dashboards and indicators (widgets).

LIC-MT-R "reports" module. It extends the standard reports with the ability to create graphical progress of 10 parameters simultaneously and incremental reports for the given period.

LIC-MT-M - "math" module. The module allows you to make the algebraic transformation (calculation) of the recorded values. The result is recorded as a virtual device and is subject to all rules of the program, just as any result of the actual equipment.

LIC-MT-OC - "CSV output" module. CSV data output, which means the ability to log the results to an external database in the form of a csv file.

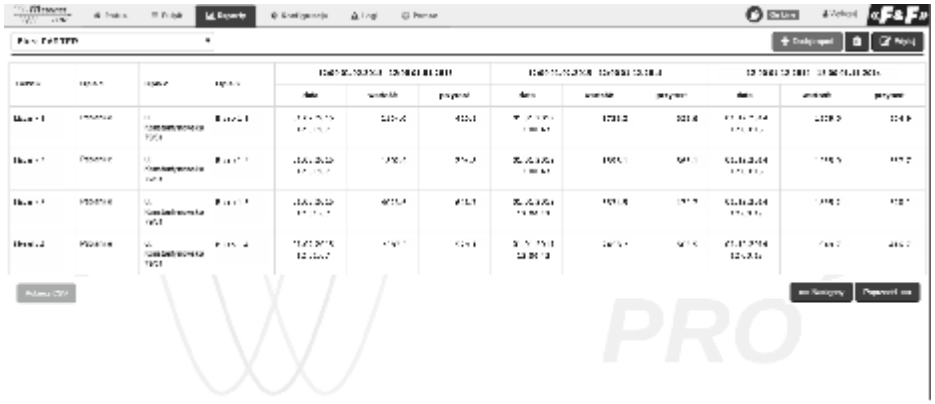
LIC-MT-E - "energy" module. The module for subscriber billing of electricity consumption.

LIC-MT-I - external implementation. Adding to the system library a device that has not been produced by the F&F. Service performed by customer's request. It allows to integrate other devices compatible with Modbus RTU protocol.

SUBSCRIBER BILLINGS OF ELECTRICITY CONSUMPTION

The "energy" module LIC-MT-E

Module for subscriber billings of electric energy consumption (or other recorded incremental values, for example consumption of water, heat, etc.).
It allows to calculate the value increases in the designated billing periods (intervals).
Cycles: monthly, weekly, daily, hourly.
The module allows you to create many individual and operating in parallel reports.



SYSTEM COMPONENTS

* DMM-5T	multimeter, four-quadrant 5÷9000A indirect measurement, U, I, F, AE, RE, P, Q, cos measurement	page 127
* LE-01M	single-phase 100A direct energy meter	page 152
* LE-03M	three-phase 100A direct energy meter	page 153
* LE-03M CT	three-phase 5÷6000A indirect energy meter	page 153
* LE-01MP	single-phase 100A direct energy meter, U, I, F, AE, T measurement	page 154
* LE-01MR	single-phase 100A direct energy meter, U, I, F, AE, RE, P, Q, T measurement	page 154
* LE-03MP	three-phase 60A direct energy meter, U, I, F, AE, RE, P, Q, cos, T, Prepaid measurement	page 155
* LE-01MQ	bidirectional single-phase 100A direct energy meter, U, I, F, AE, RE, P, Q, cos measurement	page 156
* LE-03MQ	bidirectional three-phase 100A direct energy meter, U, I, F, AE, RE, P, Q, cos measurement	page 156
* LE-03MQ CT	bidirectional single-phase 5A indirect energy meter, U, I, F, AE, RE, P, Q, cos measurement	page 157
* LE-01MB	bidirectional single-phase 100A direct energy meter, U, I, F, AE, RE, P, Q, cos; M-BUS measurement	page 158
* LE-03MB	bidirectional three-phase 100A direct energy meter, U, I, F, AE, RE, P, Q, cos; M-BUS measurement	page 158
* LE-03MB CT	bidirectional three-phase 5A indirect energy meter, U, I, F, AE, RE, P, Q, cos; M-BUS measurement	page 159
* MB-1U-1	single-phase AC/DC voltage measuring converter	page 184
* MB-3U-1	three-phase AC/DC voltage measuring converter	page 184
* MB-1I-1	single-phase AC/DC current measuring converter	page 184
* MB-3I-1	three-phase AC/DC current measuring converter	page 184
* MB-PT-100	measuring temperature converter, PT-100 sensor, range -100÷400°C	page 185
* MB-DS-2	measuring temperature converter, DS×2 sensor, range -50÷130°C	page 185
* MB-TC-1	temperature converter for K, J, E, N, T, S, R, B thermocouples	page 185
* MB-LI-4	four-channel pulse counter	page 186
* MB-LG-4	four-channel work timer	page 186
* MR-DIO-1	digital inputs/outputs expansion module ×6	page 188
* MR-DI-4	digital inputs expansion module ×4	page 188
* MR-RO-1	relay outputs expansion module 16A ×1	page 188
* MR-RO-4	relay outputs expansion module 16A ×4	page 189
* MR-AI-1	analog inputs expansion module 4÷20 mA/0÷10V ×4	page 189
* MR-AO-1	analog outputs expansion module 0÷10V ×4	page 189

ATTENTION!

It is possible to read registers of the devices that are not offered by the F&F.
This requires individual configuration of the program in accordance with the requirements of the user.

CONVERTERS

WE1800BT

RS-485 => USB

ATC-1000

RS-485 => TCP/IP

Read more - page 180.

NETWORK PARAMETERS REGISTRATIONS SETS OPERATION

LogDMM2 with CURRENT TRANSFORMER and configuration program for PC

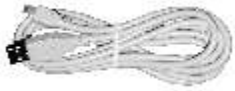
The set includes: MAX S02 controller, DMM-3T 5-9000A multimeter, 2 GB SD memory card, USB cable, software + instruction.
ATTENTION!
The set does not include the 24 V DC power supply required to power the controller and the 5 A measuring current transformers for multimeter.

Power suppliers (read more - page 120)

Current transformers (read more - page 192)

DMM-3T

MAX S02



USB cable

SD 2GB

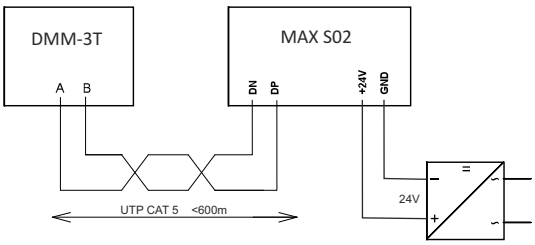
CD soft

FUNCTIONING

MAX controller and multimeter driver communicates via the RS-485 port using a Modbus RTU communication protocol. The controller cyclically registers the network parameters and stores them in the internal memory. The record from the internal memory is periodically moved to a text file on the SD card. Setting the time of cycles, date, time and backup creation is made using a special configuration program on your PC.

Recorded parameters:

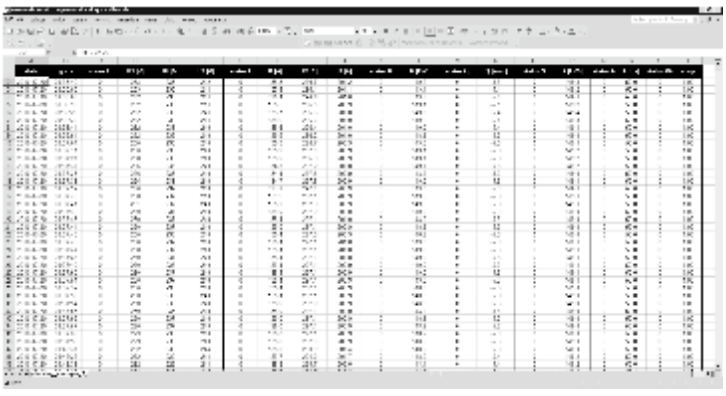
- date	[YYYY-MM-DD]	- active power	(P)	- active positive energy	(+Wh)
- time	[hh: mm : ss]	- reactive power	(Q)	- active negative energy	(-Wh)
- voltage	(U1, U2, U3)	- apparent power	(S)	- reactive positive energy	(+varh)
- current	(I1, I2, I3)	- power factor		- reactive negative energy	(-varh)
- frequency	(F)				



PC configuration programm

LOCAL DATA BACKUP ON THE SD MEMORY CARD

Registered data is stored in the internal memory of the controller and are periodically transferred to the SD card. Cycle of registers reading and writing to the internal memory and the write cycle [backup] on the SD card are set by the user. The minimum time of the reading cycle is 1 sec. The data from the SD card can be imported into Excel and then viewed and adjusted according to software features.



Registration data after import to Excel

34. PULSE AND WORKING TIME METERS

PULSE METER

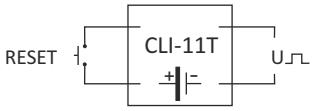
PURPOSE

Pulse meters are intended for counting AC/DC voltage signals, generated by additional peripheral devices in order to determine the number of carried out working cycles in automatics systems, e.g. in order to control the number of press strokes, the number of revolutions of a rotating device, the number of components leaving the production line, etc.

CLI-11T PANEL

FUNCTIONING

CLI-11T meter is a one-way meter, enabling the counting of pulses from 0 to 99999999 range (eight digits). It is equipped with RESET input for the connection of an external button, enabling the resetting of the meter state for any value.



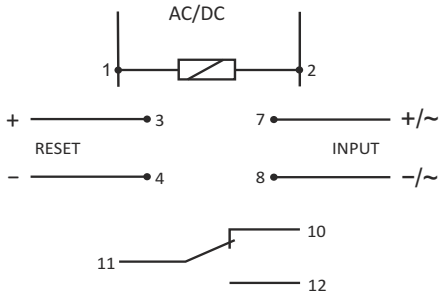
power supply	(non-voltage type) internal battery
battery life	10 years*
input voltage	
CLI-11T 230V	110÷240V AC/DC
CLI-11T 24V	4÷30V DC
counting frequency max	200Hz
display	8 characters / h=6.7mm
indication accuracy	1%±1digit
working temperature	-10÷40°C
terminal	1.5mm² screw terminals
dimensions	48×24×52mm
mounting hole	45×23mm
protection level	IP20

* battery life addicted to weather conditions

CLI-01 PROGRAMMABLE

FUNCTIONING

CLI-01 is a programmable, one-way type electronic meter enabling the counting of external pulses in 0 to 99 999 999 range. Pulses are counted from 0 to value set by the user. After reaching the limiting value, the meter will stop to count. Meter will count from 0 again after reset.



power supply	24÷264V AC/DC
INPUT:	
voltage - low state	0÷5V AC/DC
voltage - high state	10÷264V AC/DC
frequency for DC signal	<5kHz
frequency for AC signal	<50Hz
RESET:	
voltage	24÷264V AC/DC
load current contact 1×NO/NC	8A
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

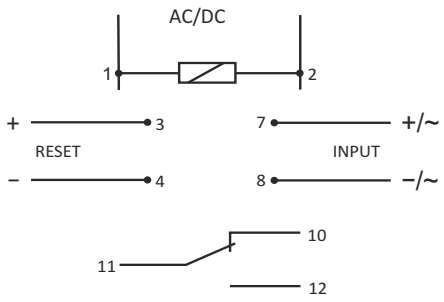
FUNCTIONS

* control panel, enabling programming and the monitoring of device operation
* meter input, adapted for operation with AC/DC signal, 10 to 264V amplitude and 50 Hz frequency for AC and 5kHz for DC signals
* possibility to set THRESHOLD parameter (1÷99 999 999 range), specifying the limiting number of pulses counted in a single operation cycle
* external RESET input
* relay output signaling the preset meter state (contact 1×NO/NC 8A)
* local counter, reset using the external reset input or using RESET button
* total counter for all impulses (loop mode 0 → 99 999 999 → 0 → ... or reset using the meter configuration menu)
* digital filter, enabling the limiting of maximum frequency of the counted pulses (in order to reduce interferences on meter input)
* local and total meter state memory after supply failure
* program menu in three languages: Polish, English or Russian

CLI-02 PROGRAMMABLE

FUNCTIONING

CLI-02 is a programmable, one-way type electronic meter enabling the counting of external pulses in 0 to 99 999 999 range. Pulses are counted from 0 to value set by the user. After reaching the limiting value, the meter will stop to count. Meter will count from 0 again after reset.

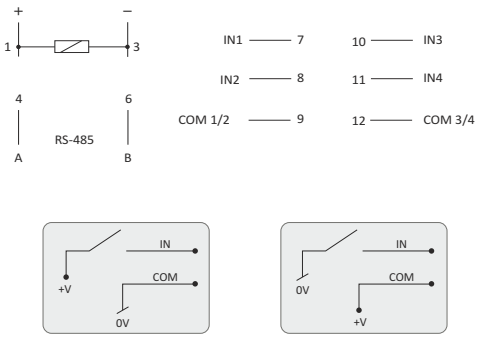


power supply	24÷264V AC/DC
INPUT:	
voltage - low state	0÷5V AC/DC
voltage - high state	10÷264V AC/DC
frequency for DC signal	<5kHz
frequency for DC signal	<50Hz
RESET:	
voltage	24÷264V AC/DC
load current contact 1×NO/NC	8A
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

* control panel, enabling programming and the monitoring of device operation
* meter input, adapted for operation with AC/DC signal, 10 to 264 V amplitude and 50 Hz frequency for AC and 5 kHz for DC signals
* possibility to set THRESHOLD parameter (1÷99 999 999 range), specifying the limiting number of pulses counted in a single operation cycle
* external RESET input
* relay output signaling the preset meter state (1×NO/NC 8A contact)
* local counter, reset using the external reset input or using RESET button
* total counter for all impulses (loop mode 0→ 99 999 999→ 0→ ... or reset using the meter configuration menu)
* digital filter, enabling the limiting of maximum frequency of the counted pulses (in order to reduce interferences on meter input)
* local and total meter state memory after supply failure
* program menu in three languages: Polish, English or Russian
* countdown mode from the preset value, with the signaling of reaching zero (e.g. 9999 →0)
* selection of input signal edge (leading or trailing), which the meter will react for
* ability to automatically reset the local meter (work in the loop) with the option of setting the relay action
* selection of relay action: pulse of a given length of time; ON→ OFF or OFF→ ON status change
* scaling recorded values of pulses according to the specified multiplier or divider
* access lock to programming menu using the PIN code
* selecting the display backlight mode

MB-LI-4 Lo/Hi 4-channel pulse meter with Modbus RTU output



supply voltage	9÷30V DC
quantity inputs DI	4
input voltage	
Lo	6÷30V AC/DC
Hi	160÷265V AC/DC
counting frequency max	100Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

* four independent counters
* selecting a mode of state 1 trigger: high or low voltage
* counter input designed to work with AC/DC signals
* factor adjustment (a floating-point value)
* rescaled value (number of pulses × factor)
* frequency filter that allows you to limit the maximum frequency of counted pulses (to eliminate interferences on the input of the counter)
* memory of counter status after power failure
* selecting an input pulse edge (leading or trailing)

WORKING TIME METERS

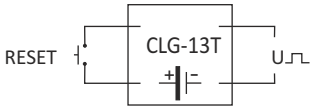
PURPOSE

Working time meters are intended for counting the number of working hours in automatic production processes or the number of device working hours, which, due to safety requirements and operation efficiency have limited overhaul life, i.e operational capacity that may not be exceeded (e.g. advanced power units, special radioactive lamps, etc.).

CLG-13T PANEL with RESET button

FUNCTIONING

CLG-13T meter is an electronic, one-way meters, enabling the counting of working hours in 0 to 99999,9 range (five digits + one decimal). It is equipped with RESET input for the connection of external button and (only CLG-13T) RESET button in front (with locking), enabling counter state reset for any value.



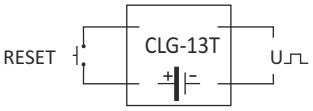
power supply	(non-voltage type) internal battery
battery life	10 years*
input voltage	
CLG-13T 230V	110÷240V AC/DC
CLG-13T 24V	4÷30V DC
display	6 characters / h=6.7mm
indication accuracy	0.1h (6min.)
working temperature	-10÷40°C
terminal	1.5mm² screw terminals
dimensions	48×24×52mm
mounting hole	45×23mm
protection level	IP20

* battery life addicted to weather conditions

CLG-14T PANEL without RESET button

FUNCTIONING

CLG-14T meter is an electronic, one-way meters, enabling the counting of working hours in 0 to 99999.9 range (five digits + one decimal). It is equipped with RESET input for the connection of external button and (only CLG-13T) RESET button in front (with locking), enabling counter state reset for any value.



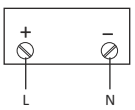
power supply	(non-voltage type) internal battery
battery life	10 years*
input voltage	110÷240V AC/DC
display	8 characters / h=6.7mm
indication accuracy	1min.
working temperature	-10÷40°C
terminal	1.5mm² screw terminals
dimensions	48×24×52mm
mounting hole	45×23mm
protection level	IP20

* battery life addicted to weather conditions

CLG-15T ELECTROMECHANICAL

FUNCTIONING

CLG-15T counter is a unidirectional electricity meter with cylinder counter, enabling the counting of operating hours in the range of 0 to 99999.99 (five digits plus two digits after the decimal point), meaning the unit hundredths (0.01 = 36 sec). Upon reaching the maximum result the counter starts counting from 0.

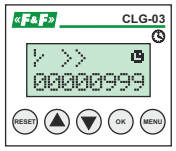


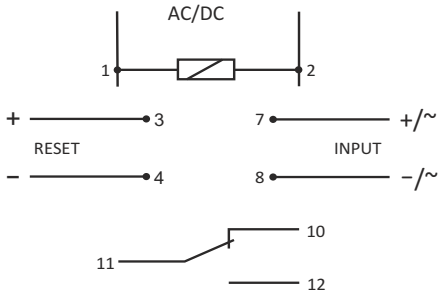
power supply / input voltage	230V AC/DC
voltage tolerance	(-15%÷+10%)
display	7 characters / h=5mm
indication accuracy	0.01h (36sec)
working temperature	-25÷50°C
dimensions	48×24×60mm
mounting hole	32×22mm
protection level	IP20

CLG-03 PROGRAMMABLE

FUNCTIONING

CLG-03 is a programmable, multi-function electronic meter, enabling the counting of working hours of the connected devices or systems in 1 to 999 999 range, corresponding to 114 years of operation. Working time is counted according to an individual program, set by the user. After reaching the limiting value, the meter will configure itself according to individual user's needs.



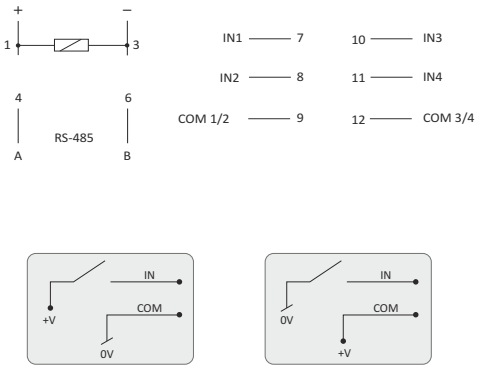


power supply	24÷264V AC/DC
INPUT: voltage	10÷264V AC/DC
RESET: voltage	10÷264V AC/DC
load current	8A
power consumption	1.5W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

* control panel, enabling programming and the monitoring of device operation
* T input for DC signal and AC signal 50 Hz
* counting time upwards without threshold value
* adjustable THRESHOLD parameter in the range of 1÷999 999 specifying the limiting number of hours to be counted in a single cycle of operation
* „downward" counting mode to the selected value with zero value signalling (e.g. 9999→0)
* counting working time with high state (constant voltage) at the T input
* counting working time between two pulses given at the T input
* counting time upwards to the selected threshold value
* external RESET input
* relay output signaling the preset meter state (1×NO/NC 8A contact)
* relay action selection: pulse with set time length; ON→ OFF or OFF→ ON state change
* local and total meter state memory after supply failure
* setting backlit display mode
* programm menu in three languages: Polish, English or Russian

MB-LG-4 Lo/Hi 4-channel worktime meter with Modbus RTU output



supply voltage	9÷30V DC
DI inputs quantity	4
input voltage	
Lo	6÷30V AC/DC
Hi	160÷265V AC/DC
input signal frequency max	100Hz
measured time max	150years
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

* four independent meters
* the overall results in the FLOAT (floating-point) values for hours and INT score values (total): seconds, minutes, hours, days (4 records per meter)
* input licznikowe przystosowane do pracy z sygnałami AC/DC
* selecting a mode of state 1 trigger: high or low voltage
* time filter for limiting the maximum length of the input signal (elimination of interference at the input of the meter)
* meter state memory after power failure
* digital input function

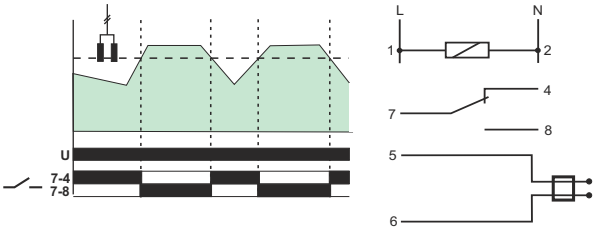
35. FLUID LEVEL CONTROL RELAYS

PURPOSE

Fluid level control relays are used to detect the presence of fluid conductive the current on the level of mounted flooding sensors.

ONE-POSITION
PZ-828
PZ-828 RC

WITH ADJUSTABLE SENSITIVITY

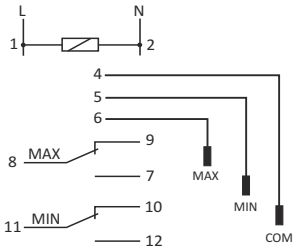


power supply	230V AC
load current	<16A
contact	separated 1×NO/NC
sensitivity - adjustable for PZ-828 RC	1÷100kΩ
output voltage measurement	<6V
power indication	green LED
working status indication	red LED
power consumption	1.1W
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
flooding probe type	1×PZ
5-6 contact	galvanic separated
protection level	IP20

In dry conditions, the relay's contact remains in the 7-4 position. Once the sensor becomes flooded with liquid, the red LED indicator lights up, and the contact is shifted to the 7-8 position. After the level of the conductive liquid decreases (and the electrodes of the flooding sensor depart), the contact returns to position 7-4.

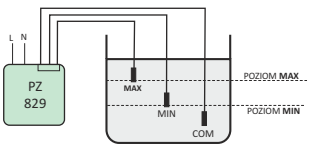
TWO-POSITION
PZ-829
PZ-829 RC

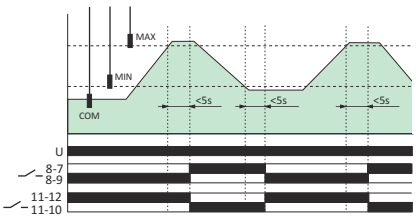
WITH ADJUSTABLE SENSITIVITY



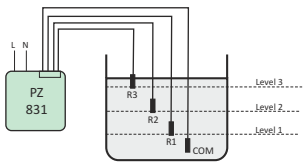
power supply	230V AC
load current	2×[<16A]
contact	separated 2×[1×NO/NC]
sensitivity - adjustable for PZ-828 RC	1÷100kΩ
switching delay contact	
for MIN	1÷2sec
for MAX	<5sec
output voltage measurement	<6V
power indication	green LED
working status indication	2×red LED
power consumption	1.1W
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
flooding probe type	3×PZ2
4-5-6 contact	galvanic separated
protection level	IP20

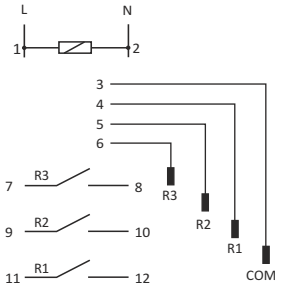
After the liquid level decreases to MIN (i.e. electrodes MIN and COM spaced), the MIN contact is switched to position 11-12, whereas the MAX contact remains in position 8-9. On the other hand, when the MAX liquid level is reached (MAX and COM electrodes shorted), the relay's MIN contact will be switched to position 11-10, whereas the MAX into position 8-7.





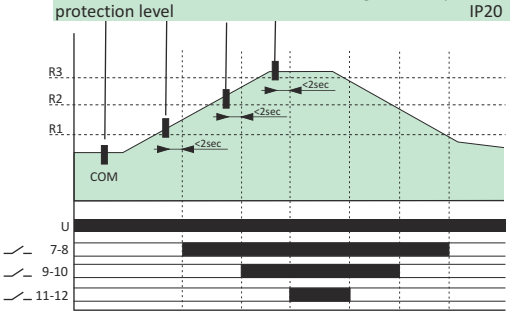
THREE-POSITION
PZ-831 RC





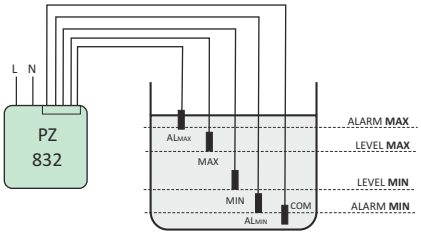
power supply	230V AC
load current	3×[<8A]
contact	3×[1×NO]
sensitivity - adjustable	1÷180kΩ
contact switching delay	<2sec
output voltage measurement	<6V
power indication	green LED
working status indication	3×red LED
power consumption	1.1W
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
flooding probe type	4×PZ2
3-4-5-6 contact	galvanic separated
protection level	IP20

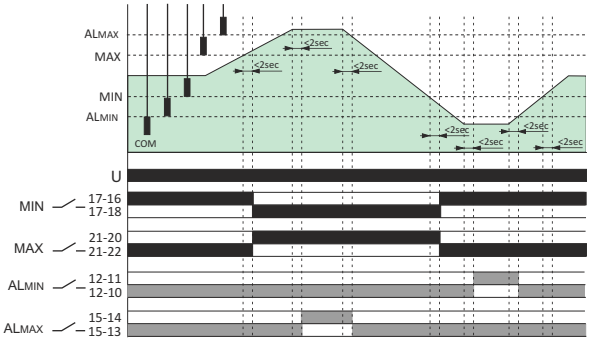
In dry condition (all probes open), all the transformer's contacts are also open. If the base probe COM and the next level probe are closed due to a liquid presence, the contact for a given probe will close, e.g. once the first R1 level probe (the COM base probe and the R1 level probe closed) is submerged, the 11-12 contact will close. The same procedure applies to the R2 and R3 level probes. On the other hand, once the liquid level drops below the probe level (the COM probe and the level probe open), the contact for a given probe will open as well.



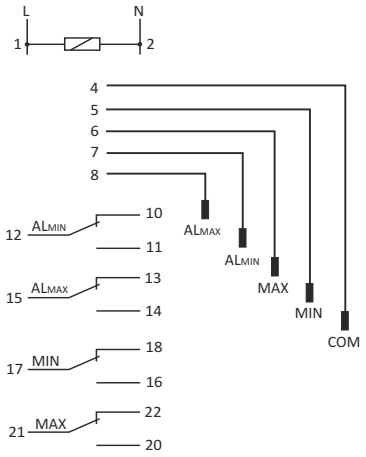
TWO-POSITION WITH EMERGENCY STATES MIN AND MAX

PZ-832 RC





power supply	230V AC
contact	separated 4×[1×NO/NC]
load current MIN and MAX	2×[<16A]
load current ALMIN and ALMAX	2×[<8A]
sensitivity - adjustable	1÷100kΩ
switching ON delay	1÷2sec
output voltage measurement	<6V
power indication	green LED
working status indication	yellow RED
state signalling MIN and MAX	2×green LED
alarm state signalling	2×red LED
power consumption	1.1W
terminal	2.5mm² screw terminals
dimensions	5 modules (85mm)
mounting	on TH-35 rail
flooding probe type	5×PZ2
4-5-6-7-8 contact	galvanic separated
protection level	IP20



Relay control MAX and MIN statues set by user of controlled fluid. After the liquid level decreases to MIN (i.e. electrodes MIN and COM spaced), the MIN contact is switched to position 17-16 (FILLING), whereas the MAX contact remains in position 21-22. On the other hand, when the MAX liquid level is reached (MAX and COM electrodes shorted), the relay's MIN contact will be switched to position 17-18 (EMPTYING), whereas the MAX into position 21-20.
Emergency state: **AL$_{min}$** (dry running) - after the liquid level decreases to **AL$_{min}$** (i.e. electrodes MIN and COM spaced), the **AL$_{min}$** contact is switched to position 12-11; **AL$_{max}$** (overflow) after level is reached **AL$_{max}$** (**AL$_{max}$** and COM electrodes shorted), the relay's **AL$_{max}$** contact will be switched to position 15-14.

PZ PROBE

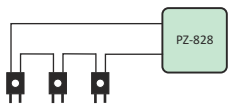
flooding probe	electrode
probe dimensions / wire length	30×25×5mm/1.5m
length / pitch of electrodes	30mm/5mm
sensor voltage	<6V~
current probe	<0.13mA
length connection wire	<100m
dedicated	PZ-828, PZ-828 RC

PZ2 PROBE

flooding sensor	acid-resistant steel electrode in + plastic box for electrode + gland PG9
probe dimensions	Ø15, l=9.5cm
probe voltage	<6V~
probe current	<0.13mA
liquid temperature max	<85°C
connection wire	e.g. DY 1mm²
length connection wire	<100m
dedicated	PZ-829, PZ-829 RC, PZ-831 RC, PZ-832 RC

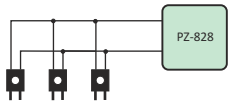
How to connect the probe

The design of the probe makes it possible to install the probe on a flat horizontal base, for example on the floor in a room where hydro-valves and flow pipes are installed or in a laundry room. Thanks to such a design of the probe, any failure or flooding of a room with a liquid can be quickly detected as well as electric circuits can be simultaneously switched off or the sound or light signalling system (alarm system) can be actuated. The probe cable can be extended to 100 m.



A maximum of 10 probes can be connected in parallel connection or in series connection to 5-6 output:
* series connection - for a dependant system that controls the level of liquid in many points a simultaneous short-circuit of all sensors connected must occur in order to activate the relay.
* parallel connection - for an alternative system that controls the level of liquid in many points a short-circuit of at least one of the sensors connected must occur.

In case of a series connection, the sensitivity of the sensors is reduced (conductivity is reduced).

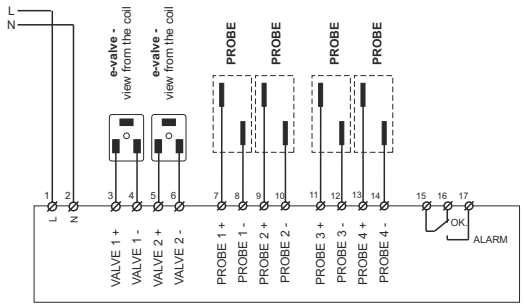


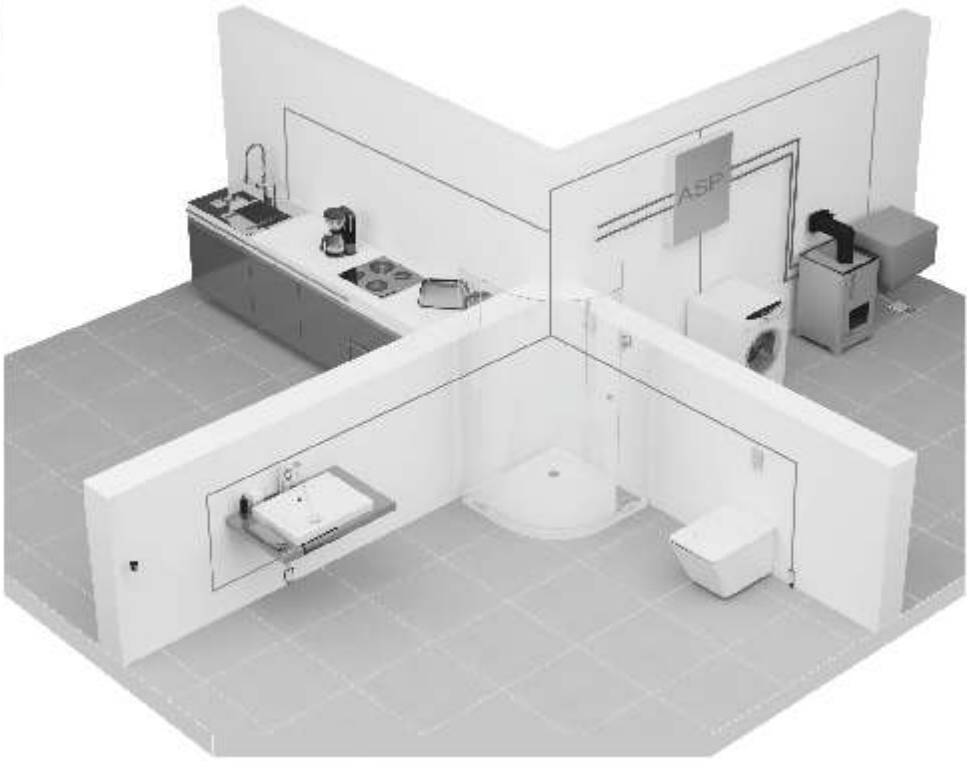
AUTOMATIC ANTI-FLOOD SYSTEM

ASP

PURPOSE

ASP automatic anti-flood system is an autonomous system to prevent flooding of residential, single-family and multifamily buildings. It is used for comprehensive protection of property from the effects of flooding.





FEATURES

* detection of leaks and spills
* cutting off water supply to the property
* notifying the user about this situation
* reducing pressure drops
* improving the efficiency of fire-fighting installations
* bistable solenoid valve remains closed after power loss
* solenoid coil is not constantly powered (power at the time of switching)
* own emergency power supply

COMPONENTS OF THE SYSTEM

1) Distribution box containing: SAM-01 central controller, electrical circuits protection and backup battery for short power outages.
2) 1", 2", 3/4"or 5/4" solenoid valve - 1 pc.
3) SON-K boiler room flooding probe - 1 pc.
4) SON-M living areas flooding probe - 2 pcs.

SAM-1
multi-purpose ASP system controller

solenoid valve for cutting off water supply to the facility (1", 2", 3/4"or 5/4")

SON-K
boiler room flooding probe

SON-M
living areas flooding probe

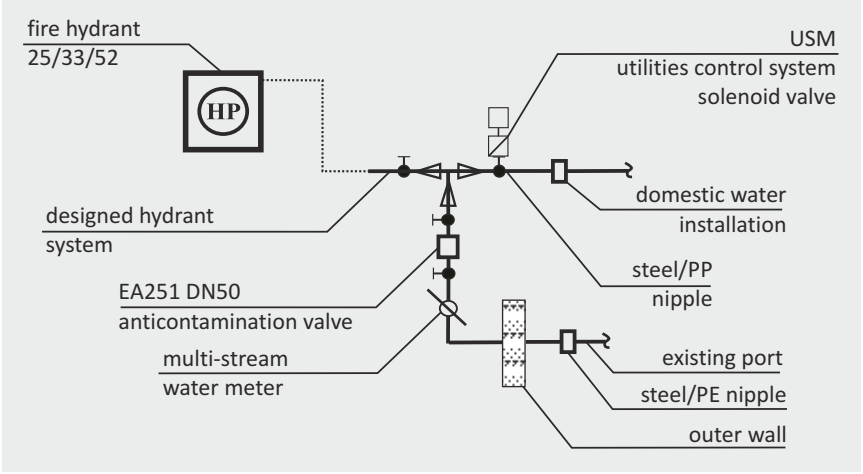
option to integrate with alarm systems and fire alarm systems

UTILITIES CONTROL SYSTEM

USM

PURPOSE

USM system is used to cut-off all water receivers in case of fire or failure of water installation, with the exception of fire-fighting devices.



An example of water distribution in a building with USM system in case of fire.
Support of hydrant system by cutting off the domestic water.

FEATURES

* reduces pressure drops and improves the efficiency fire-fighting installations by cutting off the domestic water;
* can be installed in any building without certification from CBNOP and ITB
* own power reserve system
* manual control or monitoring (works with wireless systems)
* self-test once a month
* can be controlled via the Internet, Ethernet, GSM, etc.
* product ready for assembly (can be tailored to the needs of the users and requirements of the building)

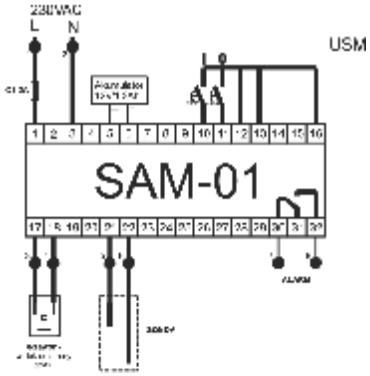
VERSIONS

USM H - for detection of emergencies and cutting off power to water and central heating installations.
USM O - for supporting the hydrant systems by cutting off domestic water supply in order to secure an efficiency of hydrant installation in the building. Can be combine with USM H.
USM I – for machinery and equipment.

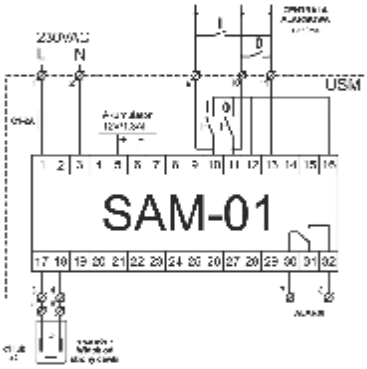
COMPONENTS OF THE SYSTEM

* SAM-1 controller
* flooding probes (installed in bathrooms, kitchens, baths, boiler rooms, etc.).
* solenoid valve EZ to 2" for 12 V DC voltage with GW or with additional flanges
* ROP-type switch or tension switch
* solenoid valve filter and fittings with appropriate size 12 V 1.3 Ah battery
* C 1A to 2A circuit breaker
* pressure switch (in central heating installation)
* double button (switching the solenoid valve on and off)

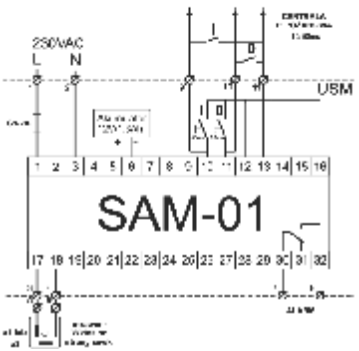
An example of USM applications



USM H 1
application for free-standing houses or semi-detached houses with probes.



USM H 2
application for free-standing houses or semi-detached houses without probes. Cooperation with Alarm Control Panel.

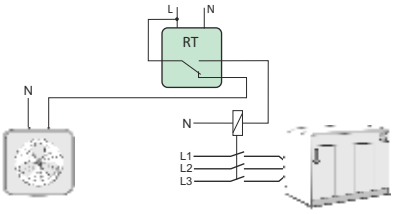


USM O 1
application for buildings with the hydrant installation without probes. Cooperation with the Fire Alarm Control Panel. Reference will be tailored for the needs of specific objects.

36. TEMPERATURE REGULATORS

PURPOSE

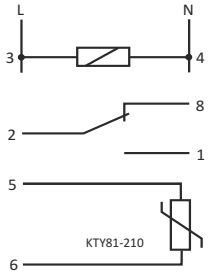
Temperature regulators may be used for equipment control in anti-freeze systems which prevent the freezing of gutters, the accumulation of ice on stairs, vehicles, etc.



RT-820 **temperature setting range: 4÷30°C**
RT-821 **temperature setting range: -4÷5°C** → for anti-icing heating systems
RT-822 **temperature setting range: 30÷60°C**
RT-823 **temperature setting range: 60÷95°C**

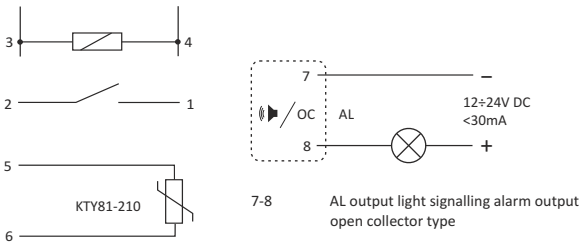
FUNCTIONING

The power supply to the generator is indicated by the green LED. Until the required ambient temperature is achieved, the contact of the regulator remains in position 2-1 and the heating device is active. Once the set value is achieved, the contact shifts into position 2-8 and the heating or ventilation device is turned off. Any drop in temperature by the hysteresis value will activate the heating device again (contacts 2-1 closed) until the set temperature value is achieved.



power supply	230V AC
load current	<16A
contact	separated 1×NO/NC
temperature range	
RT-820	4÷30°C
RT-821	-4÷5°C
RT-822	30÷60°C
RT-823	60÷95°C
hysteresis - adjustable	0.5÷3°C
setting accuracy	1°C
measurement accuracy	±1°C
temperature probe type	RT/RT2
power indication	green LED
working status indication	red LED
power consumption	1.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

RT-826 DIGITAL temperature setting range: -25÷130°C



power supply	230V AC
load current	<16A
contact	1×NO
temperature range	-25÷130°C
hysteresis - adjustable	1÷30°C
setting accuracy	1°C
measurement accuracy	±1°C
sound signalling	DAP12 buzzer
resonant frequency	2.4kHz
volume	80dB
visual alarm output	open collector (OC)
connection voltage	12÷24V DC
current	<30mA
display	3×segment LED 5×9mm
contact signalling activation	red LED
temperature probe type	RT/RT2
power consumption	1.1W
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	2 modules (35mm)
mounting	on TH-35 rail
protection level	IP20

* working mode: HEATING / COOLING
* indication correction ±9°C
* audible indication of alarm status when the temperature exceeded ±5°C oriented (internal piezoelectric hooter)
* projection of the currently measured temperature

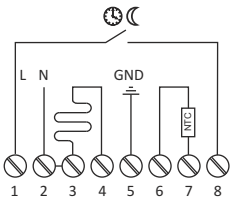
RT PROBE

temperature sensor	KTY 81-210
measuring range	-50÷130°C
working temperature	-50÷65°C
sensor dimensions	Ø5; h=20mm
sensor insulation	heat shrink
wire	OMY 2×0.34mm²; l=2.5m

RT2 PROBE

temperature sensor	KTY 81-210
measuring range	-50÷130°C
working temperature	-50÷130°C
sensor dimensions	Ø8; h=40mm
sensor insulation	brass muff
wire	SIHF heatresist 2×0.5mm²; l=2.5m

RT-824 temperature range: 5÷35°C

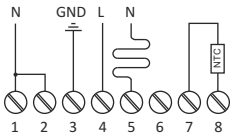


power supply	230V AC
load current	<16A
contact	1×NO
temperature range	5÷35°C
hysteresis	3°C
setting accuracy	1°C
measurement accuracy	±1°C
internal temperature sensor	NTC
power consumption	0.8W
working temperature	-5÷50°C
terminal	1.5mm² screw terminals
dimensions	
front	83.5×83.5mm; D: 22mm
back	Ø50; D: 27.5mm
mounting	in flush mounted Ø60
protection level	IP20

FUNCTIONS

* possibility of programming 1 required temperature
* the knob located on the front panel enables setting a required temperature
* the breaker switch located on the front panel enables switching off the power supply of the whole heating system
* the input for connecting a control clock
* signalling of the heating system activation
* 2 temperature sensors: an internal one and an external one
* 3 operation modes of the regulator:
  - operation with the internal temperature sensor
  - operation with the external temperature sensor
  - operation with two temperature sensors
* in the mode of operation with the internal temperature sensor: in case of the failure of the temperature sensor the regulator will shift to the so-called safe automatic model and will try to maintain the temperature set
* automatic switching over to the mode of operation with the internal temperature sensor in case of a failure of the external sensor
* in the mode of operation with two temperature sensors, the external sensor is the limiting one and it does not permit the temperature of 27°C to be exceeded regardless of the temperature set by means of the temperature adjusting knob
* in the mode of operation with two temperature sensors: if both temperature sensors fail, the regulator will shift to the so-called safe automatic model. Working with interruptions, the regulator will try to maintain the temperature at the level of 80% of the set temperature.

RT-825 temperature range: 5÷60°C



power supply	230V AC
load current	<16A
contact	1×NO
temperature range	5÷60°C
antifrost temperature range - adjustable	0÷10°C
hysteresis	1°C
setting accuracy	1°C
measurement accuracy	±1°C
reading accuracy	0.1°C
backup time clock	<1h
internal temperature sensor	NTC
power consumption	0.8W
working temperature	-10÷50°C
terminal	1.5mm² screw terminals
dimensions	
front	83.5×83.5mm; D: 22mm
back	Ø50; D: 27.5mm
mounting	in flush mounted Ø60
protection level	IP20

FUNCTIONS

* the control panel enables programming and monitoring the device operation
* the breaker switch located on the front panel enables switching off the power supply of the whole heating system
* maintaining a preset temperature in accordance with programmed hours and days of the week
* possibility of programming 4 intervals of a required temperature per 24 hours
* 12 program entries: 4 entries concerning the required temperature for working days (Pn-Pt: Monday through Friday); 4 entries concerning the required temperature for Saturday (So: Saturday) and 4 entries concerning the required temperature for Sunday (Nd: Sunday)
* possibility of a quick, manual correction of the currently maintained temperature
* adjustable hysteresis
* 2 temperature sensors: an internal one and an external one
* 3 operation modes of the regulator:
  - operation with the internal temperature sensor;
  - operation with the external temperature sensor;
  - operation with two temperature sensors
* in the mode of operation with two temperature sensors, the external sensor is the limiting one with an adjustable temperature within the range of 15÷50°C

RT-45 PROBE

dedicated	RT-824, RT-825
temperature sensor	NTC
working temperature	-50÷65°C
sensor dimensions	Ø7; h=25mm
sensor insulation	PC muff
wire	PC 2×0.34mm²; l=3m

DIGITAL PROGRAMMABLE

PURPOSE

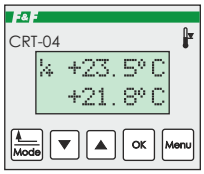
The CRT controllers are multi-function, programmable electronic devices which enable control of heating or cooling devices in order to maintain a stable room temperature, as well as to control ambient and substance temperatures in industrial conditions, with the option of supervising technological processes.

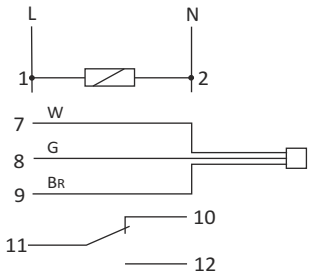
WITH PROGRAMMABLE CLOCK CONTROL

CRT-04 temperature range: 0÷60°C

FUNCTIONING

The operation time and required temperature are achieved according to the individual program set by the user. The CRT controllers are equipped with a calendar and a real time clock which enable switching the controlled device on and off at preset hours within the following cycles: 24-hour, weekly, business-day (Mon. Fri.) or weekend (Sat., Sun.).





power supply	230V AC
load current	<16A
contact	separated 1×NO/NC
battery	3 years*
temperature range	0÷60°C
hysteresis - adjustable	0÷10°C
setting accuracy	0.1°C
model correction	±5°C
temperature probe type	RT4
lagged switching - adjustable	1÷15min.
power consumption	1.5W
working temperature	-20÷40°C
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

* battery life addicted to weather conditions and frequency of mains failure

FUNCTIONS

* control panel for programming and monitoring;
* operation modes: HEATING and COOLING to maintain a preset temperature according to programmed hours and days;
* CONTINUOUS operating mode to maintain a single preset temperature value while ignoring other program entries;
* MEASUREMENT operating mode display of an actual temperature value without controlling a connected machine;
* 50 program entries;
* INTERVAL this feature enables the user to program up to 8 required temperature values (3 in the MY1, MY2 and MY3 modes, and an additional 5 in modes called MORNING, WORK, DINNER, DAY, and NIGHT for everyday time windows related to the users' lifestyle;
* DELAY programmable time of response delay while exceeding limit temperature values;
* CORRECTION related to the temperature read-out error against the model thermometer;
* SENSORS visual signalisation of the temperature sensor failure;
* DST automatic DST time implementation with programmable shift to manual mode;
* LIGHT selection of display illumination mode.
* LANGUAGE program menu in three languages: Polish, English or Russian

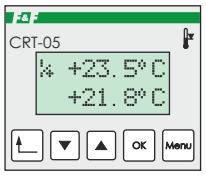
RT4 PROBE

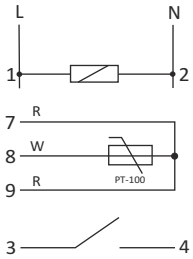
dedicated	CRT-04
temperature sensor	DS18S20
measuring range	-55÷125°C
working temperature	-30÷65°C
sensor dimensions	Ø5; h=30mm
sensor insulation	heat shrink
wire	LiYY 3×0.34mm² l=2.5m

RT-56 PROBE

dedicated	CRT-05, CRT-06
temperature sensor	PT-100
measuring range	-100÷400°C
sensor dimensions	Ø4; h=85mm
sensor insulation	steel sleeve
wire	PC 3×0.34mm²; l=1.5m in braided metal

CRT-05 2-FUNCTION temperature range: -100÷400°C

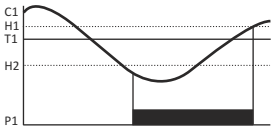




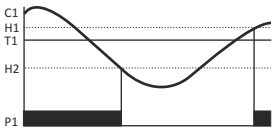
power supply	230V AC
load current	<16A
contact	separated 1×NO/NC
temperature range	-100÷400°C
hysteresis - adjustable	0÷10°C
setting accuracy	1°C
model correction	±20°C
gradient	4°C/1sec
temperature probe type	RT-56 (PT-100)
working temperature	-20÷40°C
power consumption	1.5W
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

HEATING

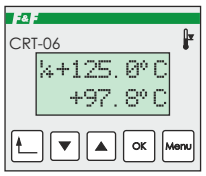


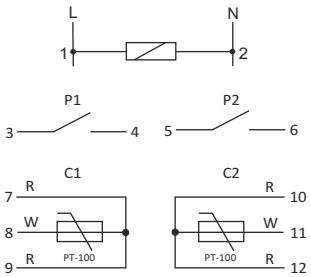
COOLING



* control panel for programming and monitoring;
* 2 operations modes: HEATING and COOLING
* 2 regulated HYSTERESIS values lower and upper limits;
* AUTOMATIC mode operation with one selected function;
* MANUAL mode permanent closing or opening of the contact without a temperature measurement.
* CORRECTION related to the temperature read-out error against the model thermometer;
* WARNING - visual signalisation of the temperature sensor failure, range exceed and speed riasing or falling temperature exceed
* limiting access to program menu using PIN code
* LIGHT selection of display illumination mode.
* LANGUAGE program menu in three languages: Polish, English or Russian

CRT-06 10-FUNCTION temperature range -100÷400°C



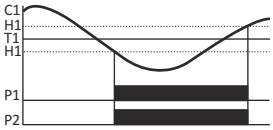


power supply	230V AC
load current	2×[<16A]
contact	separated 2×[1×NO]
temperature range	-100÷400°C
hysteresis - adjustable	0÷100°C
setting accuracy	1°C
model correction	±20°C
lagged switching - adjustable	0÷45min.
gradient - adjustable	4°C/1sec ÷ 6°C/1min.
sampling frequency - adjustable	1÷120samples/1min.
temperature probe type	RT-56 (PT-100)
working temperature	-20÷40°C
power consumption	1.5W
terminal	2.5mm² screw terminals
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

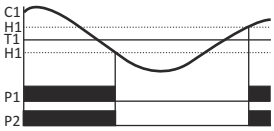
FUNCTIONS

* control panel for programming and monitoring
* 10 operation functions
* 2 independent temperature sensors
* two independent temperature values may be set
* 2×[1×NO/NC] contacts applied to the temperature sensors
* 2 hysteresis set values, one for each sensor
* AUTOMATIC mode - operation with one selected function
* MANUAL mode permanent closing or opening of the contact without a temperature measurement. Separate temperature drops for the P1 and P2 contacts
* DELAY - programmable time delay of activation when passing through the threshold values of temperature
* CORRECTION related to the temperature read-out error against the model thermometer
* WARNING - visual signalisation of the temperature sensor failure, range exceed and speed riasing or falling temperature exceed
* memory feature for maximum and minimum temperature values registered, independent for the C1 and C2 sensors
* limiting access to program menu using PIN code
* LIGHT selection of display illumination mode
* LANGUAGE program menu in three languages: Polish, English or Russian

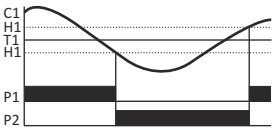
OPERATIONAL FUNCTIONS OF THE CRT-06

1


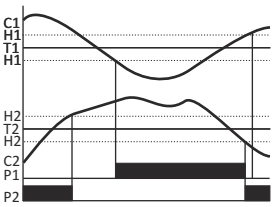
HEATING mode. The P1 and P2 contacts depend on the C1 sensor.
- 1 sensor: C1
- P1 and P2 work in parallel
- 1 temperature set value: T1
- 1 hysteresis set value: H1 (upper and lower limit)

2


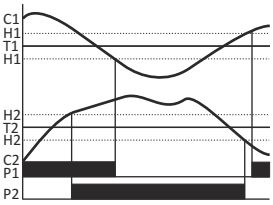
COOLING mode. The P1 and P2 contacts depend on the C1 sensor.
- 1 sensor: C1
- P1 and P2 work in parallel
- 1 temperature set value: T1
- 1 hysteresis set value: H1 (upper and lower limit)

3


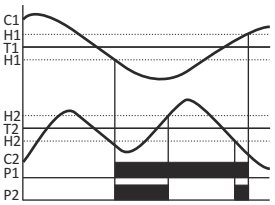
HEATING / COOLING modes. The P1 and P2 contacts depend on the C1 sensor.
-1 sensor: C1
- contacts work in alternate manner:
P1 - cooling; P2 - heating
- 1 temperature set value: T1
- 1 hysteresis set value: H1
(upper and lower limit)

4


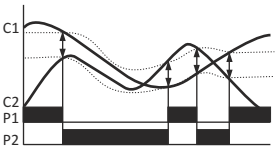
HEATING mode for contacts P1 and P2. The P1 contact dependent on the C1 sensor; the P2 on the C2 sensor.
- 2 sensors: C1 and C2
- contacts work independently:
P1 - heating; P2 - heating
- 2 temperature set values: T1 and T2
- 2 hysteresis values:
H1 upper and lower limit for T1
H2 upper and lower limit for T2

5


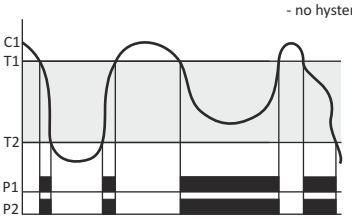
COOLING mode for the P1 and P2 contacts. The P1 contact depends on the C1 sensor; the P2 on the C2 sensor..
- 2 sensors: C1 and C2
- contacts work independently:
P1 - cooling
P2 - cooling
- 2 temperature set values: T1 and T2
- 2 hysteresis set values:
H1 - upper and lower limit for T1
H2 - upper and lower limit for T2

6


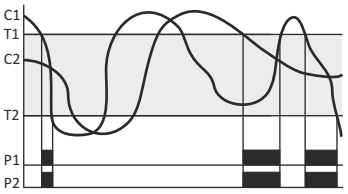
HEATING mode for the contacts P1 and P2. The P1 contact depends on the C1 sensor, and the P2 on the C2 and C1 (activated only with the P1 contact closed).
- 2 sensors: C1 and C2
- the contacts interdependent:
P1 - heating
P2 - heating with the P1 closed
- 2 temperature set values: T1 and T2
- 2 hysteresis set values:
H1 upper and lower limit for T1
H2 upper and lower limit for T2

7


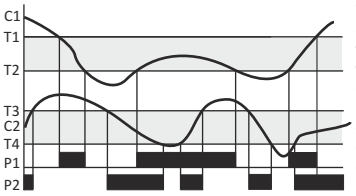
DIFFERENTIAL mode. The P1 contact closed with the temperature difference exceeding the set value. The P2 contact activated in the reversed conditions in comparison to the P1, i.e. with the temperature difference lower than the set value.
- 2 sensors: C1 and C2;
- contacts work in alternate manner:
P1 - heating
P2 - heating with the P1 closed
- 2 temperature set values: T1 and T2
- no hysteresis set values H1 and H2

8


WINDOW mode. The P1 and P2 contacts closed when the C1 sensor temperature is between the preset temperature values of T1 and T2.
- 1 sensor: C1
- contacts work in alternate manner:
P1 and P2
- 2 temperature set values: T1 and T2
- no hysteresis set value H1 and H2

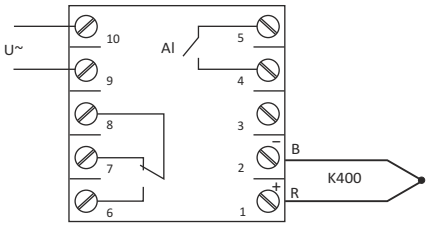
9


WINDOW mode. The P1 and P2 contacts closed when the C1 and C2 sensors temperature is between the preset temperature values of T1 and T2.
- 2 sensors: C1 and C2
- contacts work in alternate manner:
P1 and P2
- 2 temperature set values: T1 and T2
- no hysteresis set value H1 and H2

10


WINDOW mode independent for the P1 and P2 contacts. The P1 contact closed when the C1 sensor temperature is between the preset temperature values of T1 and T2. The P2 contact closed when the C2 sensor temperature is between the preset temperature values of T3 and T4.
- two sensors: C1 and C2
- contacts work independently: P1 and P2
- 4 temperature set values:
T1 and T2 for the P1 and
T3 and T4 for the P2 contact
- no hysteresis set value H1 and H2

CRT-15T temperature range: 0÷400°C



power supply	100÷240V AC
load current	<3A
contact	separated 1×NO/NC
load current alarm output	<1A
output alarm contact	separated 1×NO
temperature range	0÷400°C
PID setting	
proportional part P	0÷100
integral part I	0÷255
derivative part D	0÷255
setting accuracy	0.5°C±1digit
model correction	±15°C
working temperature	-10÷40°C
power consumption	1W
terminal	2.5mm² screw terminals
dimensions	48×48×86mm
mounting hole	45×45mm
protection level	IP20

FUNCTIONS

* control panel for programming and monitoring of device operation
* PID controller (a proportional-integral-derivative controller);
* automatic tuning of the PID regulator
* ALARM programmable temperature limit to trigger off the alarm feature
* preset temperature indications
* current temperature indications
* 1×NO/NC output contact
* additional ALARM output: 1×NO contact
* model correction

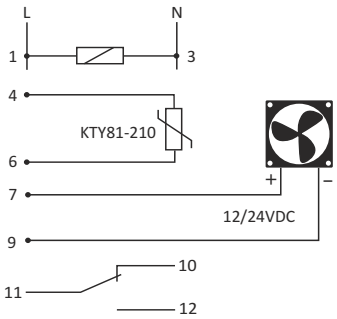
K400 PROBE

dedicated	CRT-15T
temperature sensor	K400
sensor dimensions	M6 thread; h=15mm
sensor insulation	steel
wire	2×0.34mm² l=1.0m in braided metal

RT-833 WITH ADJUSTABLE FAN SPEED

PURPOSE

This regulator is designed for direct control of 12/24 V DC fans speed in control cabinets (or similar installations) as a function of temperature.



power supply	12÷24V DC
load current DC (7-9)	<6A
contact (overload)	separated 1×NO/NC (10A)
temperature range	
Tmin	25÷60°C
ΔT	5÷30°C
measurement accuracy	±1°C
start speed setting	0÷80%
temperature probe type	RT/RT2
power indication	green LED
working status indication	red LED
power consumption	
standby	0.05W
on	0.6W
working temperature	-15÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONING

If the temperature exceeds the preset Tmin value, fan will be activated and its speed will be proportional to the measured temperature and regulator settings:

- for temperature Tmin speed will be equal to the preset minimum speed.
- for temperature Tmin + Δ speed is 100%.
- for temperatures between Tmin < > Tmin + Δ speed will be proportionally mapped in a range from the preset minimum to 100% speed.

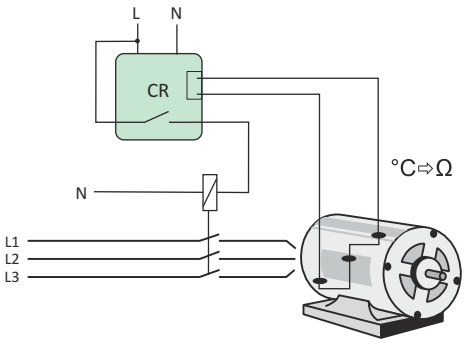
The regulator is equipped with a relay output to signal too high temperature or damage (power loss) of the controller. During normal operation, contact is closed (position 11-12). If the measured temperature is higher for three minutes than the maximum value (Tmin + Δ), then contact is opened (position 10-11). When the regulator is damaged or the power supply to regulator is disconnected, 10-11 contacts can be used to indicate the error.

RESISTANCE RELAY

CR-810 TO CO-OPERATION WITH THE PTC THERMISTOR-EQUIPPED TEMPERATURE SENSORS

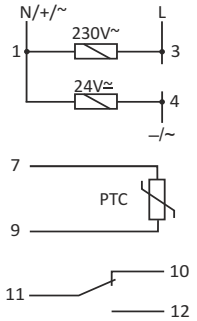
PURPOSE

The resistance relay protects electrical equipment against any undesirable temperature increases by means of PTC resistors in serial connection (1-6 pieces).



FUNCTIONING

Correct operation (closed contacts 3-7) is indicated by the green LED (correct power voltage, temperature of the controlled device, working circuit of connected PTC sensors). The increase in temperature of at least one sensor over the rated value results in an increase in its resistance over 3000 Ω. The relay is then activated (contacts 3-7 open). The system is activated automatically if the resistance of the PTC sensor loop decreases below the threshold of 1800 Ω (drop in temperature of the controlled device). The contact of the executive relay also opens in the event of the resistance dropping to 70 Ω (e.g. during a short circuit between cables) or with the power voltage turned off .



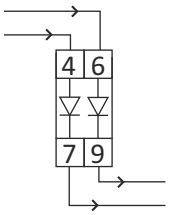
power supply	230V AC / 24V AC/DC
load current	<16A
contact	separated 1×NO/NC
opening contacts resistance	R>3000Ω, R<70Ω
closing contacts resistance	110Ω<R<1800Ω
sensor loop resistance (cold state)	R=1500Ω
power indication	green LED
failure signalling	2×red LED
power consumption	0.8W
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

37. SUPPORTING COMPONENTS OF AUTOMATION SYSTEMS

CONTROL SIGNAL SEPARATORS

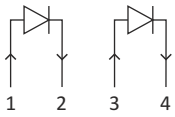
SEP-01 is used for the separation of control signals in automation systems with separate control subgroups and central control.
The control signal is passed in one direction and blocked in the opposite direction.
EXAMPLE USES:
Group control system created on BIS-412 bistable relays (page 17) and group control system of roller (page 17).

SEP-01



load current	<1A 1000V
working temperature	-25÷40°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

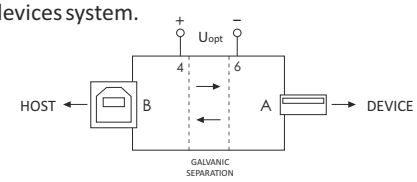
SEP-02



load current	<1A 1000V
working temperature	-25÷40°C
terminal	2.5mm² screw terminals
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

SEP-03 USB AMPLIFIER/USB LINE SEPARATOR

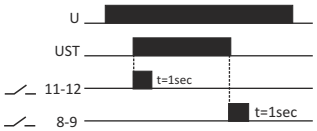
SEP-03 is used for galvanic separation of devices connected via a USB cable. Provides surge protection for HOST-type devices (e.g. PC) from external devices that are connected directly to the power grid, industrial power supply systems or high voltage measurement networks. If you connect an external power supply, the SEP-03 USB is used as a signal amplifier and increases the efficiency of current to 1A for the connected devices system.

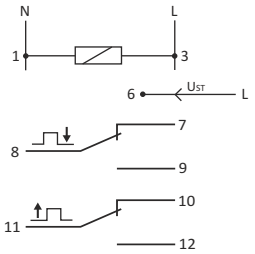


power supply	
USB	5V DC
Uopt	12÷30V DC
load current	
USB	<400mA
Uopt	<1A
USB standard	1.1 / 2.0
speed low/full	1.5Mbpsec / 12Mbpsec
connectors type	1×A / 1×B
galvanic separation	
tracks A -> B	5kV RMS
U_{USB} -> A/B tracks	1kV DC
U_{opt} -> A/B tracks	none
working temperature	-25÷40°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

PSI-02 "CONTINUOUS ➔ PULSE" SIGNAL CONVERTER

PSI-02 is used to convert a continuous control signal to a single control pulses required for the automation control systems. Upon receiving the control signal at the UST input (leading edge), the converter generates a pulse at the output 12 (contact 11-12 will be closed for 1 sec.). After the disappearance of the control signal (trailing edge), the converter generates a second pulse at the output 9 (contact 8-9 will be closed for 1 sec.). EXAMPLE USES: Group control system of roller blinds (page 33).



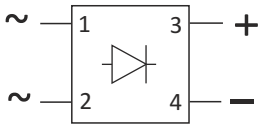


power supply	
PSI-02 230V	230V AC
PSI-02 24V	24V AC/DC
load current	2×[<8A]
contact	separated 2×[1×NO]
input signal	
PSI-02 230V	230V AC
PSI-02 24V	24V AC/DC
output signal time	1sec
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

MPG-03 FULL-WAVE BRIDGE RECTIFIER (in GRAETZ circuit)

PURPOSE

The MPG-03 changes alternating current into unidirectional direct current.



power supply	
MPG-03 230V	110÷264V AC
MPG-03 12÷48V	12÷48V AC
load current	<2A
output voltage signalling	green LED
working temperature	-25÷40°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

LT-04 TERMINATION/POLARISATION MODULE NETWORK RS-485

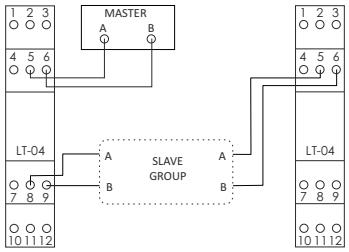
PURPOSE

LT module is used to termination of signal line (UTP cable) between devices exchange data according to the standard MODBUS protocol on the network RS-485.

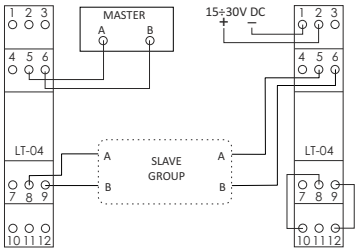
FUNCTIONING

Termination means ending of the signal line (UTP wire) with suitable resistors in order to maintain a uniform wave resistance across the line, which greatly improves the quality of the transmitted data and eliminates errors that occur on the signal line.
Polarization of the line is required when at least one of the SLAVE-type devices in RS-485 network does not have a signal GND point. Polarization is done only for MASTER devices.
Signal amplification is realized through active powering of the line with low voltage through one of the modules.

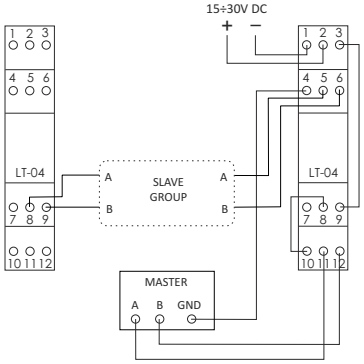
power supply	15÷30V DC
system current	<10mA
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20



Network termination system



Signal amplification system (including termination)



Network polarization system (including termination) for slave devices GND without

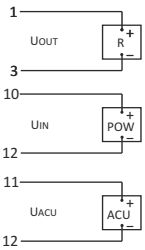
ECH-06 RESERVE DC POWER MODULE (with battery charger 1.3 ÷ 7.2 Ah)

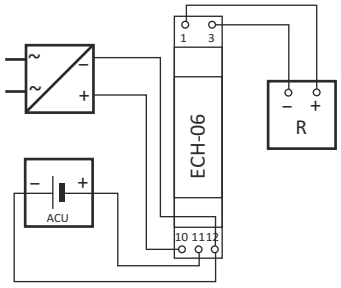
PURPOSE

Power module and charging battery of ECH allows you to implement flexible power scheme to ensure continuity of the device after the main power failure. With the external acid battery (gel) of a nominal voltage 12 V is battery reserve system.

FUNCTIONING

The module performs the continuous surveillance of the battery and recharges it automatically when the presence of the main supply voltage. In the case of main power failure or a decline in its value below the battery voltage of the receiver is powered from the battery. With the battery voltage of approx. 10.5 V the module automatically cuts off the power supply (protection against damaging the battery).



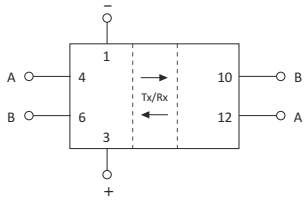


supply voltage / charging Uin	18÷30V DC
output voltage Uout	(Uin -0.5V DC / Uacu -0.5V DC)
output load current Uout	<3A
supported battery capacity	1.3÷7.2Ah
battery voltage max	13.8V DC
charging current	<0.35 A
power supply cut-off threshold	<10.5V DC
power consumption	<1W
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

RM-07 RS-485 NETWORK AMPLIFIER/SEPARATOR

PURPOSE

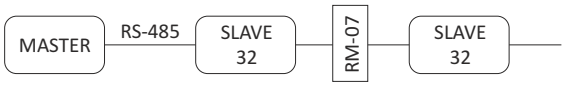
RM-07 module is used as a signal amplifier for Modbus RTU transmission as well as a galvanic separator in RS-485 network. It amplifies the signal thus extending the coverage of the bus and allowing to connect more devices. It can also be used for branching the lines and protect them from the influence of electromagnetic interference. The module amplifies the signal in both directions. Galvanic isolation between ports.



power supply	9÷30V DC
baud rate	1200÷115200bpsec
system current	<25mA
galvanic separation	1kV
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

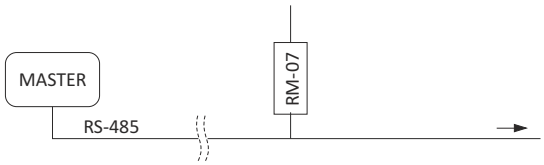
EXTENSION

In order to extend the bus by another group of 32 receivers.
Ability to extend up to 4 groups for transmission rate of 9600.



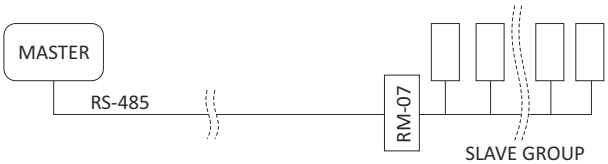
BRANCHING

To reduce the impact of interference caused by the branching of long signal lines.



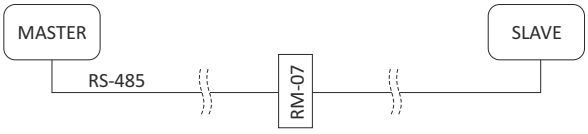
SEPARATION

To protect a group of receivers from interference generated on the side of the long communication networks.



AMPLIFICATION

To strengthen the signal in long communication networks.



WE1800BT RS-485 => USB CONVERTER

PURPOSE

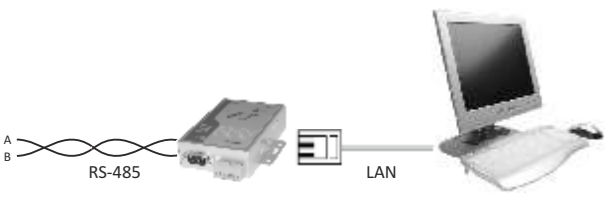
The converter allows you to access the RS-485 and RS-232 serial ports from any computer on the local network and from any computer in the world connected to the Internet, if the IP address is shared. Communication is carried out via TCP, UDP, DHCP and other protocols.

wire lenght	1.8m
RS-485 connector	2×0.34mm²

ATC-1000 RS-485 => TCP/IP CONVERTER

PURPOSE

The converter allows you to access the RS-485 serial port from any computer on the local network and from any computer in the world connected to the Internet, if the IP address is shared. Communication is carried out via TCP, UDP, DHCP and other protocols.



power supply	9÷24V DC
RS-485 connector	1.0mm²
TCP connector	RJ-45 slot
dimensions	86×100×26mm
mounting	two screws to substrate
supplier	9V DC included

AKS-08 CONVERTER/SEPARATOR OF ANALOG SIGNALS

PURPOSE

The analog separator is a module capable of processing an analog signal from one form to the other with an additional galvanic separation between input and output signals.

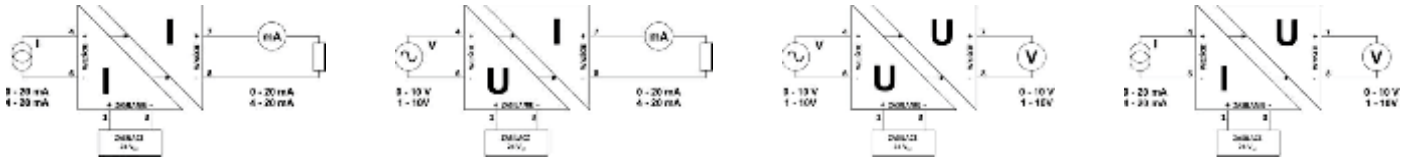
NEW !

Input signals IN:
* 0÷10 V voltage
* 1÷10 V voltage
* 0÷20 mA current
* 4÷20 mA current

→

Output signals OUT:
* 0÷10 V voltage
* 1÷10 V voltage
* 0÷20 mA current
* 4÷20 mA current

power supply	24÷30V DC
input impedance	
voltage mode	3kΩ
current mode	50Ω
output current (voltage mode)	<50mA
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20



FUNCTIONS

* Galvanic separation (min. 1 kV) between analog input and output
* High speed processing - the ability to transfer signals with frequencies up to 100 Hz
* Optical control of the correctness of input and output signals
* Signaling cases where the output signal is beyond the permitted range of values
* Indication of an overload or short circuit on the output line

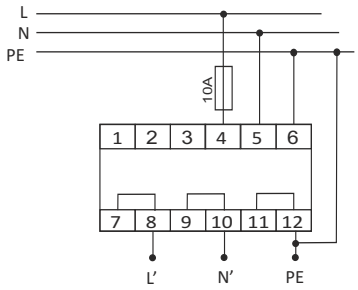
APPLICATION

* Protection of expensive automation components (PLCs, inverters, controllers, etc.) against surges that may appear on the signal lines.
* Adjust the level of the analog signal to the capabilities of the controllers or regulators, for example it is possible to connect the sensor with the current output to a PLC controller equipped only with voltage analog inputs.
* Increasing the range of analog transmission, for example a very susceptible to interference voltage analog signal can be converted into a resistant current signal. In such form it can be send across, for example, factory complex, and then returned to a voltage signal form using the second converter.

OP-230 OVERVOLTAGE PROTECTOR type 3 (early D-class) with a triple interference filter

PURPOSE

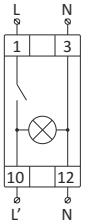
Protection of electronic devices, i.e. computers, PLCs, microprocessor systems, etc. against electromagnetic disturbance and overvoltage in the electrical system.



standard no.	IEC 61643-1:2001
protection class	III
rated voltage	230V AC
rated current	10A
max. stable working voltage	255V
overvoltage protection level L→N measured	<1kV
operating time	<25nsec
additional protection	10A gL/gG lub C10A
inductans	1mH/track
leakage current	0.5mA
capacitance L→N	880nF
capacitance L(N)→PE	2.2nF
electromagnetic interference damping capacity	>85dB
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	3 modules (52.5mm)
mounting	on TH-35 rail
protection level	IP20

WB-1 TOGGLE SWITCH WITH SIGNAL LIGHT

NEW !



overload	16A 250V AC
transmission speed	1200÷115200bpsec
working temperature	-25÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

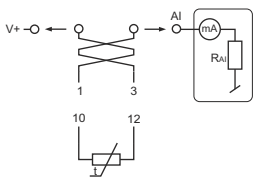
38. SIGNAL TRANSDUCERS

ANALOG TRANSDUCERS

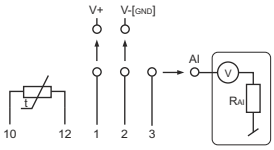
The analog transducers dedicated for measuring physical values with an external or internal sensor and converting the measured features to the standard analog current signal output 4÷20 mA or voltage 0÷10 V.

TEMPERATURE TRANSDUCERS

AT-1I / AT-1U to co-operate with KTY temperature sensor



AT-1I

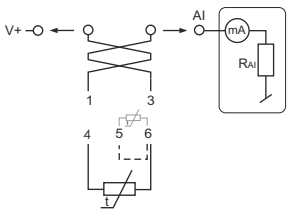


AT-1U

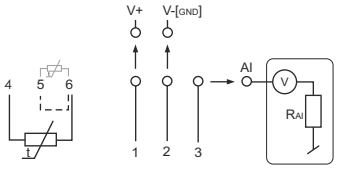
supply voltage	9÷30V DC
range of measurement	-50÷100°C
maximum measurement error	±1.5°C
I/U output signal	4÷20mA/0÷10V
processing error	±0.5%
I/U length of signal wire	300m/20m
temperature probe	RT/RT2
power consumption	0.8W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

The module works with resistance-type temperature sensaor KTY81-210 (or similar).
A dedicated temperature probe of F&F production: RT probe or RT2 probe (page 172).

AT-2I / AT-2U with internal KTY temperature sensor



AT-1I

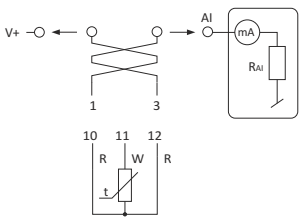


AT-1U

supply voltage	9÷30V DC
range of measurement	-50÷100°C
maximum measurement error	±1.5°C
I/U output signal	4÷20mA/0÷10V
processing error	±0.5%
I/U length of signal wire	300m/20m
internal temperature sensor	KTY81-210
temperature probe	RT/RT2
power consumption	0.8W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	Ø55, h=13mm
mounting	in flush mounted Ø60
protection level	IP20

The module works in one of two options - with the internal sensor or external probe.
The module works with resistance-type temperature sensor KTY81-210 (or similar).
A dedicated temperature probe of F&F production: RT probe or RT2 probe (page 172).

AT-3I to cooperate with PT-100 temperature sensor

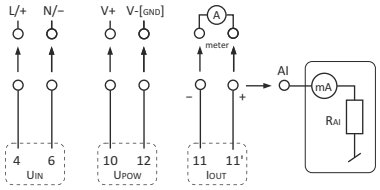


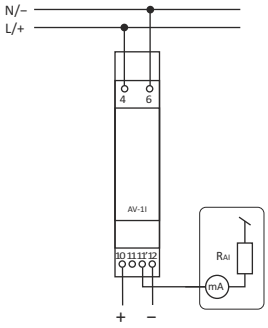
supply voltage	9÷30V DC
range of measurement	-100÷100°C
maximum measurement error	±1°C
I/U output signal	4÷20mA
processing error	±0.5%
I/U length of signal wire	300m
temperature sensor	PT-100
working temperature	-20÷50°C
power consumption	0.8W
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

The module works with resistance-type temperature sensor PT-100 (or similar).
A dedicated temperature probe of F&F production: RT -56 probe (page 174).

TRANSDUCERS OF MEASUREMENT VOLTAGE

AV-1I SINGLE-PHASE 230V AC / 400V DC





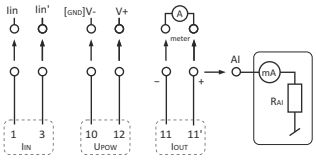
supply voltage	9÷30V DC
range of measurement TrueRMS	
AC voltage	0÷285V
DC voltage	0÷400V
instantaneous voltage max	320V AC/450V DC
maximum measurement error	±0.5V
output signal	4÷20mA
I/U length of signal wire	300m
input/output breakdown voltage	3kV
processing error	±0.5%
power consumption	0.8W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

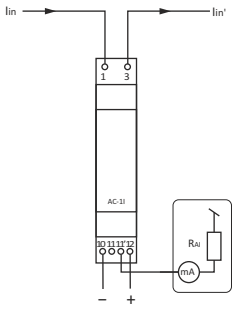
The transducer measures the RMS value voltage TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

CURRENT TRANSDUCER

AC-1I 5A SINGLE-PHASE 5A AC

AC-1I 15A SINGLE-PHASE 15A AC / 20A DC



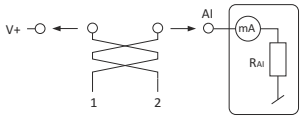


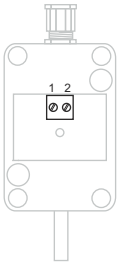
supply voltage	9÷30V DC
range of measurement TrueRMS/voltage max	
AC-1I 5A	0÷5A/285V
AC-1I 15A	0÷15A/285V AC 0÷20A/400V DC
acceptable overload	100A/100msec
measurement error max	±0.2A
output signal	4÷20mA
I/U length of signal wire	300m
input/output breakdown voltage	2.1kV
processing error	±0.5%
power consumption	0.8W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

The transducer measures the RMS current TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

HUMIDITY TRANSDUCER

AH-1I IP65. HERMETIC





supply voltage	9÷30V DC
measuring range	0÷100%RH
measurement accuracy (for 25°C)	±3.5RH
inertia	5sec
output signal	4÷20mA
I/U length of signal wire	300m
processing error	±0.5%
power consumption	0.8W
working temperature	-40÷70°C
relative humidity	100%
terminal	1.5mm² screw terminals
dimensions	42×98×30mm
mounting	to flat surface
protection level	IP65

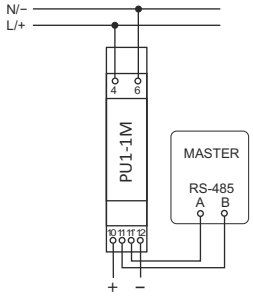
Converter mounted in the place of the measurement. The design of the converter allows for condensation of moisture on the moisture sensor and housing.

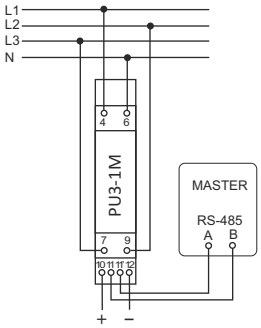
TRANSDUCERS WITH MODBUS RTU OUTPUT

Transducers for measuring physical values with an external or internal sensor with the possibility of reading data from the internal registers using Modbus RTU protocol.

TRANSDUCERS OF MEASUREMENT VOLTAGE

MB-1U-1 SINGLE-PHASE
MB-3U-1 THREE-PHASE



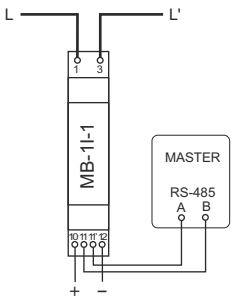


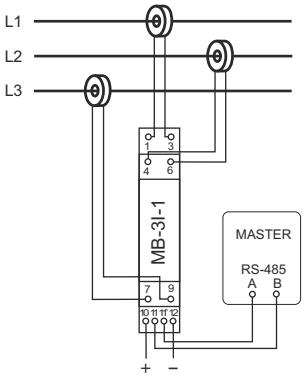
supply voltage	9÷30V DC
maximum current consumption	50mA
range of measurement TrueRMS	
AC voltage	0÷285V
DC voltage	0÷400V
measurement error	0.5%
reading registry precision	1V
input/output breakdown voltage	3kV
processing error	±0.5%
sampling frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/s
data bits	8
stop bits	1/2
parity bit	EVEN/ODD/NONE
address	1÷247
working temperature	-20÷50°C
relative humidity (for +30°C)	85%
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

Przetwornik dokonuje pomiaru wartości skutecznej napięcia True RMS, co gwarantuje dużą measurement accuracy również przy przebiegach odkształconych.

CURRENT TRANSDUCER

MB-1I-1 5A / MB-1I-1 15A SINGLE-PHASE
MB-3I-1 5A / MB-3I-1 15A THREE-PHASE





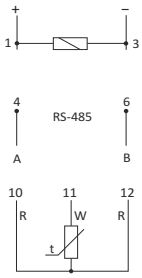
supply voltage	9÷30V DC
maximum current consumption	50mA
range of measurement TrueRMS/voltage max	
AC-1I 5A	0÷5A/285V
AC-1I 15A	0÷15A/285V AC 0÷20A/400V DC
measurement error	±0.5%
reading registry precision	0.1A
sampling frequency	10Hz
input/output breakdown voltage	2.1kV
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/2
parity bit	EVEN/ODD/NONE
address	1÷247
working temperature	-20÷50°C
relative humidity (for +30°C)	85%
terminal	2.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

The transducer measures the RMS current TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

TEMPERATURE TRANSDUCERS

MB-PT-100 TO CO-OPERATE WITH PT-100 TEMPERATURE SENSOR

Recorded values: current temperature and recorded minimum and maximum temperature. Settings of the measuring parameters of the converter: the averaging time of the temperature measurement result and temperature model correction.

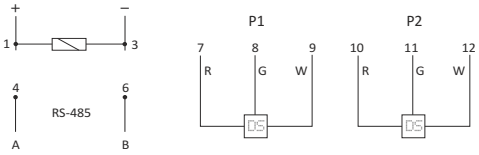


supply voltage	9÷30V DC
range of measurement	-100÷400°C
maximum measurement error	±1°C
input/output breakdown voltage	2.1kV
type of temperature sensor	PT-100
sampling frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

The module works with resistance-type temperature sensor PT-100 (or similar).
A dedicated temperature probe of F&F production: RT -56 probe (page 174).

MB-DS-2 TO CO-OPERATE WITH THE DS DIGITAL TEMPERATURE SENSOR

The converter has two independent measuring circuits. Recorded values: current temperature, maximum and minimum recorded temperatures. Measuring parameters of the converter that can be adjusted: averaging time of temperature measuring and model temperature correction.



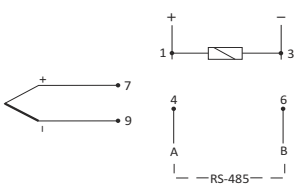
supply voltage	9÷30V DC
maximum current consumption	40mA
range of measurement	-55÷125°C
maximum measurement error	±1°C
type of temperature sensor	DS1820
sampling frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

Dedicated temperature probe produced by F&F: RT4 probe (page 176).

TEMPERATURE CONVERTER

MB-TC-1 TEMPERATURE CONVERTER for K, J, E, N, T, S, R, B thermocouples

Recorded values: current temperature, recorded minimum and maximum temperatures. The ability to set the measuring parameters of the converter: averaging time of temperature measurement result and the reference correction of the temperature.

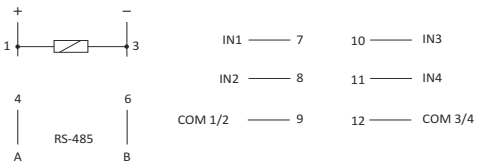


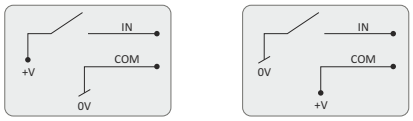
supply voltage	9÷30V DC
range of measurement	depend on sensor type
maximum measurement error	±2°C
type of temperature sensor	K, J, E, N, T, S, R, B.
sampling frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

Sensor type is set programmatically in accordance with Modbus RTU protocol.

FOUR-CHANNEL PULSE METER

MB-LI-4 Lo COUNTING INPUT LOW VOLTAGE
MB-LI-4 Hi COUNTING INPUT HIGH VOLTAGE





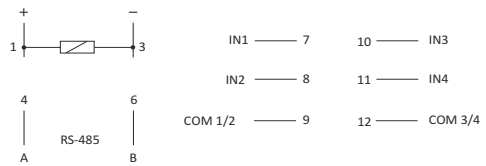
supply voltage	9÷30V DC
DI inputs quantity	4
input voltage	
Lo	6÷30V AC/DC
Hi	160÷265V AC/DC
counting frequency max	100Hz
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

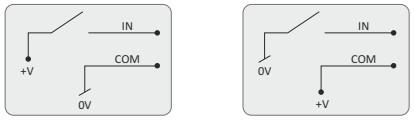
FUNCTIONS

* four independent meters
* meter inputs designed to work with AC/DC signals
* factor adjustment (a floating-point value)
* rescaled value (number of pulses × factor)
* selecting a mode of state 1 trigger: high or low voltage
* selecting an input pulse edge (leading or trailing)
* frequency filter that allows you to limit the maximum frequency of counted pulses (elimination of distortions at the input))
* memory of meter status after power failure
* digital input function

FOUR-CHANNEL WORK TIME METER

MB-LG-4 Lo COUNTING INPUT LOW VOLTAGE
MB-LG-4 Hi COUNTING INPUT HIGH VOLTAGE





supply voltage	9÷30V DC
DI inputs quantity	4
input voltage	
Lo	6÷30V AC/DC
Hi	160÷265V AC/DC
input signal frequency max	100Hz
measured time max	150years
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

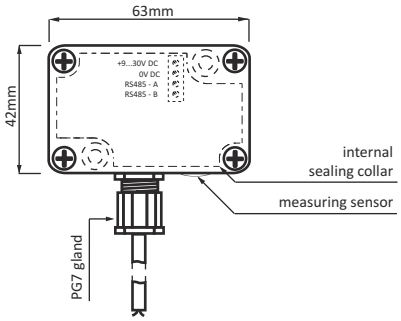
FUNCTIONS

* four independent meters
* the overall results in the FLOAT (floating-point) values for hours and INT score values (total): seconds, minutes, hours, days (4 records per meter)
* meter input, adapted for operation with AC/DC signals
* selecting an input pulse edge (leading or trailing)
* time filter for limiting the maximum length of the input signal (elimination of interference at the input of the meter)
* meter state memory after power failure
* digital input function

MB-AHT-1 HUMIDITY AND TEMPERATURE TRANSDUCER

The transducer continuously measures the temperature in the range of -40 to 70°C and humidity in the range of 0 to 100% RH.

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.

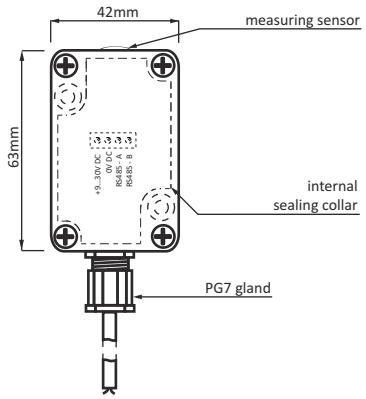


supply voltage	9÷30V DC
maximum current consumption	40mA
range of measurement	0÷100%RH / -40÷70°C
maximum measurement error temp.	±1°C
maximum measurement humidity error	±4,5% (0÷80RH) ±6,5% (80÷100RH)
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	42×63×30mm
mounting	2 fastening screws to the ground
protection level	IP65

MB-LS-1 BRIGHTNESS LEVEL TRANSDUCER

The transmitter continuously measures the level of brightness (sunlight) in the range of 1÷2000 Lux.

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.



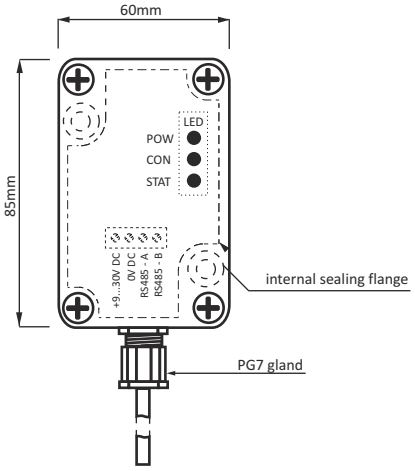
supply voltage	9÷30V DC
maximum current consumption	40mA
range of measurement	1÷2000Lux
maximum measurement error temp.	±1°C
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	42×63×30mm
mounting	2 fastening screws to the ground
protection level	IP65

MB-GPS-1 GPS LOCATION TRANSDUCER

The transducer is equipped with a standard location module of the GPS (Global Positioning System) satellite system. Based on the received signal the module provides current information about its location:

* geographic coordinates (longitude/latitude)
* date (year / month / day)
* time (hour / minutes / seconds)
* altitude (m a.s.l.)

The converter in a special, small plastic box, connected through a PG7 gland with a round cable of any length, max. Ø7 (for example 2×0.5 mm²). Box with special sealing flange, fastened to the base with two screws, closed by a four-screw cover with a silicon gasket.

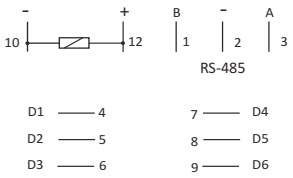


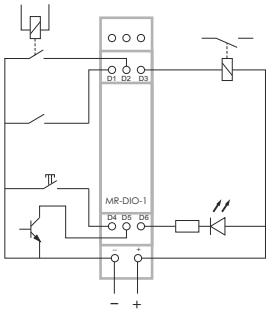
supply voltage	9÷30V DC
maximum current consumption	40mA
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-40÷70°C
terminal	2.5mm² screw terminals
dimensions	60×85×35mm
mounting	2 fastening screws to the ground
protection level	IP65

EXTENSION MODULES WITH RS-485 PORT AND MODBUS RTU PROTOCOL

MR module is dedicated as an external I/O expansion device for PLC controllers or other devices where data exchange is via the RS-485 port in accordance with MODBUS RTU.

MR-DIO-1 DIGITAL I/O EXTENSION MODULE (DI/DO)

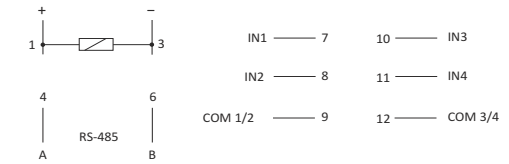


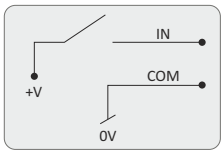


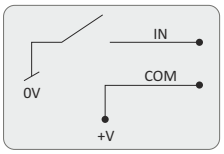
supply voltage	9÷30V DC
maximum current consumption	25mA
DI/DO contacts quantity	6
contact voltage	<50V
working current contact	
constant	100mA
pulse (20%)	200mA
port	RS-485
communication protocol	MODBUS RTU
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.5W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

Module MR-DIO-1 has six universal contacts. Each of the contacts depending on how the connection can be a digital input or output.
The module has a recording of output function in non-volatile local memory. After each power-output module will revert to a saved state.

MR-DI-4 LO / MR-DI-4 HI DIGITAL INPUTS MODULE (DI)





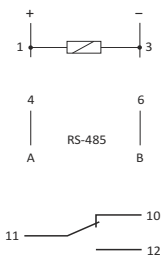


supply voltage	9÷30V DC
DI inputs quantity	4
voltage tolerance inputs	
Lo	6÷30V AC/DC
Hi	160÷265V AC/DC
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

FUNCTIONS

* 4 independent inputs
* digital input designed to work with AC/DC signals
* selecting a mode of state 1 trigger: high or low voltage
* selecting a mode of state 1 trigger: with closing or opening of the circuit inputs
* frequency filter that allows to limit the maximum frequency of counted pulses (elimination of distortions at the input)

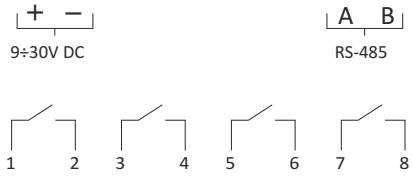
MR-RO-1 RELAY OUTPUTS MODULE (RO); 1×NO/NC CONTACT



supply voltage	9÷30V DC
contact	separated 1×NO/NC
overload (AC-1)	16A
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.4W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

The module with state memory, which means that contact automatically returns to the position from before the power shutdown.
There is also an option of forced state after reboot, which means setting an appropriate contact position after re-powering.

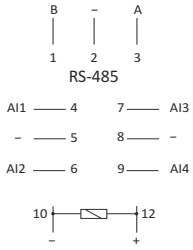
MR-RO-4 OUTPUT RELAY MODULE (RO) 4×[1×NO] CONTACT

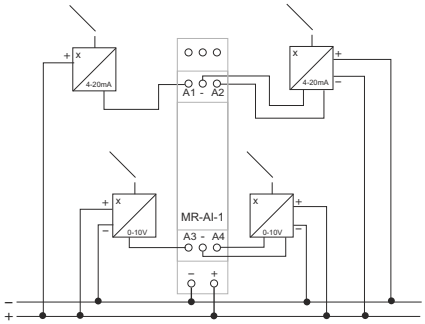


supply voltage	9÷30V DC
contact	separated 4×[1×NO]
overload (AC-1)	16A
port	RS-485
communication protocol	Modbus RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	1W
working temperature	-20÷50°C
terminal	2.5mm² screw terminals
dimensions	4 modules (70mm)
mounting	on TH-35 rail
protection level	IP20

The module has a memory of state feature, which means the contacts will automatically return to the position from before the power shutdown. It can also force the state after a reboot, which means it will set the respective contact position when the power is back on.

MR-AI-1 ANALOG INPUT EXTENSION MODULE (AI)

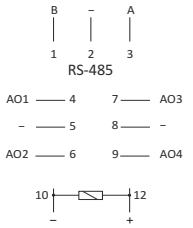


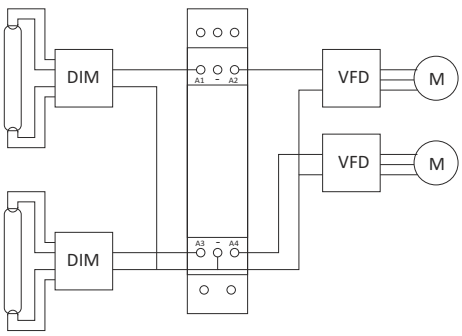


supply voltage	9÷30V DC
maximum current consumption	30mA
inputs quantity	4
inputs type/range	
current	0÷20mA
voltage	0÷10V
resistance inputs	
current	47Ω
voltage	110kΩ
measurement error	0.5%
port	RS-485
communication protocol	MODBUS RTU
working mode	SLAVE
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	1W
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

The module has 4 universal analog inputs. Input type compatible 0÷10V (voltage U) or 4÷20 mA (current I) is determined using internal contacts. The module measures the value of input current and voltage on all inputs regardless of the hardware configurations of input types (location of contacts). However, they will be properly measured input values for which this entry is configured.

MR-AO-1 ANALOG OUTPUT EXTENSION MODULE (AO)





supply voltage	9÷30V DC
maximum current consumption	40mA
outputs quantity	4
output signal	0÷10V
output signal precision	0.1V
output signal error	±0.02V
load resistance minimum	2kΩ
short circuit current	40mA
port	RS-485
communication protocol	MODBUS RTU
communication parameters	
speed - adjustable	1200÷115200 bit/sec
data bits	8
stop bits	1/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	
working temperature	-20÷50°C
terminal	1.5mm² screw terminals
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

The module has 4 analog voltage outputs 0÷10 V. The values of the outputs volages can be set or read via RS-485, using MODBUS RTU protocol. The module has the function of recording the output voltage non-volatile memory in the local area. Each time you power up the module output value will be restored to the saved state.

39. ELECTROMAGNETIC CONTACTORS AND RELAYS

MODULAR CONTACTORS

PURPOSE

Electromagnetic contactors in modular housings for direct mounting on 35 mm rail.

FUNCTIONING

Applying the supply voltage to the contactor coil switches the contact. Switching state of the contactor is indicated by a red marker in the window. After a power failure, contactors return to its original position.

ST25

ST40

ST63

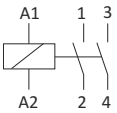
ST100

NEW !

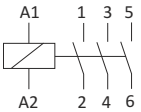
Type	Contactors	Main circuit current	Total power AC1 cat. [230V]	Total power AC3 cat. [230V]	Coil supply voltage	Power consumption	Module	Weight	Screw terminals
ST25-20	2×NO	25A	4kW	1.3kW	230V AC	2.2W	1	106g	4mm²
ST25-20/24	2×NO	25A	4kW	1.3kW	24V AC	2.2W	1	106g	4mm²
ST25-11	1×NO+1×NC	25A	4kW	1.3kW	230V AC	2.2W	1	106g	4mm²
ST25-30	3×NO	25A	9kW	2.2kW	230V AC	4.0W	2	168g	6mm²
ST25-31	3×NO+1×NC	25A	9kW	2.2kW	230V AC	4.0W	2	168g	6mm²
ST25-31/24	3×NO+1×NC	25A	9kW	2.2kW	24V AC	4.0W	2	168g	6mm²
ST25-40	4×NO	25A	9kW	2.2kW	230V AC	4.0W	2	168g	6mm²
ST25-40/24	4×NO	25A	9kW	2.2kW	24V AC	4.0W	2	168g	6mm²
ST25-04	4×NC	25A	9kW	2.2kW	230V AC	4.0W	2	168g	6mm²
ST25-22	2×NO+2×NC	25A	9kW	2.2kW	230V AC	4.0W	2	168g	6mm²
ST40-04	4×NC	40A	16kW	5.5kW	230V AC	6.4W	3	241g	16mm²
ST40-22	2×NO+2×NC	40A	16kW	5.5kW	230V AC	6.4W	3	241g	16mm²
ST40-40	4×NO	40A	16kW	5.5kW	230V AC	6.4W	3	241g	16mm²
ST40-40/24	4×NO	40A	16kW	5.5kW	24V AC	6.4W	3	241g	16mm²
ST40-31	3×NO+1×NC	40A	16kW	5.5kW	230V AC	6.4W	3	241g	16mm²
ST63-40	4×NO	63A	24kW	8.5kW	230V AC	6.4W	3	241g	16mm²
ST63-40/24	4×NO	63A	24kW	8.5kW	24V AC	6.4W	3	241g	16mm²
ST63-31	3×NO+1×NC	63A	24kW	8.5kW	230V AC	6.4W	3	241g	16mm²
ST100-20	2×NO	100A	22kW	8.0kW	230V AC	6.4W	3	305g	25mm²
ST100-40	4×NO	100A	38kW	13.0kW	230V AC	9.0W	6	617g	25mm²

standard no.	IEC 61095
electrical endurance	1×10^5
electrical endurance (mechanical)	1×10^6
insulation voltage	4.0kV
working temperature	-25÷50°C
mounting	on TH-35 rail
protection level	IP20

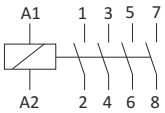
ST25-20
ST100-20



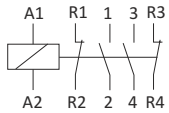
ST25-30



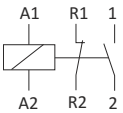
ST25-40
ST40-40
ST63-40
ST100-40



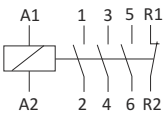
ST25-22



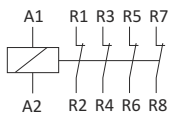
ST25-11



ST25-31
ST40-31
ST63-31



ST25-04



ELECTROMAGNETIC RELAYS

Application of the power supply voltage to the relay's coil results in a shift of the contact. After the decay of the voltage in question, the contact returns to the initial position.

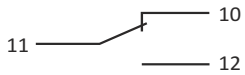
MODULE TH-35 RAIL

PK-1P 1×NO/NC contact [1×16A]
PK-2P 2×NO/NC contacts [2×8A]
PK-3P 3×NO/NC contacts [3×8A]
PK-4PZ 2×NO/NC contacts [2×8A] + 2×NO contacts [2×8A]
PK-4PR 2×NO/NC contacts [2×8A] + 2×NC contacts [2×8A]

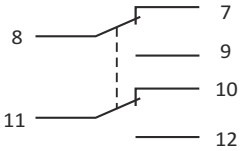
Order labelling method: PK-2P ⌊48V⊢ supply voltage

power supply	
PK-xP 230V	230V AC
PK-xP 110V	110V AC/DC
PK-xP 48V	48V AC/DC
PK-xP 24V	24V AC/DC
PK-xP 12V	12V AC/DC
load current	
PK-1P	<16A
PK-2P	2×(<8A)
PK-3P	3×(<8A)
PK-4PZ	2×(<8A), 2×(<8A)
PK-4PR	2×(<8A), 2×(<8A)
contacts	
PK-1P	1×NO/NC
PK-2P	2×NO/NC
PK-3P	3×NO/NC
PK-4PZ	2×NO/NC, 2×NO
PK-4PR	2×NO/NC, 2×NC
mechanical durability	min. 5×10^6 cycles
current consumption	25mA
terminal	2.5mm² screw terminals
working temperature	-25÷50°C
dimensions	1 module (18mm)
mounting	on TH-35 rail
protection level	IP20

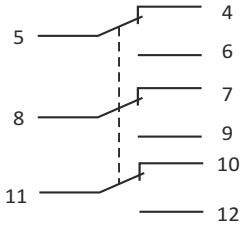
PK-1P



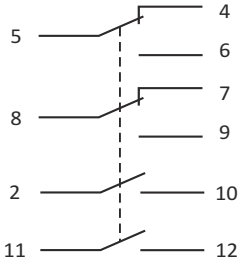
PK-2P



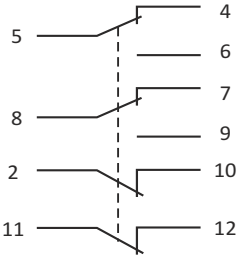
PK-3P



PK-4PZ

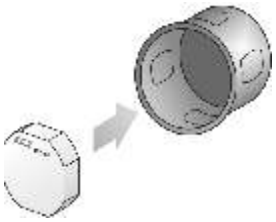


PK-4PR



TO FLUSH MOUNTED Ø60

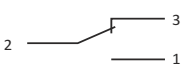
PP-1P 1×NO/NC contact <16A 250V AC
PP-1Zi 1×NO contact <16A (160A/20msec)
PP-2Z 2×NO contacts <16A 250V AC
PP-2Zi 2×NO contacts <16A (160A/20msec) 250V AC



Relay version "i" is to pin adapted to cooperate with the receivers with high starting current, such as LED fluorescent lamps, ESL fluorescent lamps, electronic transformers, discharge lamps, etc.

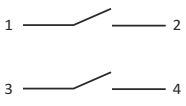
power supply	
PP-1P 24V	7÷30V AC / 9÷40V DC
PP-1P 230V	100÷265V AC
PP-1Zi 24V	7÷30V AC / 9÷40V DC
PP-1Zi 230V	100÷265V AC
PP-2Z 24V	7÷30V AC / 9÷40V DC
PP-2Z 230V	100÷265V AC
PP-2Zi 24V	7÷30V AC / 9÷40V DC
PP-2Zi 230V	100÷265V AC
contacts / load current	
PP-1P 24V	1×NO/NC / <16A 250V AC
PP-1P 230V	1×NO/NC / <16A 250V AC
PP-1Zi 24V	1×NO / <16A (160A/20msec) 250V AC
PP-1Zi 230V	1×NO / <16A (160A/20msec) 250V AC
PP-2Z 24V	2×NO / <16A 250V AC
PP-2Z 230V	2×NO / <16A 250V AC
PP-2Zi 24V	2×NO / <16A (160A/20msec) 250V AC
PP-2Zi 230V	2×NO / <16A (160A/20msec) 250V AC
mechanical durability	min. 5×10^6 cycles
power consumption	<0.6W
terminal	2.5mm² screw terminals
tightening torque	0.4Nm
working temperature	-25÷50°C
dimensions	Ø54 (□48×43mm), h=25mm
mounting	in flush mounted Ø60
protection level	IP20

PP-1P

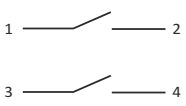


PP-1Zi

PP-2Z



PP-2Zi



40. CURRENT TRANSFORMERS

PURPOSE

Current transformer is used for the proportional changes of large currents to lower values, adapted to ranges of control and measuring devices.

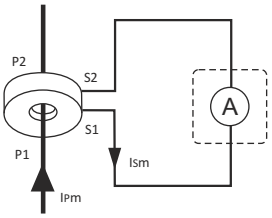
TI-30 ÷ TI-80

NEW !

TH-35 rail adapter

norm no.	IEC 60044-1
nominal secondary current Is	5A
rated voltage	0.66kV AC
insulation breakdown voltage	3kV/1min.
frequency	50/60Hz
security factor	FS<5
working temperature	-5÷40°C
S1/S2 terminal	4mm² screw terminals
mounting	board/busbar
position	vertical/horizontal
protection level	IP20

Type	Transmission Ip/Is	Class	Power [VA]	P1/P2 hole dimensions [mm]	Dimensions W×H [mm]	Weight [kg]
TI-30	30/5	0.5	1	Ø22	87.5×104	0.135
TI-40	40/5	0.5	1	Ø22	87.5×104	0.135
TI-50	50/5	0.5	2.5	Ø22	87.5×104	0.135
TI-60	60/5	0.5	2.5	Ø22	87.5×104	0.135
TI-75	75/5	0.5	2.5	Ø22	87.5×104	0.135
TI-80	80/5	0.5	2.5	Ø22	87.5×104	0.135

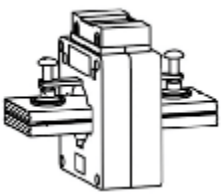


TI-100 ÷ TI-600

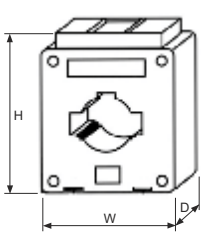
assembling accessories

norm no.	IEC 60044-1
nominal secondary current Is Is	5A
rated voltage	0.66kV AC
insulation breakdown voltage	3kV/1min.
frequency	50/60Hz
security factor	FS<5
working temperature	-5÷40°C
S1/S2 terminal	4mm² screw terminals
mounting	board/busbar
position	vertical/horizontal
protection level	IP20

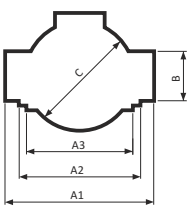
Type	Transmission Ip/Is	Class	Power [VA]	P1/P2 hole dimensions A1/A2/A3×B; C [mm]	Dimensions W×H×D [mm]	Weight [kg]
TI-100	100/5	0.5	2.5	30/25/20×10; Ø22	61×81×34	0.235
TI-150	150/5	0.5	2.5	30/25/20×10; Ø22	61×81×34	0.235
TI-200	200/5	0.5	5.0	30/25/20×10; Ø22	61×81×34	0.235
TI-250	250/5	0.5	5.0	30/25/20×10; Ø22	61×81×34	0.235
TI-300	300/5	0.5	5.0	30/25/20×10; Ø22	61×81×34	0.235
TI-400	400/5	0.5	10.0	40/30/ - ×10; Ø30	75×99×40	0.305
TI-600	600/5	0.5	10.0	40/30/ - ×10; Ø30	75×99×40	0.305



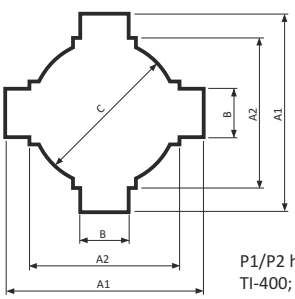
busbar assembly



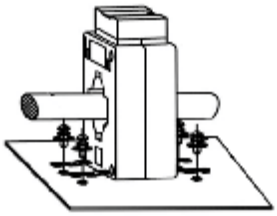
dimensions



P1/P2 hole for:
TI-100; TI-150; TI-200;
TI-250; TI-300



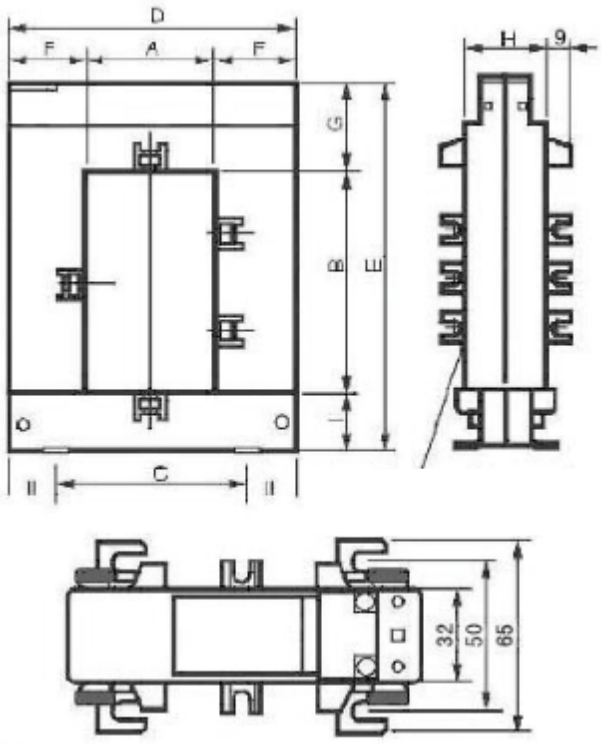
P1/P2 hole for:
TI-400; TI-600



baseplate assembly

TO-100 ÷ TO-1000 TRANSFORMERS WITH OPEN CORE

norm no.	IEC 60044-1
nominal secondary current Is	5A
rated voltage	0.66kV AC
insulation breakdown voltage	3kV/1min.
frequency	50/60Hz
security factor	FS<5
working temperature	-15÷50°C
S1/S2	4mm² screw terminals
mounting	board
position	vertical/horizontal
protection level	IP20



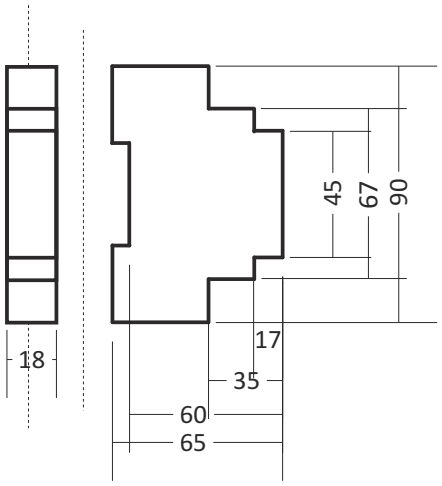
Type	Transmission Ip/Is	Class	Power [VA]	Dimensions [mm] A	B	C	D	E	F	G	H	I	Weight [kg]
TO-100	100/5	1.0	1.5	21	32	51	89	105	34	42	40	32	0.78
TO-150	150/5	1.0	3,0	21	32	51	89	105	34	42	40	32	0.78
TO-200	200/5	0.5	1.5	21	32	51	89	105	34	42	40	32	0.78
TO-250	250/5	0.5	1.5	21	32	51	89	105	34	42	40	32	0.78
TO-300	300/5	0.5	1.5	21	32	51	89	105	34	42	40	32	0.78
TO-400	400/5	0.5	2.5	21	32	51	89	105	34	42	40	32	0.78
TO-600	600/5	0.5	2.5	50	80	78	114	145	32	32	32	33	0.9
TO-750	750/5	0.5	5.0	50	80	78	114	145	32	32	32	33	0.9
TO-1000	1000/5	0.5	5.0	50	80	78	114	145	32	32	32	33	0.9

ATTENTION!

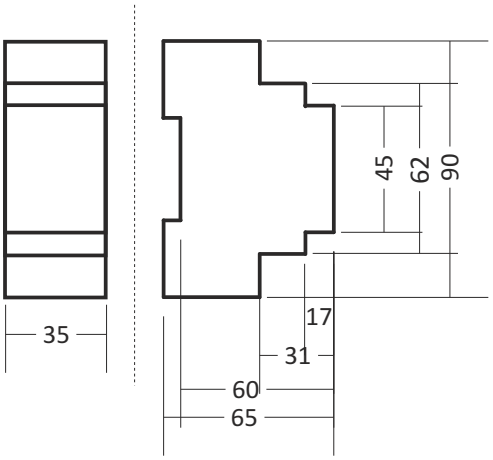
It is recommended to connect the secondary system using a wire with a diameter of not less than 2.5 mm².
Recommended grounding of the S2 terminal.
Do not disconnect the secondary system during operation of the transformer (risk of high voltage that may cause electric shock or damage the device).

41. TYPES AND ENCLOSURE DIMENSIONS

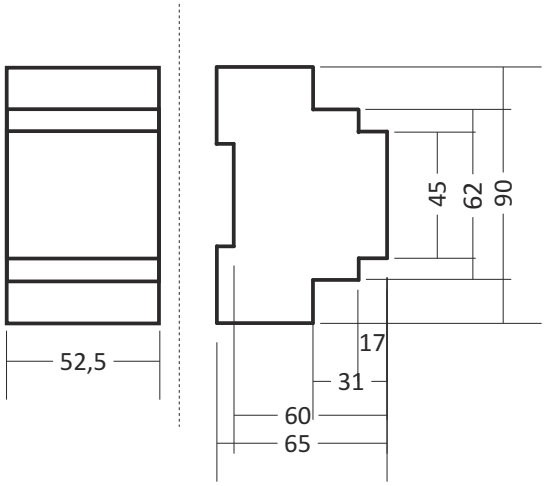
[mm]



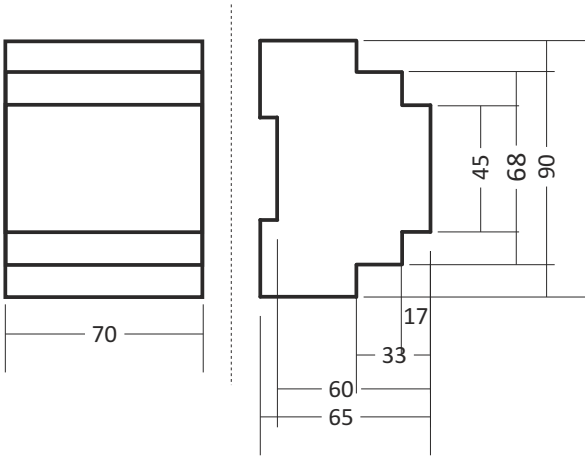
1 module



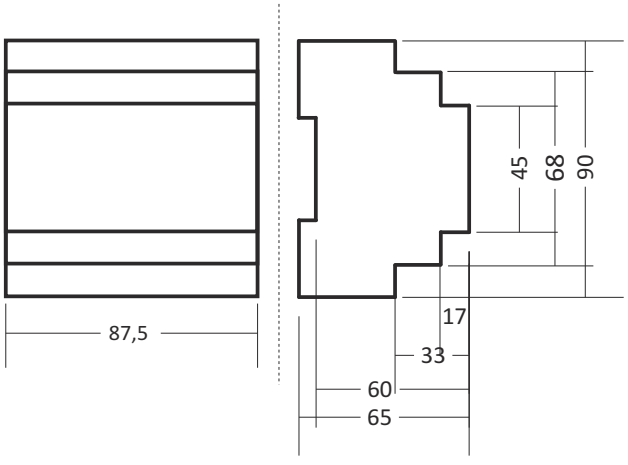
2 modules



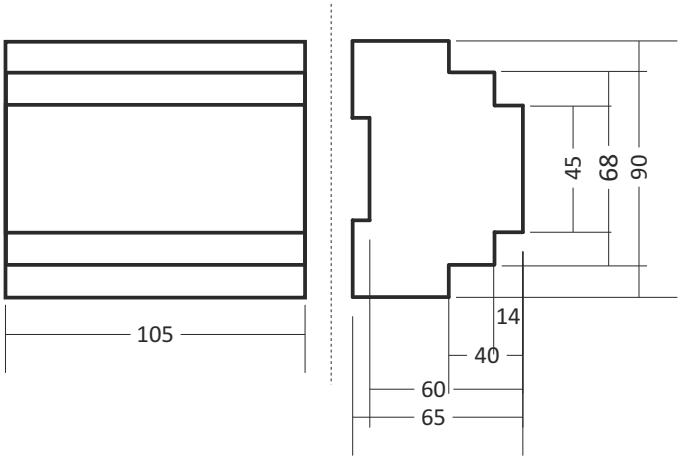
3 modules



4 modules

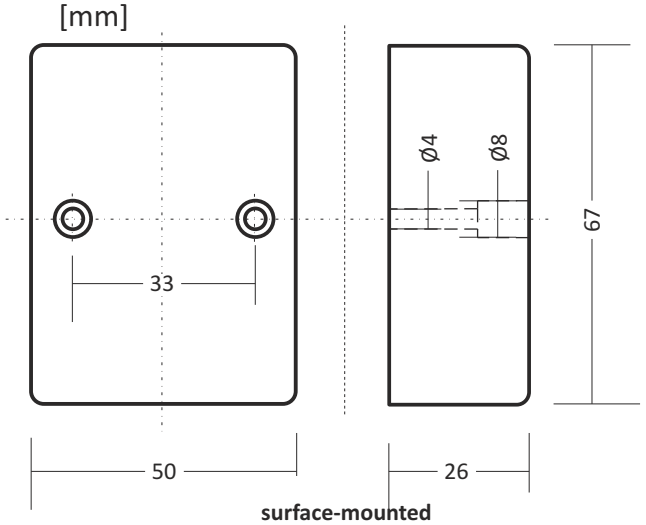


5 modules

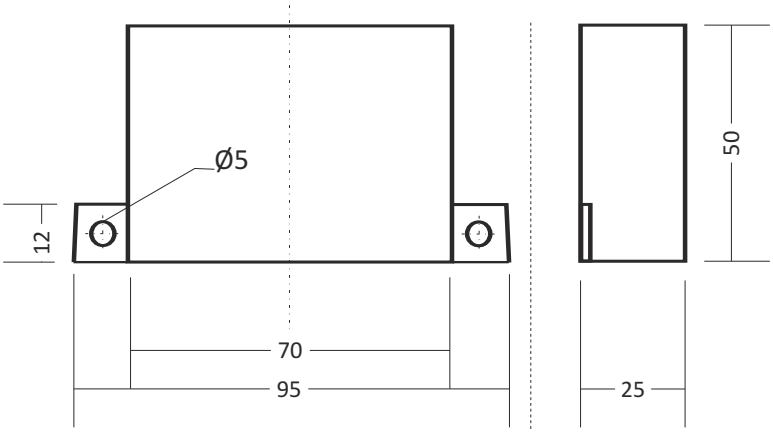


6 modules

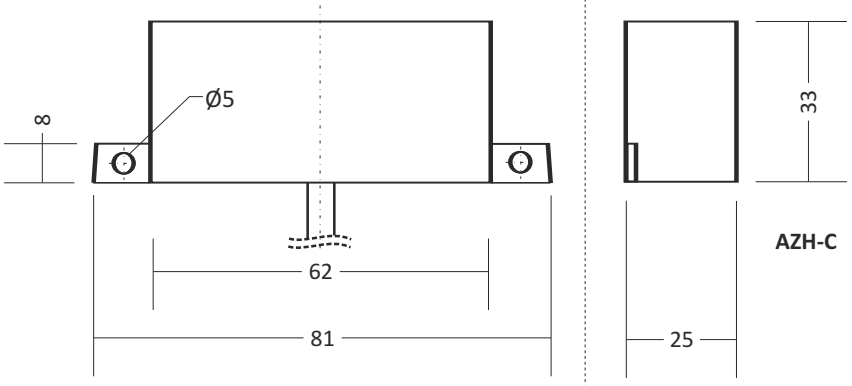
[mm]



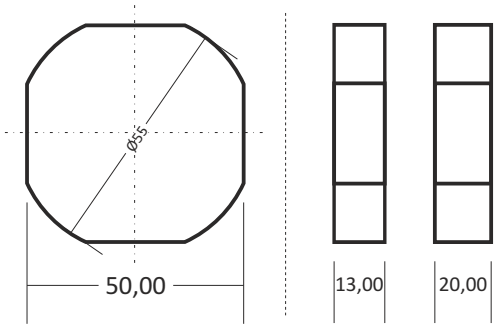
surface-mounted



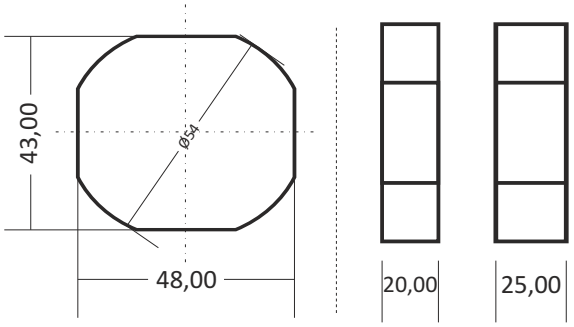
CZF2 PO-405



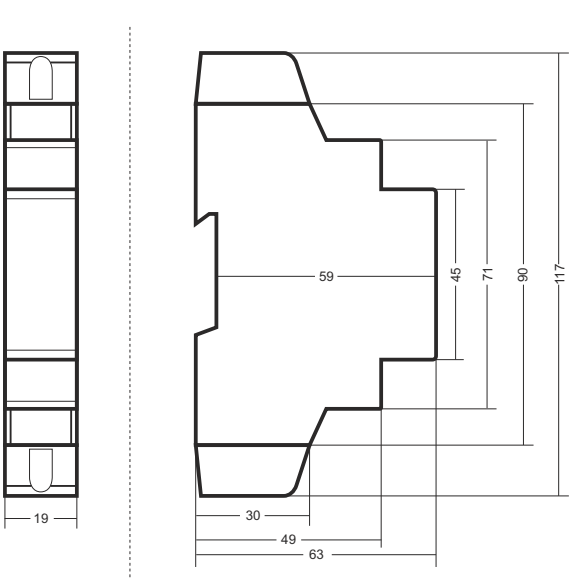
AZH-C



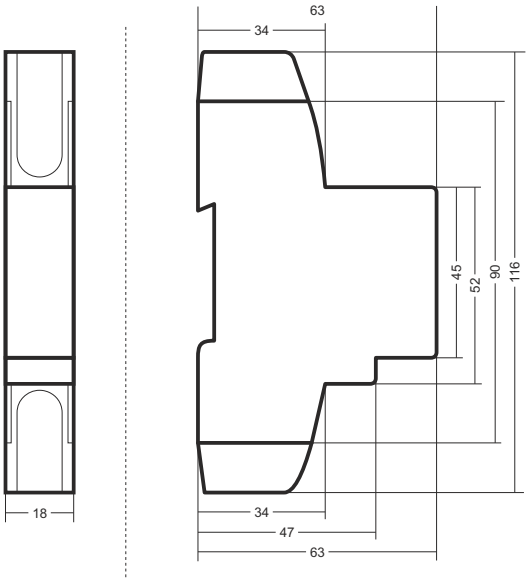
PDT flush-mounted



PDTN flush-mounted

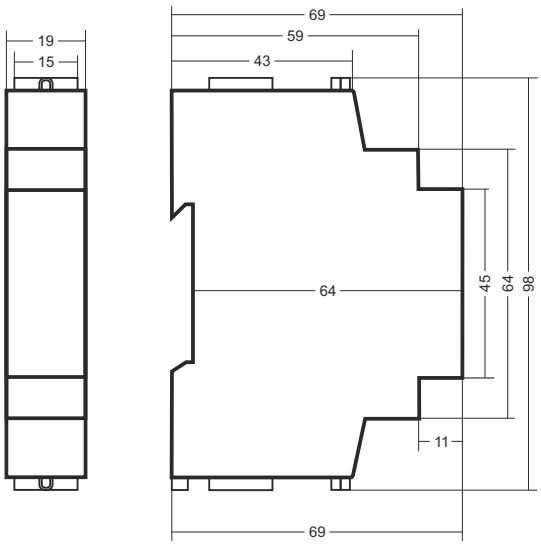


LE-01

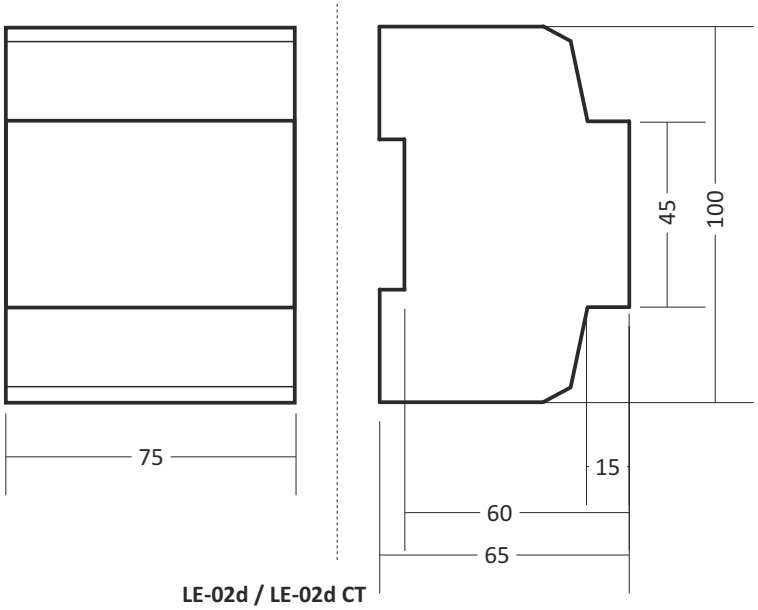


LE-01d

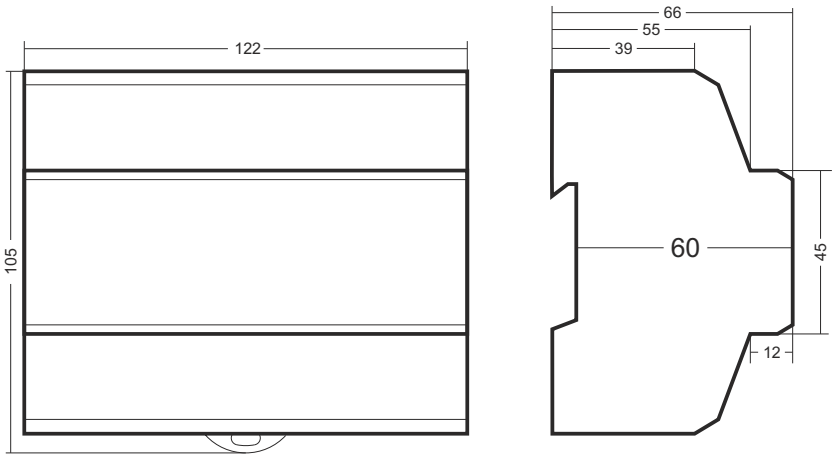
[mm]



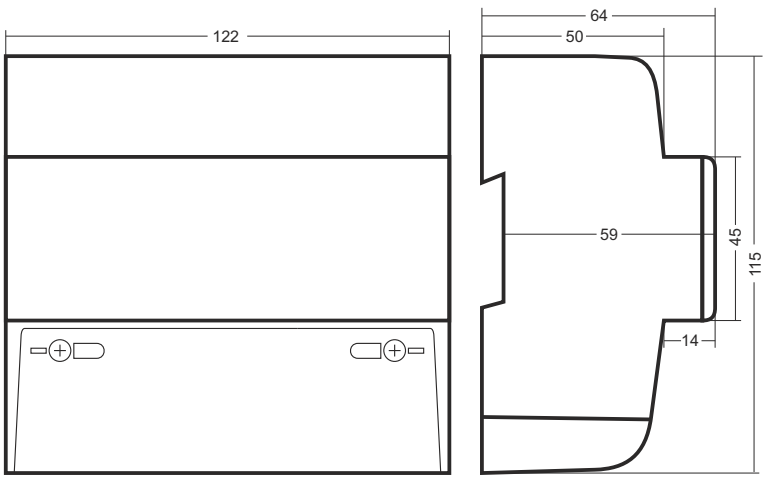
LE-01MP



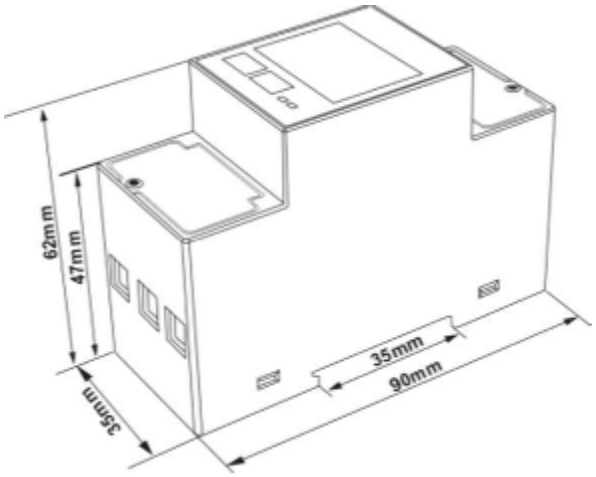
LE-02d / LE-02d CT



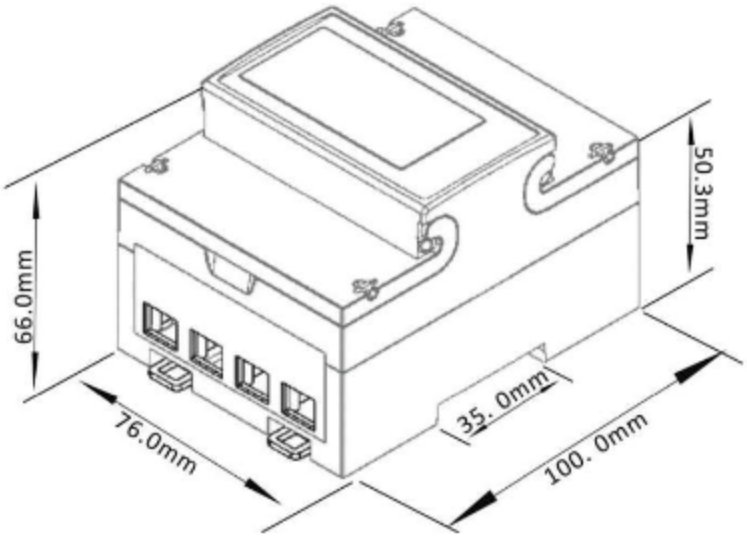
LE-03 / LE-03d / LE-03d CT200 / LE-03d CT400 / LE-03M / LE-03M CT



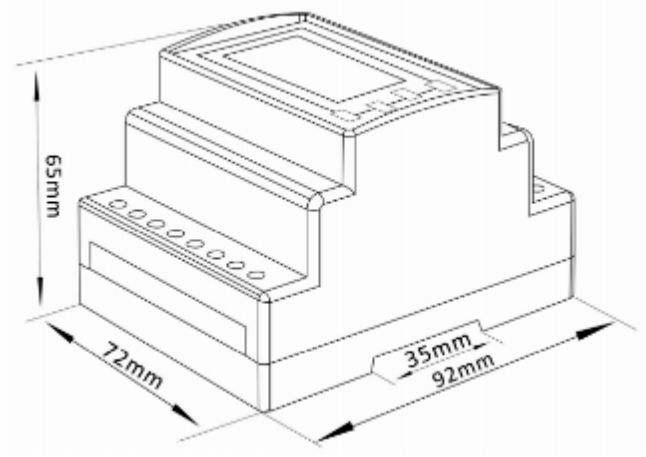
LE-03MP



LE-01MB / LE-01MQ



LE-03MB / LE-03MQ



LE-03MB CT / LE-03MQ CT

PRODUCT INDEX

NOTES

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