

PANEL VOLTAGE
 INDICATOR (RMS) 10÷480 V AC

DMV-1AC-MBT

WARRANTY. The F&F products are covered by a warranty of the 24 months from the date of purchase. Effective only with proof of purchase. Contact your dealer or directly with us. More information how to make a compliant can be found on the website: www.fif.com.pl/reklamacje



Do not dispose of this device in the trash along with other waste! According to the Law on Waste, electro coming from households free of charge and can give any amount to up to that end point of collection, as well as to store the occasion of the purchase of new equipment (in accordance with the principle of old-for-new, regardless of brand). Electro thrown in the trash or abandoned in nature, pose a threat to the environment and human health.

Purpose

The DMV-1AC-MBT panel meter is used for measurement of AC voltage effective value (RMS) in the range of 10÷480 V AC.

The result of the measurement is shown on a numerical LED display with a digit height of 14 mm.

The measuring channel is galvanically isolated and allows measurement on an independent circuit.

Functioning

The device is equipped with 2 independently configured alarms, which control the operation of two relays with a switching contact. Each of the alarms has a configurable lower and upper activation threshold and hysteresis. The lower alarm threshold can be set in the range of 10÷479 V, and the upper one in the range of 11÷480 V. The hysteresis is set within the range of 1÷150 V.

Alarm status is indicated by two red LEDs (A1 and A2) on the front of the device.

Communication

Communication with the meter is also possible via RS-485 bus and Modbus RTU protocol. Through the communication interface it is also possible to read the maximum and minimum values of the measured voltage and the peak-to-peak voltage. It is also possible to configure the device.

Communication with the device is indicated by a yellow LED (Tx) on the front of the device.

Main configuration menu

To enter the main configuration menu, press the [OK] button for about 2 seconds. The display will show "0000" indicating the service password input mode, the first digit will blink:



Enter the service password (default: 0000).

The [UP/DOWN] buttons are used to change the value of a given item, the [OK] button confirms the set value of a given password position (currently set position blinks).

If you enter the incorrect password, an error message will be displayed:



Then the device will switch to the mode of displaying the currently measured voltage value.

After entering the correct password, the first item of the main configuration menu will be displayed:



Exiting the menu will occur automatically after 30 seconds of inactivity or after selecting "EXIT"



and confirming the selection with the [OK] button.

After entering the correct password, it is remembered for 2 minutes after leaving the menu, which allows you to re-enter the settings (within 2 minutes from the last time you left the menu) without having to re-enter the password.

Alarm configuration menu

The device has 2 relay outputs, which are controlled by two user-configurable alarms.

Alarm configuration menu can be found in position No. 1 in the main configuration menu - "ALAR"



After confirming the selection with the [OK] button, the menu for selecting the alarm for configuration will be displayed.

To access the configuration submenu of alarm No. 1, select "A1":



and then confirm your selection with the [OK] button.

Position No. 1 of the alarm configuration submenu will be displayed - "En":



The "En" position is used to activate or deactivate the alarm function.

After pressing the [OK] button, select whether you want the alarm function to be active - [YES] or inactive - [NO], and then confirm your selection with the [OK] button.

Position No. 2 in the alarm configuration submenu is "LO":



The "LO" position is used to set the value of the lower threshold at which the alarm will be triggered in the range of 10÷479 V (or up to a value lower by 1 V than the upper threshold of alarm triggering).

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 3 in the alarm configuration submenu is "HI":



The "HI" position is used to set the value of the upper threshold at which the alarm will be triggered in the range of 11 (or up from the value higher by 1 V than the lower threshold of alarm triggering) ÷480 V. After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.



If the difference between the "HI" and "LO" values is less than the currently set hysteresis value "HYST", then the value "HYST" will be automatically reduced to the value "HI" - "LO"

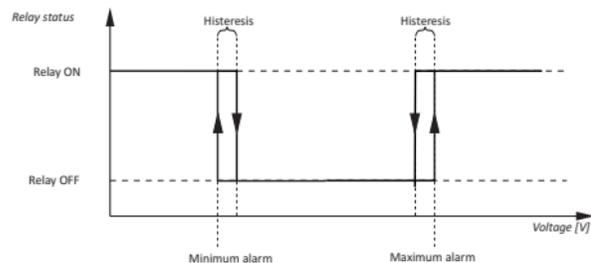
Position No. 4 in the alarm configuration submenu is "HYST" (Hysteresis):



The "HYST" position is used to set the hysteresis value for both thresholds (lower and upper) of the alarm operation, in the range from 1÷150 V, but not greater than the voltage difference between the upper and lower alarm activation threshold.

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value, and then confirm the set value with the [OK] button.

A drawing showing the operation of the alarm along with the set thresholds and the hysteresis value is shown below:



Position No. 5 in the alarm configuration submenu is "T_ON" (time to relay switch on):



The "T_ON" position is used to set the delay time for switching on the alarm relay in the range of 0÷180 s.

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 6 in the alarm configuration submenu is "TOFF" (time to relay switch off):



The "TOFF" position is used to set the delay time for switching off the alarm relay in the range of 0÷180 sec.

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 7 in the alarm configuration submenu is "BACK":



The "BACK" position is used to exit the alarm configuration menu



Alarm No. 2 must be configured in the same way by selecting "A2" in the menu for alarm configuration

Configuration menu for communication parameters

The menu for configuration of communication parameters can be found in item No. 2 in the main configuration menu - "CONN":



After confirming the selection with the [OK] button, the configuration menu for communication parameters will be displayed.

Position No. 1 in the configuration menu for communication parameters is "ADDR":



The "ADDR" position is used to set the address of the device seen through the Modbus RTU protocol in the range of 1÷247. After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 2 in the configuration menu for communication parameters is "BAUD":



The "BAUD" position is used to set the communication speed of the RS-485 communication interface within the range of the values presented below

Speed	Information on display
1200 bps	
2400 bps	
4800 bps	
9600 bps	
19200 bps	
38400 bps	
57600 bps	

Speed	Information on display
115200 bps	

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 3 in the configuration menu for communication parameters is "PARI":



The "PARI" position is used to set the RS-485 communication interface parity bits control within the range of the values shown below:

Parameter	Information on display
Parity check disabled	
Parity bit	
Odd parity bit	

After pressing the [OK] button, set the expected value using the [UP/DOWN] buttons and then confirm the set value with the [OK] button.

According to the Modbus RTU standard, 2 stop bits are sent if the parity check is deactivated.

When the parity check is enabled, 1 stop bit is sent:

Data format without parity check

Start bit	8 data bits	2 stop bits
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Data format with parity check

Start bit	8 data bits	Parity bit	1 stop bit
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Position No. 4 of the communication parameters configuration menu is "BACK":



The "BACK" item is used to exit the configuration menu for configuration of communication parameters.

Configuration menu for display settings

The configuration menu for display settings can be found in position No. 3 in the main configuration menu - "DISP":



When you confirm your selection with the [OK] button, the configuration menu for display settings is displayed.

Position No. 1 of the display settings configuration menu is "REFR":



The "REFR" position is used to set the refreshing time of the result shown on the display in the range of 0.1÷10 seconds. After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 2 of the display settings configuration menu is "ACCU":



The "ACCU" position is used to select the accuracy of displaying the currently measured value the range of the values presented below:

Parameter	Information on display
Result with decimal part	
Result without decimal part	

After pressing the [OK] button, use the [UP/DOWN] buttons to set the expected value and then confirm the set value with the [OK] button.

Position No. 3 of the display settings configuration menu is "LED":



The "LED" position is used to enable or disable Modbus communication signaling with the Tx diode on the front panel of the device. After pressing the [OK] button, set the expected value using the [UP/DOWN] buttons and then confirm the set value with the [OK] button.

Position No. 4 of the display settings configuration menu is "BACK":



The "BACK" position is used to exit the display settings configuration menu.

Configuration menu for general settings

The menu for configuring general settings can be found in position No. 4 in the main configuration menu "OTHR":



After confirming the selection with the [OK] key, the general configuration settings menu will be displayed.

Position No. 1 of the general settings configuration menu - "VERS":



The "VERS" position is used to check the software version of the device. After pressing the [OK] button, the device software version will be displayed. Pressing the [OK] button again will return to the general settings configuration menu.

Position No. 2 of the general settings configuration menu - "FACT":



The "FACT" position is used to restore the factory settings of the device. After pressing the [OK] button, the device will enter the service password entry mode.

After entering the correct password, use the [UP/DOWN] buttons to select the desired action according to the following values:

Parameter	Information on display
YES – reset the device to factory settings	
NO – no action	

Then confirm the set value by pressing [OK].

Position No. 2 of the general settings configuration menu - "PASS":



The "PASS" position is used to change the service password. After pressing the [OK] button, the device will enter the mode of entering the current service code.

After entering the correct password, 4 zeros will be displayed - use the [UP/DOWN] and [OK] buttons to enter the new password.

If the operation is carried out correctly, the message "SAVE" will be displayed confirming the change of the password:



After changing the service code, the main configuration menu will exit. You will be able to enter the menu again after entering a new password.

Position No. 3 of the general settings configuration menu - "BACK":



The "BACK" position is used to exit the general settings configuration menu.

Restoring factory settings

It is possible to restore the device to its factory settings, for example in case of loss of the service password. To do this, turn on the power of the device while holding down the [UP] and [DOWN] buttons and keep them pressed for 30 seconds from the moment the power is turned on.

The factory settings reset will be confirmed by a test of the display.

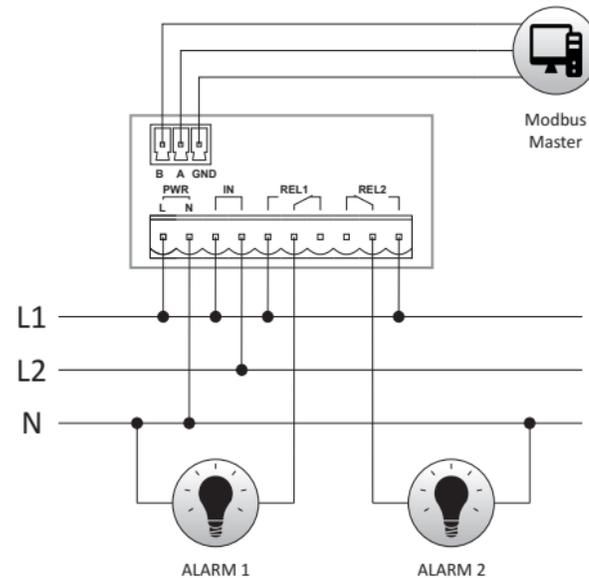
Default display settings

Parameter	Value
alarm 1 ON	no
alarm 1 minimum	10 V
alarm 1 maximum	180 V
alarm 1 hysteresis	30 V
alarm 1 T _{ON}	1 sec
alarm 1 T _{OFF}	1 sec
alarm 2 ON	no
alarm 2 minimum	10 V
alarm 2 maksimum	180 V
alarm 2 hysteresis	30 V
alarm 2 T _{ON}	1 sec
alarm 2 T _{OFF}	1 sec
Modbus address	1
communication speed	9600 bpsec
parity	off
display refresh time	1x/sec
display accuracy	with decimal point
communication diode	ON
service password	0000

Description of the panel

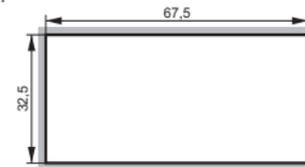


Connection scheme



Mounting

1. The device should be mounted in a cut-out prepared according to the following figure:



2. The device should be inserted from the front into the hole.
3. Then attach the fastening elements to the sides of the device from behind and stabilize the device with them.

Technical data

power supply	85÷265 V AC
load current of the relays (AC-1)	6 A
contacts	separated 2×NO/NC
measuring input	separated 10÷480 V AC
measurement accuracy	1%
alarm hysteresis	1 V÷150 V
lower alarm threshold	10 V÷479 V
upper alarm threshold	11 V÷480 V
alarm delay	0.0÷180.0 sec
communication parameters	
speed (adjustable)	1200÷115200 bit/sec
data bits	8
stop bits	1 or 2
parity check	EVEN/ODD/NONE
address	1÷247
communication protocol	Modbus RTU
power consumption	2 W
working temperature	-10÷40°C
terminal	2.5 mm ² disconnectable terminals
tightening torque	0.4 Nm
display height	14 mm
dimensions	72×36×72 mm
mounting hole dimensions	67,5×32,5 mm
mounting	panel
protection level	IP20

CE declaration

Copy of the CE declaration can be downloaded from the website: www.fif.com.pl from the product subpage.

Communication parameters (default settings)	
Protocole	Modbus RTU
Operating mode	SLAVE
Range of network addresses	1÷247 (1)
Command codes	3: Read registers group (0x03 – Read Holding Registers) 6: Write a single register (0x06 – Write Single Register) 16: Write registers group (0x10 - Write Multiple Registers)
Port settings (default settings)	
Communication speed	1200/2400/4800/(9600)/19200/38400/57600/115200
Data bits	(8)
Parity	(NONE)/EVEN/ODD
Stop bits	1/(2)
Max. query frequency	15 Hz

Modbus registers

Measurement registers				
address	description	type	access*	
0 (0x0000)	Value of RMS voltage (Value ×10, for example 100.0 V = 1000)	int	R	
1 (0x0001)	Value of Peak to Peak voltage (Value ×10, for example 100.0 V = 1000)	int	R	
2 (0x0002)	Highest measured peak voltage value (Value ×10, for example 100.0 V = 1000)	int	R	
3 (0x0003)	Lowest measured peak voltage value (Value ×10, for example 100.0 V = 1000)	int	R	

*R – read only

Registers - alarm 1				
address	description	type	access*	
16 (0x0010)	Alarm activation (1 - alarm on, 0 - alarm off)	int	R/W	
17 (0x0011)	Lower alarm threshold (Value ×10, for example 100.0 V = 1000) (minimum 110 – 11.0 V, maximum 4790 - 479.0 V)	int	R/W	
18 (0x0012)	Upper alarm threshold (Value ×10, for example 100.0 V = 1000) (minimum 110 – 11.0 V, maximum 4800 - 480.0 V)	int	R/W	
19 (0x0013)	Alarm hysteresis (Value ×10, for example 100.0 V = 1000) (minimum 10 – 1.0 V, maximum 1500 - 150.0 V)	int	R/W	
20 (0x0014)	Alarm activation delay (Value ×10, for example 100.0 sec. = 1000) (minimum 0 - no delay, maximum 1800 - 180.0 sec.)	int	R/W	
21 (0x0015)	Alarm deactivation delay (Value ×10, for example 100.0 sec. = 1000) (minimum 0 - no delay, maximum 1800 - 180.0 sec.)	int	R/W	
22 (0x0016)	Current alarm status (1 - alarm triggered, 0 - alarm not triggered)	int	R	

*R – read only, R/W – read and write

Registers - alarm 2				
address	description	type	access*	
23 (0x0017)	Alarm activation (1 - alarm on, 0 - alarm off)	int	R/W	
24 (0x0018)	Lower alarm threshold (Value ×10, for example 100.0 V = 1000) (minimum 110 – 11.0 V, maximum 4790 - 479.0 V)	int	R/W	
25 (0x0019)	Upper alarm threshold (Value ×10, for example 100.0 V = 1000) (minimum 110 – 11.0 V, maximum 4800 - 480.0 V)	int	R/W	
26 (0x0020)	Alarm hysteresis (Value ×10, for example 100.0 V = 1000) (minimum 10 – 1.0 V, maximum 1500 - 150.0 V)	int	R/W	
27 (0x0021)	Alarm activation delay (Value ×10, for example 100.0 sec. = 1000) (minimum 0 - no delay, maximum 1800 - 180.0 sec.)	int	R/W	
28 (0x0022)	Alarm deactivation delay (Value ×10, for example 100.0 sec. = 1000) (minimum 0 - no delay, maximum 1800 - 180.0 sec.)	int	R/W	
29 (0x0023)	Current alarm status (1 - alarm triggered, 0 - alarm not triggered)	int	R	

*R – read only, R/W – read and write

Communication settings					
address	description	type	access*		
256 (0x0100)	Modbus address (minimum 1, maximum 247)	int	R/W		
257 (0x0101)	Transmission speed 0 – 1200 bps 1 – 2400 bps 2 – 4800 bps 3 – 9600 bps 4 – 19200 bps 5 – 38400 bps 6 – 57600 bps 7 – 115200 bps	int	R/W		
	Parity check 0 - None 1 - Even 2 - Odd CAUTION! Setting the parity to ODD or EVEN automatically sets the communication to work with one stop bit. If there is no parity (NONE), 2 stop bits are automatically set.	int	R/W		
	258 (0x0102)	Default configuration Entering 1 restores the default configuration	int	R/W	
	259 (0x0103)	Default configuration Entering 1 restores the default configuration	int	R/W	

*R/W - read and write

Other registers				
address	description	type	access*	
32 (0x0020)	Display refresh interval (minimum 1 - every 100 msec., maximum 100 - every 10 sec.)	int	R/W	
33 (0x0021)	Display accuracy (0 - integer value (0), 1 - value with one decimal place [0.0])	int	R/W	
34 (0x0022)	Control of the communication diode (0 - LED does not flash during Modbus communication, 1 - LED flashes during Modbus communication)	int	R/W	
64 (0x0040)	Password to access the menu from the keyboard (minimum 0, maximum 9999)	int	R/W	
1024 (0x0400)	Operating time from power on [LSW] Value is calculated as MSW * 65536 + LSW	int	R	
1025 (0x0401)	Operating time from power on [MSW] Value is calculated as MSW * 65536 + LSW	int	R	
1026 (0x0402)	Serial number [MSW] Value is calculated as MSW * 65536 + LSW	int	R	
1027 (0x0403)	Serial number [LSW] Value is calculated as MSW * 65536 + LSW	int	R	
1028 (0x0404)	Manufacturing date 5 bits - day, 4 bits - month, 7 bits - year [without2000]	int	R	
1029 (0x0405)	Software version (10 - 1.0 etc.)	int	R	
1030-1037 (0x0406– 0x040D)	The device identifier " F&F_DMV-1AC-MBT " 2 characters in each register	char	R	

*R - read only, R/W - read and write