



F&F Filipowski L.P.
Konstantynowska 79/81, 95-200 Pabianice, POLAND
phone/fax (+48 42) 215 23 83 / (+48 42) 227 09 71
www.fif.com.pl; e-mail: biuro@fif.com.pl

CRT-15T

Temperature controller
programmable



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 CRT-15T is a digital temperature controller adapted to regulate temperature by switching on and off the receiver connected to the relay output of the controller.

The regulator is equipped with:

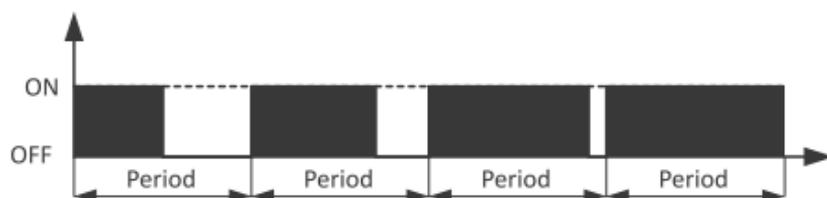
- » Control panel, enabling monitoring of the measured temperature, and setting of the regulator parameters;
- » Built-in PID controller, with an option of automatic parameter tuning;
- » Relay output switching on/off the heating element;
- » Independent alarm output signalling exceeding of the set temperature.



The CRT-15T controller cooperates with a K400 type temperature sensor.

Functioning

The CRT-15T controller is an electronic temperature controller with a two-state output, cooperating with temperature sensors of the K400 type. The system is equipped with a PID controller allowing the regulator characteristics to be adjusted to the characteristics of the controlled object, and the selection of the regulator parameters itself is greatly facilitated by a built-in automatic tuning mechanism. Depending on the difference between the current temperature and the set temperature, and depending on the regulator setting, the switching coefficient of the relay output changes.

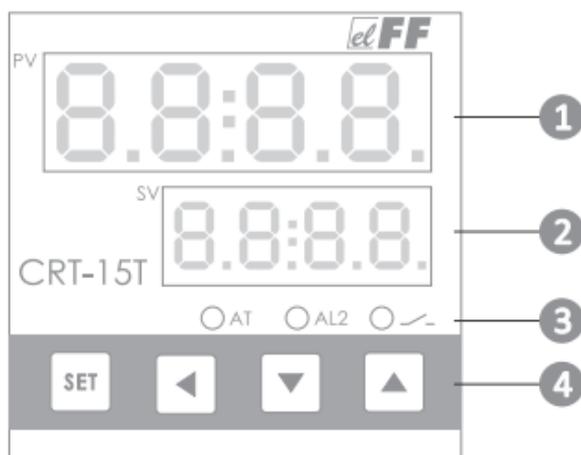


The duration of one cycle can be set between 1 and 100 s. However, it should be borne in mind here that a short period will result in frequent switching of the relay output, while a long sampling period will result in large fluctuations of the regulated value.



Exceeding the set temperature threshold (independent of the temperature) will additionally trigger the alarm output.

Control panel description



- 1 Four-digit display (red) indicating the current temperature value. In the parameter setting mode of the controller, this display shows the symbol of the parameter being edited.
- 2 Four-digit display (yellow) indicating the set temperature value. In the parameter setting mode of the controller, this display indicates the current value of the parameter being edited.
- 3 Signalling LEDs:
 - AT (LED green) indicates that the controller operates in the automatic PID controller parameter tuning mode
 - AL2 (LED red) signalling exceeding of the alarm temperature value
 - (LED green) indication of output relay status

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Control buttons:

 SET

Briefly pressing the SET button enters the mode of editing the set temperature value. A long press (min. 5 s) enters the editing mode of the remaining controller parameters. If the system is in the edit mode, pressing the SET button causes the approval of the changes made.



Shift button.

In the parameter value edit mode, pressing it moves to edit the next digit of the number being edited.



The DOWN button causes the edited digit to decrease by 1.



The UP button causes the edited digit to increase by 1.

Regulator settings

Temperature setpoint (SU)

To change the temperature setpoint, briefly press the SET button. This will enter the parameter edit mode, signalled by the SU symbol in the top line of the display and the current temperature setpoint in the bottom line. The parameter digit available for editing is signalled by its rapid flashing. Use the UP or DOWN buttons to set the appropriate value for this digit and then press the shift button, which will move the cursor to the next position and allow the next digit to be edited. In this way, all the digits of the parameter should be set and the changes made should be confirmed by pressing the SET button. Once the changes have been saved, the programme will return to the display of the current temperature..



Exiting the setpoint setting mode is only possible by pressing the SET button. The only way to exit the setting mode without saving the changes is to switch off the power supply of the controller.

Configuration parameters

To enter the controller's configuration parameters, press and hold down the SET key for 5 seconds. After this time, the symbol of the first parameter to be configured will appear in the upper display of the controller. To move to the next parameter, briefly press the SET button. Once you have gone through all the configuration parameters in this way, the programme returns to the display of the current temperature value.

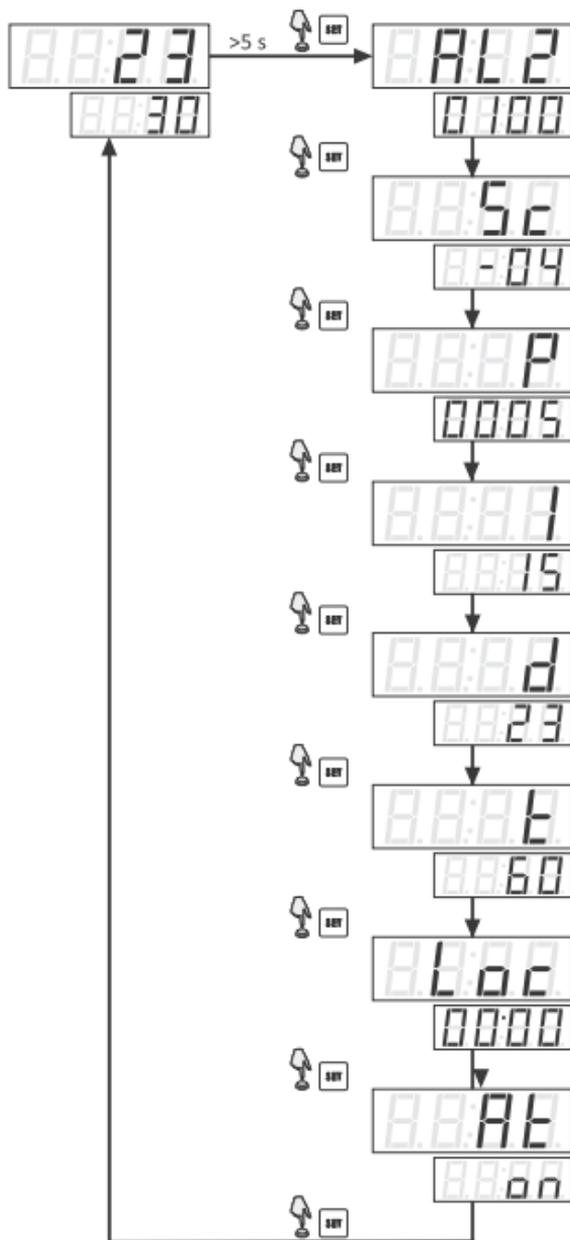


Diagram available on the next page of the manual.

(AL2) alarm



The AL2 parameter allows to set the temperature, exceeding of which will be signalled by closing the contact between pin 4 and pin 5, and lighting up the AL2 diode on the control panel. The alarm signalling operates independently of the main regulation process. The alarm temperature can be set in the range from 0 to 600°.



Temperature moving (Sc)



This parameter moves the temperature indication read by the sensor by a set value. The sensor indication can be shifted by a maximum of $\pm 15^\circ$. To change the [Sc] parameter, after entering the configuration parameters and selecting [Sc], press the UP or DOWN button. This will cause the program to enter the parameter editing mode, which is signalled by the blinking of the digit currently available for editing. Using the UP or DOWN buttons, set the desired shift value and confirm the change by pressing the SET button.

(PID) regulator parameters



Parameters P, I, D are used to set the parameters of the proportional, integral and differential parts of the PID controller respectively. Setting the parameter value to "zero" disables the respective regulator block. The value of the gain coefficient can be changed in the range from 0 to 100, and the coefficients for the integrating and differentiating part can be changed in the range from 0 to 255. The higher the set value, the stronger the effect of a given part of the regulator.

To change the PID controller settings, enter the configuration parameters and select the P, I, or D parameter respectively. Then press the UP or DOWN button and enter the edit mode, which is signalled by the flashing of the digit currently available for editing. Use the UP or DOWN buttons to set the preset value of this digit and then use the shift button to move on to edit the next digit. In this way, set all the digits of the parameter and confirm the change using the SET button. Performing an automatic tuning of the controller parameters deletes the previously entered PID controller settings.

Sample period (t)



The controller controls the output relay by means of a signal with a set period and a variable fill factor. The fill factor will vary depending on the difference between the current value and the setpoint, and on the settings of the PID controller. The sampling period, on the other hand, is set via the [t] parameter. This time can take values from 1÷100 s and should be adjusted to the speed of the regulated processes. Too short a sampling period leads to frequent switching of the receiver, while a long time may cause large fluctuations of the regulated temperature. To change the [t] parameter, after entering the configuration parameters and selecting the [t] item, press the UP or DOWN button. This will cause the programme to enter the parameter editing mode, which is signalled by the blinking of the digit currently available for editing. Use the UP or DOWN buttons to set the preset value of this digit and then use the shift button to

move on to edit the next digit. In this way, all the digits of the parameter should be set and the change should be confirmed using the SET button.

Setting lock (Loc)



The [Loc] parameter is designed to block access to most of the controller settings. It can take 2 values:

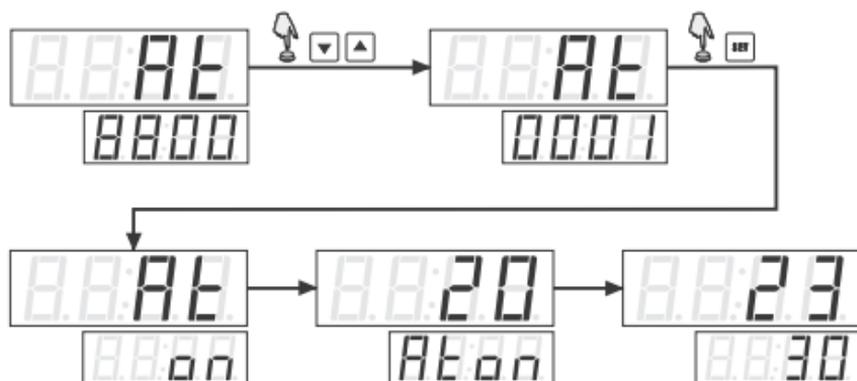
- » 0 – no protection (full access to regulator parameters);
- » 1 – secured regulator (only modification of the set temperature is possible).

In secured mode, [Loc] is the only item available from the configuration parameters. To change the security setting, enter the configuration parameters and select [Loc]. Then use the UP or DOWN buttons to select the value corresponding to the desired level of protection and confirm the changes using the SET button.

Automatic PID controller setting (At)



This parameter allows automatic selection of the controller parameters appropriate to the set process. For the setting to be successful, the controller together with the controlled device must constitute a valid automatic control system. This means that the controller must be able to actually influence the process temperature. To start the process of automatic setting of the PID controller parameters, enter the configuration parameters and select [At]. Then, by pressing the UP or DOWN button, set the parameter value to 1. At this point, the system will enter the controller setting mode. This is symbolised by the alternating display of [Aton] and the set temperature value on the lower display. The [At] LED on the control panel also flashes. Once the setting is complete, the controller will return to the normal temperature display mode.



The controller parameters selected as a result of the setting can be read in the configuration parameters. If the controller is not able to obtain the optimum regulator parameters and complete the auto-adjustment process, the process can be interrupted by entering the parameter [At] and setting it back to 1. This will cause the message [Of] to be displayed and the setting will be completed.



Exiting the parameter editing mode is only possible by pressing the SET button. The only way to exit the settings without saving the changes is to switch off the power supply of the controller.

Regulator setting table

Symbol	Function	Setting range	Factory setting
SU	Setpoint temperature	0÷400°C	150°C
AL2	Alarm	0÷400°C	10°C
Sc	Temperature moving	-15÷15°C	0
P	PID controller – proportional part	0÷100	20
I	PID controller – integrating part	0÷255	130

Symbol	Function	Setting range	Factory setting
d	PID controller - differentiating part	0÷255	30
t	Sample period	0÷100	20
At	Regulator setting	0/1	0
Loc	Settings protection	0/1	0

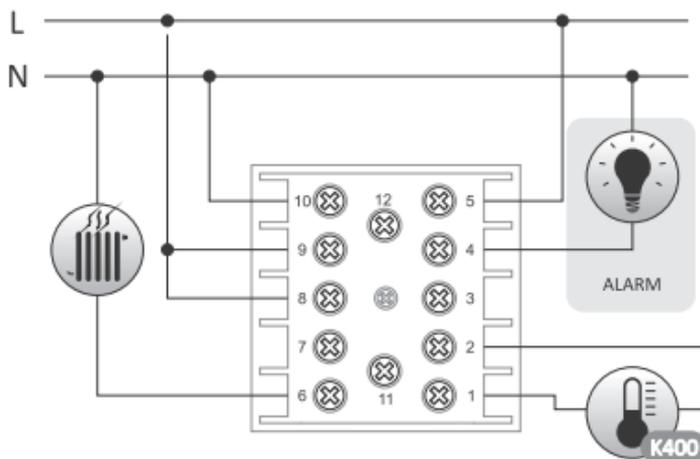
Mounting

1. Disconnect the power supply.
2. Prepare a 45×45mm mounting hole in the mounting board.
NOTE: Thickness of the board up to 10 mm.
3. Remove the clamping handle from the regulator.
4. Insert the regulator into the hole made. Place the clamping handle from the back and push it against the board. Tighten the screws.
5. Connect the power cables to terminals 9-10.
6. Connect the temperature sensor to terminals 1-2 according to the colour coding (B – black, R – red).
7. Connect the power supply circuit of the contactor coil switching the heating device in series to terminals 8-6.
8. Connect the ALARM signalling power supply circuit in series to terminals 4-5.



Do not install a device that is damaged or incomplete.

Wiring diagram



Technical data

power supply	100÷240 V AC
regulator output	
contact	separated 1×NO/NC
maximum load current (AC-1)	3 A
control	PWM
alarm output	
contact	separated 1×NO
maximum load current (AC-1)	1 A
temperature adjustment range	0÷400°C
PID settings	
proportional part [P]	0÷100
integrating part [I]	0÷255
differentiating part [d]	0÷255
setting accuracy	1°C
measurement accuracy	0,5°C (±1 digit)
calibration correction	±15°C

Technical data cont.

power consumption	1 W
working temperature	10÷40°C
terminal	2.5 mm ² screw terminals
tightening torque	0.4 Nm
dimensions	48×48×86 mm
mounting hole	45×45 mm
ingress protection	IP20

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.

CE declaration

F&F Filipowski L.P. declares that the device is in conformity with the essential requirements of The Low Voltage Directive (LVD) 2014/35/EU and the Electromagnetic Compatibility (EMC) Directive 2014/30/UE.

The CE Declaration of Conformity, along with the references to the standards in relation to which conformity is declared, can be found at www.fif.com.pl on the product page.

