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## CRT-15T

### TEMPERATURE REGULATOR programmable



5 19 0 8 3 1 2 1 5 9 2 6 4 8

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#### PURPOSE

CRT-15T is digital regulator use to regulation of temperature by switching ON and switching OFF a receiver which is connect to relay output.

Controller is equipped with:

- Control panel, which is use for control measurement temperature and set to controller parameters.
- Build controller PID with automatic function of configuration
- Relay output which enclose/exclude heating element
- Alarm output which signalize cross ordered value.

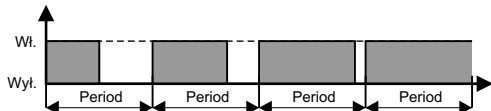
▼ - Button "DOWN" cause low edited digit by one.

▲ - Button "UP" cause increase edited digit by one.

#### FUNCTIONING

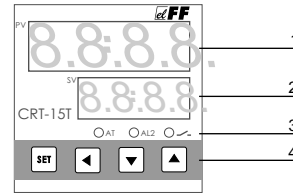
CRT-15 is electronic controller with two position output, which co-operate with temperature sensor K400. System equipped controller PID, which make possibility to adopt controller characteristic to controlled receiver features. Selection of parameter is very easy by build automatic configuration system.

Change modulus value of enclosing relays output is dependent of distinction between than actual and ordered temperature and controller settings.



Time of one cycle period could be set from range 1 to 100sec. Must remember that to short period will cause often reconnection relays output, but to long sample period cause long fluctuation of controlling value. Crossed ordered temperature threshold (independent of temperature) will cause additional enclose alarms output.

#### DESCRIPTION OF DISPLAY AND CONTROL PANEL



1 - Display with four digit (red) which displayed actual temperature value. In parameter settings mode display present sign of edited parameter.

2 - Display with four digit (yellow) which displayed actual ordered temperature value. In parameter settings mode display present actual value of edited parameter.

3 - Signalization diodes LED:

AT- (green) - controller work in automatic configuration mode of controller PID parameters

AL2- (red) signalize cross alarm temperature value

OUT (green) signalize position of relay output

4 - Control buttons

SET - Short press button SET cause pass to edition mode of ordered value. Long press this button (min 5sec.) cause pass to edition mode of leave parameter. If system work in edition mode, pressing button SET cause enter all changes.

◀ - "Move" button. In edition mode pressing this button cause to edit next digit from edited number.

#### CONTROLLER SETTINGS

##### Ordered temperature value (SU)

To change ordered value need to short press button SET. It caused pass to parameter edition mode, it is signalize by sign SU in high line on display and actual temperature value in down line. Available number which will be edit is signalize by quick blinking its. By buttons "UP" or "DOWN" set value of this number, next press "move" button, which move to next position to edition. Similarly need set to all parameter digits and enter by button SET. After entered all changes program return to present actual temperature value.



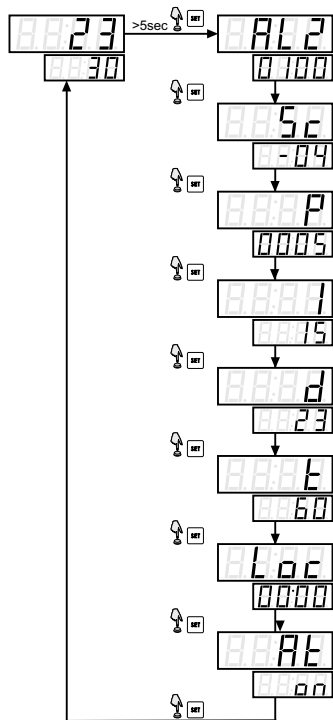
#### ATTENTION!

Out from settings mode of ordered value is possible only by button SET. One way to out from settings mode without save changes is turn OFF the power of controller.

#### Configuration parameter.

Pass to configuration parameter need to press and hold by 5 sec button SET.

After this time on high display will arrive sign of first parameter to configuration. Pass to next parameter need short press button SET. After configuration all parameter by this way, program return to display actual temperature value.



### Alarm (AL2)



This parameter is use for set temperature, which crossing will signalize by close joint between outputs 4 and 5, and turn ON the diode AL2 on control panel. Alarm signalization work independent of main controlling process. Alarm temperature could be set in range from 0 to 600°C.

To change AL2 parameter after pass to parameter configuration mode and select AL2. Then press button "UP" or "DOWN". It cause pass program to edition parameter mode, it is signalize by blinking value which is actual editing. By buttons "UP" or "DOWN" set value for this digit. Next by button "move" pass to edit next digit. In similarly process could be set all parameter digits and enter by button SET.

### Moving temperature (Sc)



This parameter move temperature which is report from sensor by ordered value. Reports from sensor could be move maximal by ±15°.

To change parameter Sc need pass to parameter configuration mode and select Sc and push a button "UP" or "DOWN". It cause pass program to parameter edition mode. It is signalize by blinking digit which is actual edit. By buttons "UP" or "DOWN" set move value and enter by button SET.

### Parameters of controller PID (PID)



Parameters P, I, D are use for set parameters of parts: proportional, integral, derivative of controller PID.

be change in range 0-100, but modulus for integral and derivative part could be change in range 0-255. If setting value is higher then is stronger affect this part of controller. To change settings of controller PID need pass to parameter configuration mode and select parameter P, I or D. Next press a button "UP" or "DOWN" and pass to edition mode. It is signalize by blinking number which is actual editing. By buttons "UP" or "DOWN" set value for this number, next by "move" button pass too edit next number. In similarly way set all parameter numbers and enter by button SET. Realize automatic tuning of controller parameter cause delete earlier settings for controller PID.

### Sample period (t)



Controller control outputs relay by signal with ordered period and rate fill (which could be change). Fill rate will be change with value which is distinction between actual and ordered value of controller PID. But sample period is set by parameter t. This time could be set in range 1-100sec., and should be adopt to speed of controlled processes. To short sample time cause often reconnection of receiver, but to long time cause fluctuation of controlled temperature.

To change parameter t need pass to parameter configuration mode, select value t by button "UP" or "DOWN". It cause pass program to parameter edition mode, it will signalize by blink a digit which is actual editing. By buttons "UP" or "DOWN" set value for this digit, next by button "move" pass to edit next digit. In this way need set all parameter digits and enter by button SET.

### Tuning block (Loc)



Parameter Loc is use to block access to more settings of controller. It will set two values:

0-lack of protection, full access to controller setting  
1-controller protected, possible is only change value of ordered temperature

In protected mode -Loc is only one available position from configuration parameters.

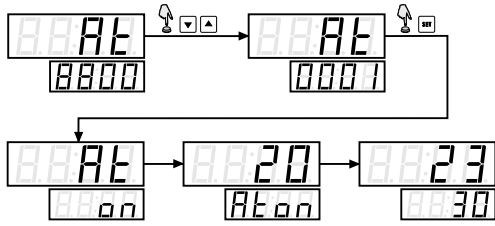
To change protection way of tunings need pass to parameter configuration mode and select Loc. Next by buttons "UP" or "DOWN" select value for protection level and enter by button SET.

### Automatic tuning of controller PID (At)



This parameter make possibility to select condoler parameter for ordered process. If tuning have to be end successful then controller with controlling receiver must be correct as automatic controlling system. It mean that controller have to possibility to control temperature of process.

To activate automatic tuning parameter process of controller PID need pass to parameter configuration mode and select At. Next by button "UP" or "DOWN" set value to 1. At this moment system pass to tuning mode of controller. It is signalize by displayed on down display sign At or value of ordered temperature (variably). At the same time diode Aton is blinking on control panel. When tuning will be ended then controller return to normal mode display temperature.



Selected in tuning mode parameters could be reading in parameter configuration mode. If controller couldn't get optimal parameters and end automatic tuning function, then this process could be break. It is possible by pass to parameter At and set it to 1. It cause displayed information "Of" and stop tuning.

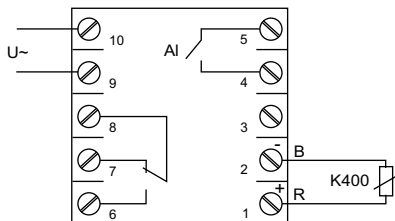


**ATTENTION!**  
Out from parameter edition mode is possible by only button SET. One way to out from settings mode without save changes is turn OFF the power of controller.

#### TECHNICAL DATA

supply	100÷240V AC
current load	<3A
joint	separated 1P
current load of ALARM output	<1A
joint of relay output	separated 1Z
range of temperature	0÷400°C
settings precision	0,5°C±1cyfra
model correction	±15°C
working temperature	-10÷40°C power
consumption	<6VA
terminal	screw terminals 2,5mm
dimensions	48×48×86

#### DIAGRAM



#### TABLE WITH CONTROLLER SETTINGS

SIGN	NAME	RANGE OF SETTINGS	DEFAULT SETTINGS
SU	Ordered temperature	0÷400°C	150°C
AL2	Alarm	0÷400°C	10°C
Sc	Moving temperature	-15÷15°C	0
P	Controller PID - proportional part	0÷100	20
I	Controller PID - integral part	0÷255	130
d	Controller PID - derivative part	0÷255	30
t	Sample period	0÷100	20
At	Tuning controller	0 / 1	0
Loc	Settings protection	0 / 1	0

#### ASSEMBLY

1. Take OFF the power
2. Make a assembly hole 45×45mm on assembling table. **ATTENTION!** Gauge of table to 10mm.
3. Take off the grip which holding a controller.
4. Put on the controller in made hole. From back take on holding grip and work to table. To screw tight.
5. To joints 9-10 connect supplies cable.
6. To joints 1-2 connect sensor with marks and colours ( B- black, R- red).
7. Supply system coil of contractor which enclose heating device connect in line to joints 8-6.
8. Signalization system ALARM connect in line to joints 4-5.