TEMPERATURE CONTROLLER/ CONTROLLER PROGRAMMER 1/16 DIN - 48 x 48 KM1/KM3 model

Quick Guide • ISTR-FKM_ENG03

Dr. Siebert und Kühn GmbH & Co. KG
Struthweg 7-9 - 34260 Kaufungen
Tel.: +49 5605 803-0, Fax: +49 5605 803-54
Internet site: www.sika.net
E-mail: info@sika.net

MANUAL RETRIEVAL

KM1/KM3 are panel mounting, Class II instruments. They have been designed with compliance to the European Directives.
All information about the controller use can be found in the Engineering Manual: **ISTR-MKM_-ENGxx** ("**x**" is the revision).
The manual of the controller can be downloaded (free of charge) from the web-site:

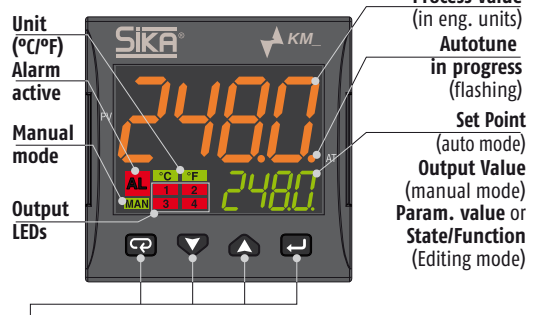
www.sika.net

To download the operating instructions, go through the main menu on Products -> Electronic Measuring and Calibration Instruments -> Electronic controllers and indicators -> Controller Series CON.
Here you can select the desired product. The tab "Documents" contains the current operating instructions in PDF format.

⚠ Warning!

- Whenever a failure or a malfunction of the device may cause dangerous situations for persons, things or animals, please remember that the plant must be equipped with additional devices which will guarantee safety.
- We warrant that the products will be free from defects in material and workmanship for 18 months from the date of delivery. Products and components that are subject to wear due to conditions of use, service life and misuse are not covered by this warranty.

DISPLAY AND KEYS

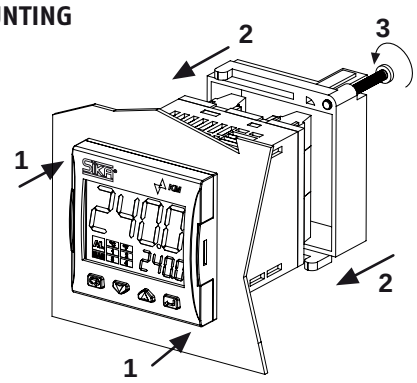


	Operator Mode	Editing Mode
↵	Access to: - Operator Commands (Timer, Setpoint selection ...) - Parameters - Configuration	Confirm and go to Next parameter
▲	Access to: - Operator additional information (Output value, running time ...)	Increase the displayed value or select the next element of the parameters list
▼	Access to: - Set Point	Decrease the displayed value or select the previous element
↵	Programmable key: Start the programmed function (Autotune, Auto/Man, Timer ...)	Exit from Operator commands/Parameter setting/Configuration

DIMENSIONS

Overall dimensions (L x H x D): 48 x 48 x 63 mm (1.89 x 1.89 x 2.48 in.)
Panel Cut-out (L x H): $45^{+0.6}$ x $45^{+0.6}$ mm ($1.78^{+0.023}$ x $1.78^{+0.023}$ in.)

MOUNTING



MODEL CODE

The Hardware resources are identified by the following Model Code.

Model: KM# ABCDEFGHI - 0000

⚠ Warning!

Some order codes present in the tables that follow (Digit **A**: Code **T** and **P**, Digits **E** and **F**: Code **M**) are fully described in the "**Engineering Manual**" that can be freely downloaded from SIKA web site.

Line	KM #
Controller (+ timer)	1
Controller (+ timer + programmer)	3

Optional functions	A
None	-
Timer	T
Programmer + Timer **KM3 only**	P

Power Supply	B
100... 240Vac (-15... +10%)	H
24Vac (-25... +12%) or 24Vdc (-15... +25%)	L

Input	C
TC, PT100, PT1000, mA, mV, V + Digital Input 1	C
TC, NTC, PTC, mA, mV, V + Digital Input 1	E

Output OP1	D
Relay (1 SPST NO, 4 A/250 Vac)	R
VDC for SSR (12 Vdc/20 mA)	O
Analogue Output (0/4... 20 mA, 0/2... 10 V) **KM3 only**	I

Output OP2	E
None	-
Relay (1 SPST NO, 2 A/250 Vac)	R
VDC for SSR VDC (12 Vdc/20 mA)	O
Relay (1 SPST NO, 2 A/250 Vac) **KM3 servomotor drive only** (note)	M

Output OP3	F
None	-
Relay (1 SPST NO, 2 A/250 Vac)	R
VDC for SSR (12 Vdc/20 mA)	O
Relay (1 SPST NO, 2 A/250 Vac) **KM3 servomotor drive only** (note)	M

Output OP4	G
Digital I/O (see the Electrical Connections paragraph for details)	D

Serial Communications	H
TTL	-
RS485 Modbus	S

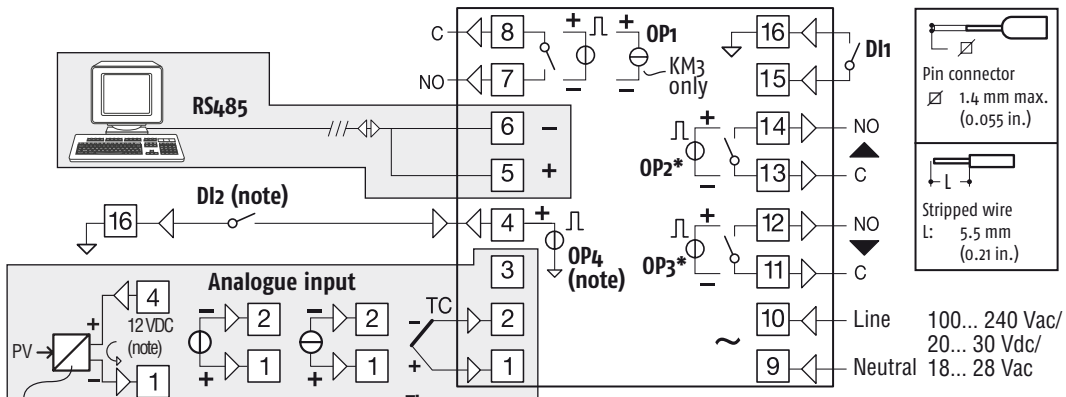
Terminal Type	I
Standard (screw type non removable terminal blocks)	-
With plug-in screw type terminal blocks	E
With plug-in clamp type terminal blocks	M
With plug-in terminal blocks (fixed part only)	N

Note: For servomotor drive, both OUT2 and OUT3 codes must be selected as "**M**".

Model Code example: **KM3-HCRRRD--**

Controller KM3, no timer, no programmer, 100... 240 Vac, TC/PT100/PT1000/mV/V + Digital Input 1, 3 Relay Outputs, Output 4, TTL, non removable screw type terminals.

ELECTRICAL CONNECTIONS

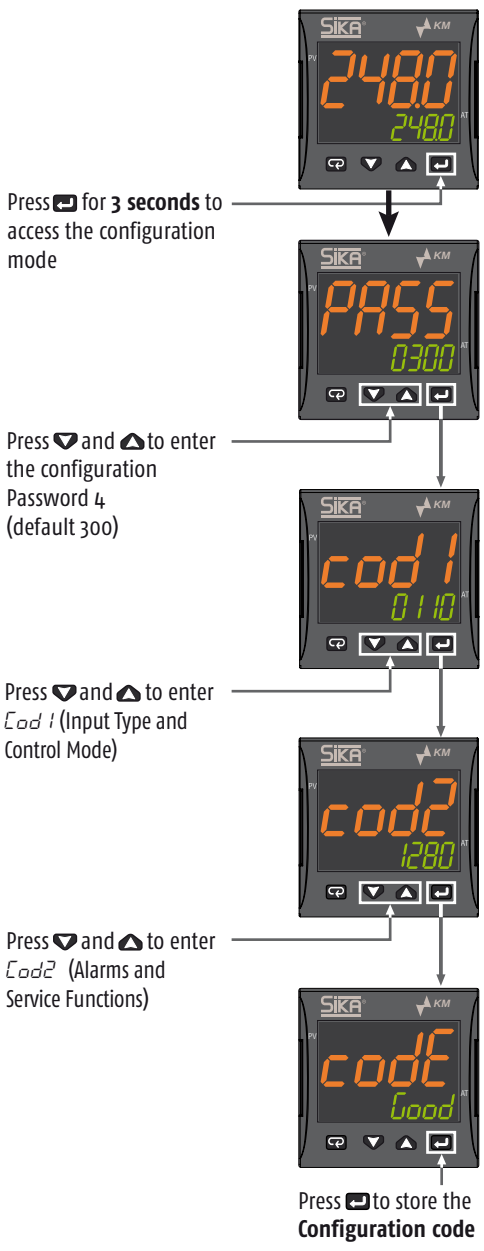


Note: Terminal 4 can be programmed as:
- **Digital Input** (DI2) connecting a free of voltage contact between terminals 4 and 16;
- **0... 12 V SSR Drive Output** (OP4) connecting the load between terminals 4 and 16;
- **12 Vdc (20 mA) transmitter power supply** connecting the 2 wire transmitter between terminals 4 and 1; for 3 wire transmitter connect terminal 4 to transmitter power supply input and terminal 1 and 2 to transmitter signal output.

* For KM3 servomotor drive: **OP2 = open, OP3 = close.**

TERMINALS

HOW TO SET THE CONFIGURATION CODE



Note: To leave the Configuration session **without saving** the settings made, press the ↩ button

CONFIGURATION CODE

The KM instruments can be easily configured by the "**Code Configuration**" method for the most common requirements, just entering two 4-digit codes: Cod 1 [**LMNO**] for the Input Type and Control Mode selection and Cod2 [**PQRS**] for the Alarms and the Service Functions.
For complete controller configuration see the Engineering Manual.

Note: Before starting the configuration code setting, please define and write down Cod 1 and Cod2 as needed:

User Cod 1 [L][M][N][O]

Input Type and Range		L	M
TC J	-50... +1000°C	0	0
TC K	-50... +1370°C	0	1
TC S	-50... 1760°C	0	2
TC R	-50... +1760°C	0	3
TC T	-70... +400°C	0	4
Infrared J	-50... +785°C	0	5
Infrared K	-50... +785°C	0	6
PT 100/PTC KTY81-121	-200... +850°C/-55... +150°C	0	7
PT 1000/NTC 103-AT2	-200... +850°C/-50... +110°C	0	8
Linear 0... 60 mV		0	9
Linear 12... 60 mV		1	0
Linear 0... 20 mA (this selection forces Out 4 = TX)		1	1
Linear 4... 20 mA (this selection forces Out 4 = TX)		1	2
Linear 0... 5 V		1	3
Linear 1... 5 V		1	4
Linear 0... 10 V		1	5
Linear 2... 10 V		1	6
TC J	-58... +1832°F	1	7
TC K	-58... +2498°F	1	8
TC S	-58... 3200°F	1	9
TC R	-58... +3200°F	2	0
TC T	-94... +752°F	2	1
Infrared J	-58... +1445°F	2	2
Infrared K	-58... +1445°F	2	3
PT 100/PTC KTY81-121	-328... +1562°F/-67... +302°F	2	4
PT 1000/NTC 103-AT2	-328... +1562°F/-58... +230°F	2	5

Control mode	OP1	OP2	OP3	OP4	N	O
ON/OFF heating = H	H	AL1	AL2	AL3	0	0
	NU	AL1	AL2	H	0	1
ON/OFF cooling = C	C	AL1	AL2	AL3	0	2
	NU	AL1	AL2	C	0	3
ON/OFF with neutral zone (H/C)	H	C	AL2	AL3	0	4
	H	AL1	AL2	C	0	5
	C	H	AL2	AL3	0	6
	NU	H	AL2	C	0	7
	C	AL1	AL2	H	0	8
	NU	C	AL2	H	0	9
PID heating = H	H	AL1	AL2	AL3	1	0
	NU	AL1	AL2	H	1	1
PID cooling = C	C	AL1	AL2	AL3	1	2
	NU	AL1	AL2	C	1	3
PID double action (H/C)	H	C	AL2	AL3	1	4
	H	AL1	AL2	C	1	5
	C	H	AL2	AL3	1	6
	NU	H	AL2	C	1	7
	C	AL1	AL2	H	1	8
	NU	C	AL2	H	1	9

Note: As default, when the alarms are active, only AL1 threshold is available at "**Operator Command**" level to perform non critical tasks. To protect the AL2 and AL3 thresholds against undesired changes, they are available only at "**Parameters list**" level (password: 20). For different configurations, see the Engineering Manual.

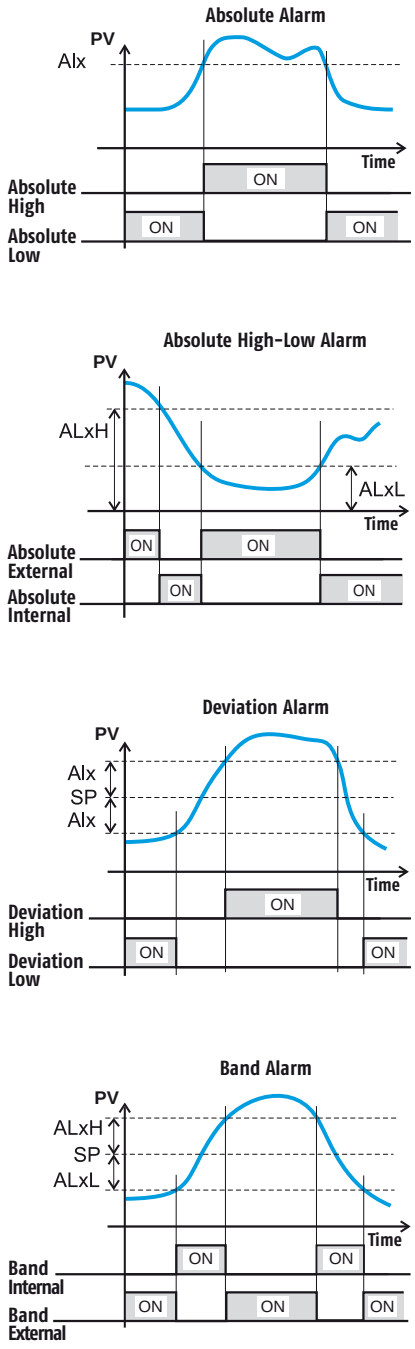
User Cod2 [P][Q][R][S]

Alarm 3 / Alarm 2 / Alarm 1		P	Q	R
Not used		0	0	0
Sensor break		1	1	1
Absolute	High	2	2	2
	Low	3	3	3
Absolute High/Low	External High/Low	4	4	4
	Internal High/Low	5	5	5
Deviation	Deviation high	6	6	6
	Deviation low	7	7	7
Band	External band	8	8	8
	Internal band	9	9	9

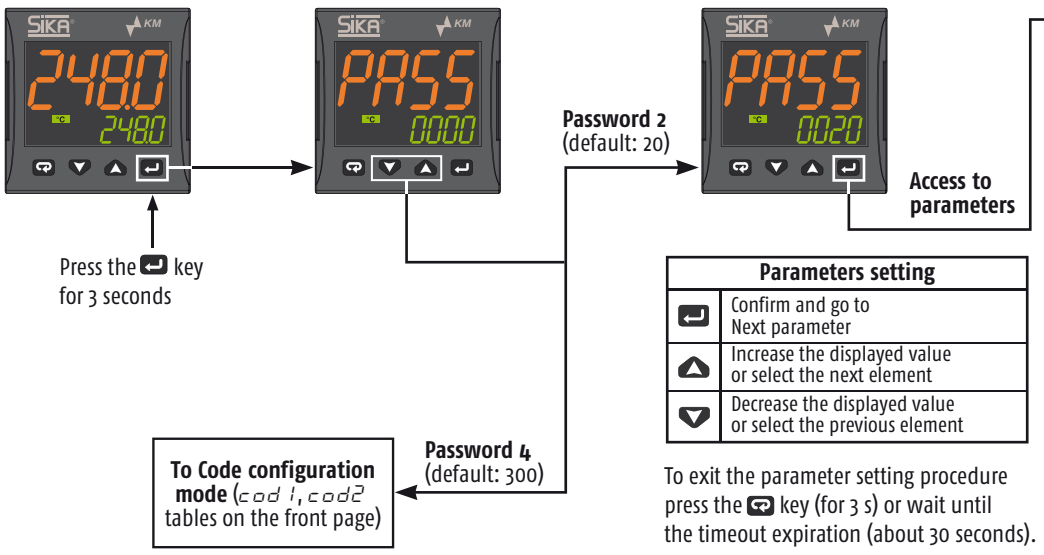
Service functions activation	S
None	0
Wattmeter (instantaneous power expressed in kW) (note 1)	1
Wattmeter (Power consuption expressed in kWh/h) (note 2)	2
Absolute worked time (expressed in days) (note 3)	3
Absolute worked time (expressed in hours) (note 3)	4

Notes: 1. Wattmeter Instantaneous power is continuously computed as multiplication of the Load Voltage, Load Current parameter values and the controller output instantaneous value.
2. Wattmeter power consumption is the estimated hourly energy consumption (using Load Voltage and Load Current parameter values), computed on the previous 15 minutes period. The readout is updated every 15 minutes.
3. Worked Time counter is continuously increased when the controller is turned ON.

ALARM TYPES (Cod2 digits: P, Q, R)



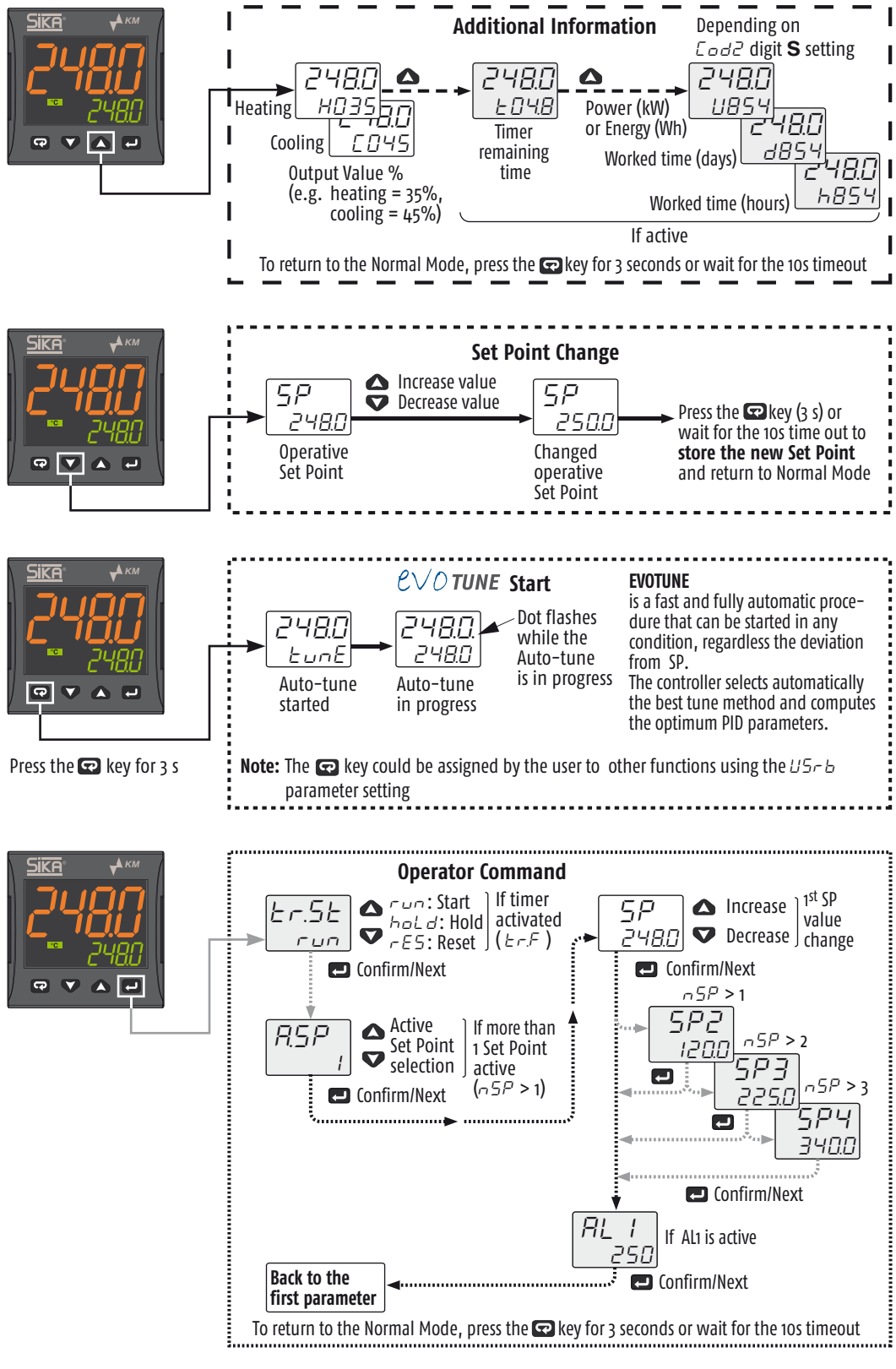
PARAMETERS SETTING



Parameters setting	
↵	Confirm and go to Next parameter
▲	Increase the displayed value or select the next element
▼	Decrease the displayed value or select the previous element

To exit the parameter setting procedure press the ↩ key (for 3 s) or wait until the timeout expiration (about 30 seconds).

CONTROLLER OPERATION



EVOTUNE
is a fast and fully automatic procedure that can be started in any condition, regardless the deviation from SP.
The controller selects automatically the best tune method and computes the optimum PID parameters.

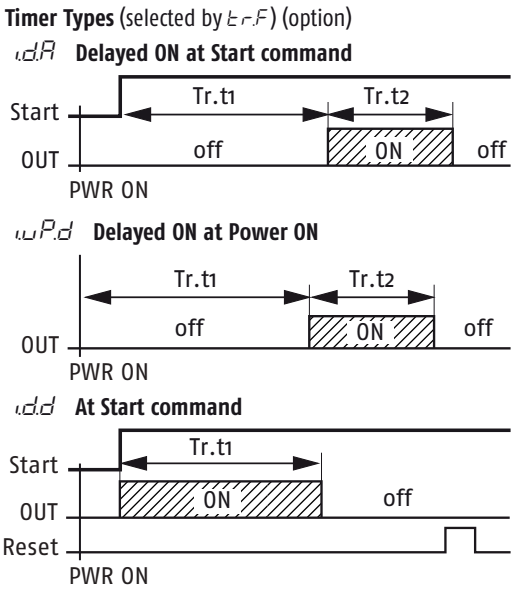
Parameters List (PASS: 20) (in gray the parameters related to optional features)

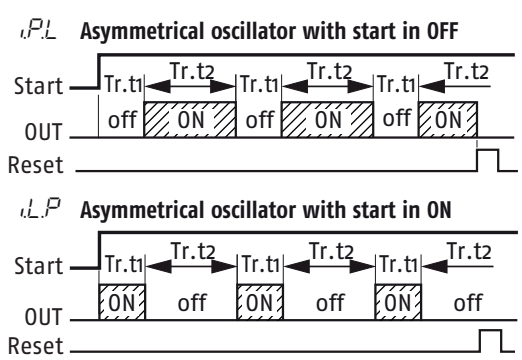
Group	Param.	Description	Range value or selection list elements	Default	User value	Note
Commands	tr.St	Timer status				Option
	oPEr	Operative Mode Selection	reg = Auto, oplo = Manual, stdy = Standby			
	rSP	Set Point Selection	0 = SP, 1 = SP2, 2 = SP3, 3 = SP4	0 = SP		
	tunE	Start Auto Tune	0 = oFF, 1 = start	0 = OFF		evoTUNE
Control	Pb	Proportional Band	1... 9999 (Engineering Units = E.U.)	20		Cod1 Digit **N** = **1**
	t i	Integral Time	0... 10000 s	200		
	td	Derivative Time	0... 1000 s	50		
	HSEt	Hysteresis ON/OFF Control	0... 9999 (E.U.)	1		Cod1 Digit **N** = **0**
	tcH	Heating output cycle time	0.1... 130 s	20.0		Cod1 Digit **N** = **1**
	rcG	Relative Cooling Gain	0.01... 99.99	1.00		Cod1 Digit **N** = **1** Cod1 Digit **O** > **4**
	tcc	Cooling output cycle time	0.1... 130 s	20.0		Cod1 Digit **N** = **1** Cod1 Digit **O** > **1**
Set Point	SP	Set Point 1	-1999... +9999 (E.U.)			
	SP2	Set Point 2				If nSP > **1**
	SP3	Set Point 3				If nSP > **2**
	SP4	Set Point 4				If nSP > **3**
	SPLL	Set Point min. Value	-1999... SPHL (E.U.)			
	SPHL	Set Point max. Value	SPLL... 9999 (E.U.)			
	nSP	No. of Set Points	1... 4	1		
Alarms	AL 1	Alarm 1 threshold	AL1L... AL1H			If digit **P** of Cod2 is > **1**
	AL 1L	Alarm 1 low threshold/Low limit	-1999... +9999 (E.U.)	-1999		
	AL 1H	Alarm 1 high threshold/High limit		9999		
	HAL 1	AL1 hysteresis	1... 9999 (E.U.)	1		
	AL2	Alarm 2 threshold	AL2L... AL2H			If digit **Q** of Cod2 is > **1**
	AL2L	Alarm 2 low threshold/Low limit	-1999... +9999 (E.U.)	-1999		
	AL2H	Alarm 2 high threshold/High limit		9999		
	HAL2	AL2 hysteresis	1... 9999 (E.U.)	1		
	AL3	Alarm 3 threshold	AL3L... AL3H			If digit **R** of Cod2 is > **1**
	AL3L	Alarm 3 low threshold/Low limit	-1999... +9999 (E.U.)	-1999		
	AL3H	Alarm 3 high threshold/High limit		9999		
	HAL3	AL3 hysteresis	1... 9999 (E.U.)	1		
Soft Start	StP	Soft Start Output value	-100... 100%	0		
	SSt	Soft Start Time	0.00... 8.00 (hh.mm)	0		
Input	SSc	Low Scale readout	-1999... 9999	-1999		For linear Input types only
	FSc	High Scale readout	-1999... 9999	9999		
	dP	Number of decimals	0... 3 (linear inputs); 0... 1 (other inputs)	0		
	F iL	Measured value Digital filter	OFF; 0.1... 20.0 s	0 = OFF		
Timer	tr.F	Timer Type	nonE = Timer not used i.d.A = Delayed ON at start command i.uP.d = Activation ON at Power ON i.d.d = At start command i.P.L = Asymmetrical oscillator, start in OFF i.L.P = Asymmetrical oscillator, start in ON	none		Timer management (Start, Stop, Reset) can be done using the tr.St command or the ↩ key (if programmed) or by the DI1/DI2 digital inputs (if programmed).
	tr.u	Timer Units	0 = hh.mm 1 = mm.ss 2 = sss.d	1 = mm.ss		
	tr.t1	Time 1	00.01... 995.9	1.00		
	tr.t2	Time 2	00.00... 995.9	1.00		
If the ordered controller is equipped with the Programmer option, see the "ISTR-FKM3P" Addendum						
I/O	io4F	I/O 4 Function	ON = Transmitter Power Supply OUT4 = SSR out Di2C = Dig. In. from contact Di2U = 24 VDC Digital Input	ON		
Digital Inputs	di F.1	Digital Input 1 Function	0... 21	0		See the DI1, DI2 functions table
	di F.2	Digital Input 2 Function	0... 21	0		
	di A	Digital Inputs Action	0 = DI1 direct action, DI2 direct action 1 = DI1 reverse action, DI2 direct action 2 = DI1 direct action, DI2 reverse action 3 = DI1 reverse action, DI2 reverse action	0		DI2 only if configured
	USrb	Key ↩ Function	nonE, tunE, oplo, aac, asi, chsp, st.by, str.t	tunE		See the ↩ Key function table
Display	di cL	Colour of the Process Value display	0 = Change 1 = Red 2 = Green 3 = Orange	2		If Change, the colour is **green** if PV differs from SP less than AdE, **red** if higher than AdE and **orange** if is lower than AdE
	AdE	Display change color threshold (when di CL = 0)	0 (OFF)... 9999 (e.u.)			
	di St	Display Power OFF time (mm.ss)	oFF (display ON) 0.1... 99.59	oFF		
Serial communications	Add	Instrument Address	1... 254	1		Modbus RTU slave protocol
	bAud	Baud rate	1200, 2400, 9600 baud, 19.2, 38.4 kbaud	9600		
Wattmeter	VoLt	Load Voltage	1... 999 (V)	230		If digit **S** of Cod2 is > **1**
	cur	Load Current	1... 9999 (A)			
Password	PAS4	Configuration access Password	0... 999	300		
	PAS2	Parameters access Password	0... 999	20		

Note: To access all the instrument features, please see the **"Complete configuration procedure"** in the **"Engineering Manual"**.
Complete Configuration and Parameter setting can be easily uploaded from the controller and downloaded to other controllers using the: **Configuration Key and Communication Adapter model: A-01.**

FUNCTION SELECTION

Timer Types (selected by tr.F) (option)





di F_ Digital Inputs DI1 and DI2 Functions

Code displayed	Description	
0	Disabled (OFF) (default)	
1	Alarm Reset	
2	Alarm Acknowledge (ACK)	
3	Hold of the measured value	
4	Stand by mode	
5	Manual Mode	
6	Heat with "SP" and CooL with "SP2"	
7	Timer Run/Hold/Reset [on transition]	Available only if timer option and tr.F is NOT set to nonE
8	Timer Run [on transition]	
9	Timer Reset [on transition]	
10	Timer Run/Hold	
11	Timer Run/Reset	
12	Timer Run/Reset with lock at the end of the time count	
18	Sequential Set Point selection [on transition]	
19	SP/SP2 selection	
20	Binary coding for Set Point selection on DI1 and DI2 (00 = SP, 01 = SP2, 10 = SP3, 11 = SP4)	
21	Digital inputs in parallel to the ▲ and ▼ keys (DI1 = ▲, DI2 = ▼)	

USrb Key ↩ Function

Code displayed	Description
nonE	Not used
tunE	Starts auto tuning functions (default)
oPLo	Manual mode
AAc	Alarm Reset
AS i	Alarm Acknowledge
chSP	Circular Set Point Selection (shows SP, SP2, SP3)
StbY	Stand-by mode
Strt	Starts/Stop/Reset timer