

CONTROLLER, PROGRAMMER AND SET POINT TRANSMITTER



1/16 DIN - 48 x 48

KM5 model

Quick Guide • ISTR-FKM5ENG00



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PREFACE

This manual contains the information necessary for the product to be installed correctly and also instructions for its maintenance and use; we therefore recommend that the utmost attention is paid to the following instructions and to save it.

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Whenever a failure or a malfunction of the control device may cause dangerous situations for persons, things or animals, please remember that the plant has to be equipped with additional safety devices.

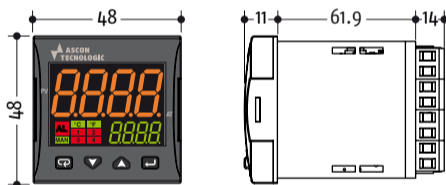
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Disposal

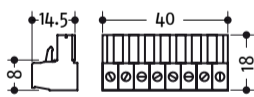
The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

1. DIMENSIONS AND CUT-OUT (mm)

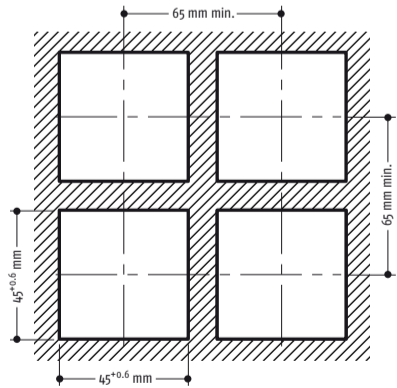
Controller with non removable terminals



Removable terminals



Panel cut-out



Mounting requirements

This instrument is intended for permanent installation, for indoor use only, in an electrical panel which encloses the rear housing, exposed terminals and wiring on the back.

Select a mounting location having the following characteristics:

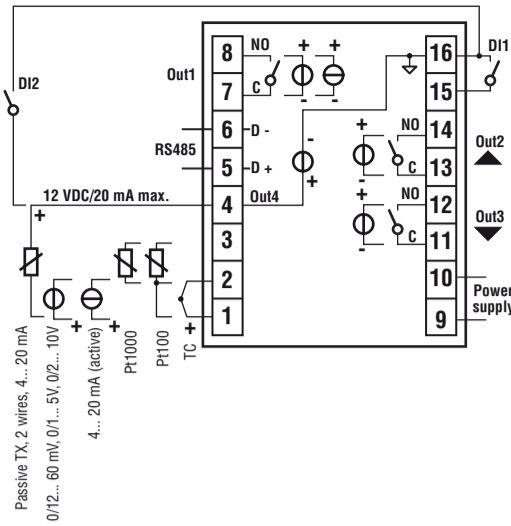
- It should be easily accessible;
- There is minimum vibrations and no impact;
- There are no corrosive gases;
- There are no water or other fluids (i.e. condensation);
- The ambient temperature is in accordance with the operative temperature (0... 50°C);
- The relative humidity is in accordance with the instrument specifications (20... 85%);

The instrument can be mounted on panel with a maximum thickness of 15 mm.

When the maximum front protection (IP65) is desired, the optional gasket must be mounted.

2. ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS



Power supply voltage:

100... 240 Vac/24 Vdc/24 Vac;

Out1 relay: 4 (4) A/250 VAC, SPST;

Out2, 3 relay: 2 (1) A/250 VAC, SPST NO (*);

Out1, 2, 3 SSR: 10 VDC/15 mA;

Linear Out: 0/4... 20 mA, 0/2... 10 V;

Out4 SSR: 12 VDC/20 mA.

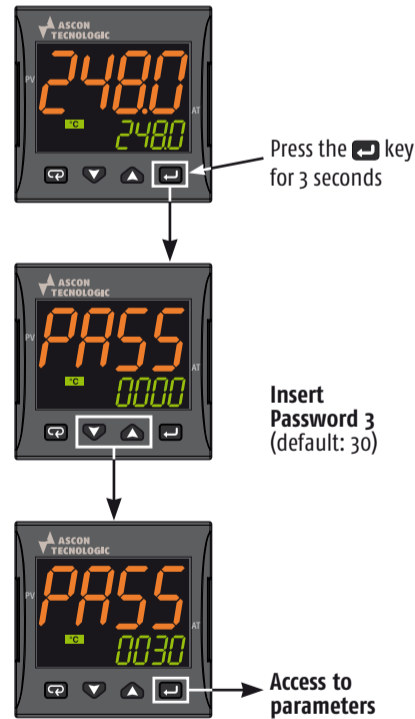
* For **servodrive** models **both Out2 and Out3** are to be selected as "M" in Configuration code; Out2: open valve, Out3: close valve.

General notes about wiring

- Safety regulations require a line switch marked as instrument disconnecting device.** This switch must be easily reachable by the operator;
- Do not run input wires together with power cables;
- External components (like zener barriers, etc.) connected between sensor and input terminals may cause errors in measurement due to excessive and/or not balanced line resistance or possible leakage currents;
- When a shielded cable is used, it should be connected at one point only;
- Pay attention to the line resistance, a high resistance of the line often causes measurement errors.
- To avoid electrical shocks, connect the power line at last;
- Before connecting the instrument to the power line, make sure that line voltage is equal to the voltage shown on the identification label;
- The power supply input is NOT fuse protected. Please, provide an external fuse T type 1A, 250 V.

3. CONFIGURATION PROCEDURES

Setting the parameters



Key	Editing Mode
	When the upper display shows a group (the lower is blank), this key allows to enter the selected group. When the upper display shows a parameter name and the lower display the value, this key allows to store value set and access the next parameter within the same group.
	Increase the displayed value or select the next element
	Decrease the displayed value or select the previous element
	A short pression on the button exits from the current parameter group and selects a new parameter group. A long pression allows to close the configuration parameter procedure (the instrument returns to the "Standard display").

How to exit the "Configuration mode"

To exit from the Configuration mode, press the key for 3 seconds.

4. LIST OF THE PARAMETERS (PASS: 30)

inP Group - Main and auxiliary input configuration

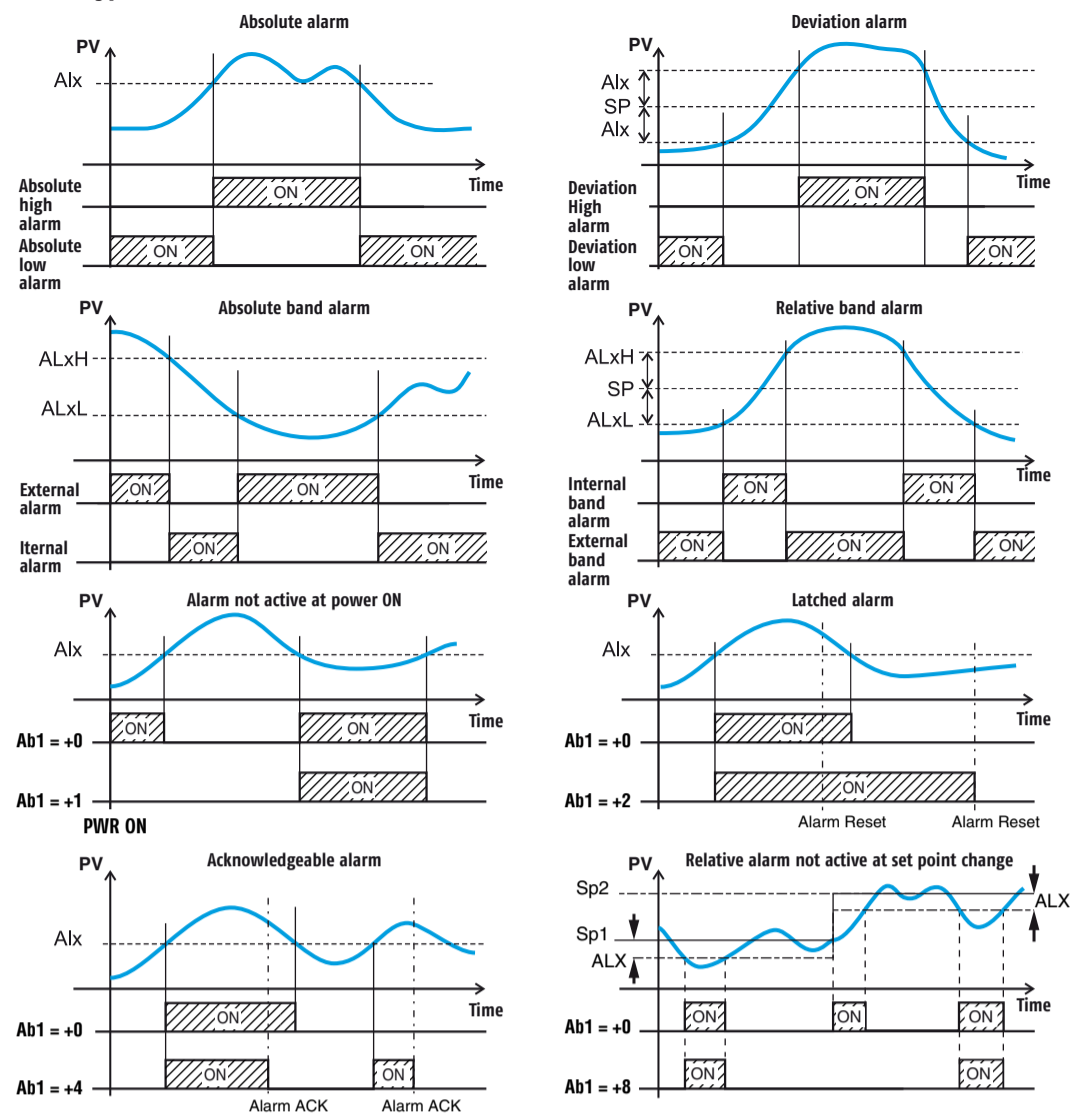
no.	Par.	Description	Dec.	Values	Default	Notes	
1	SenS	Model C	J	TC J (0... 1000°C/32... 1832°F); crAL TC K (0... 1370°C/32... 2498°F); S TC S (0... 1760°C/32... 3200°F); r TC R (0... 1760°C/32... 3200°F); t TC T (0... 400°C/32... 752°F); n TC N (0... 1000°C/32... 1832°F); ir.J Exergen IRS J (0... 1000°C/32... 1832°F); ir.cA Exergen IRS K (0... 1370°C/32... 2498°F); Pti RTD Pt 100 (-200... 850°C/-328... 1562°F); Pti0 RTD Pt 1000 (-200... 500°C/-328... 932°F);			
		Model E	J	TC J (0... 1000°C/32... 1832°F); crAL TC K (0... 1370°C/32... 2498°F); S TC S (0... 1760°C/32... 3200°F); r TC R (0... 1760°C/32... 3200°F); t TC T (0... 400°C/32... 752°F); n TC N (0... 1000°C/32... 1832°F); ir.J Exergen IRS J (0... 1000°C/32... 1832°F); ir.cA Exergen IRS K (0... 1370°C/32... 2498°F); Ptc PTC (-55... 150°C/-67... 302°F); ntc NTC (-50... 110°C/-58... 230°F);			
2	dp	Decimal Point Position (linear inputs) Decimal Point Position (non linear inputs)	0	0... 3 0/1	0		
3	SSC	Initial scale read-out for linear inputs	dp	-1999... 9999	0		
4	FSc	Full Scale Readout for linear inputs	dp	-1999... 9999	1000		
5	unit	Engineer unit		°C/°F	°C		
6	Fil	Digital filter on the measured value	1	0 oFF; 0.1... 20.0 S	1.0		
7	inE	Sensor error used to enable the safety output value		or Over range; ur Under range; our Over and under range.	our		
8	oPE	Safety output value (% of the output)		-100... 100	0		
9	IO4.F	I/O 4 function		on Output used as PWS for TX; out4 Output 4 (digital output 4); dG2c Digital input 2 driven by contact; dG2U Digital input 2 driven by voltage.	out4		
10	diF1	Digital Input 1 function		oFF Not used; 1 Alarm reset; 2 Alarm acknowledge (ACK); 3 Hold of the measured value; 4 Stand by mode; 5 Manual mode; 6 Program Start (on transition); 7 Program Reset (on transition); 8 Program Hold (on transition); 9 Program Run/Hold; 10 Program Run/Reset;	oFF		
11	diF2	Digital Input 2 function		11 SP1 - SP2 selection; 12 SP1... SP4 binary selection; 13 Digital inputs in parallel to keys.	oFF		
12	di.A	Digital Inputs Action (DI2 only if configured)		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		

Out group - Output parameters

no.	Par.	Description	Dec.	Values	Default	Notes
13	o1t	Output 1 type (when Out 1 is a linear output)		0-20 0... 20 mA; 4-20 4... 20 mA; 0-10 0... 10 V; 2-10 2... 10 V.	0-20	
14	o1F	Out 1 function (when Out 1 is a linear output)	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; r.inP Measure retransmission; r.Err Error (SP - PV) retransmission; r.SP Set point retransmission; r.SEr Serial value retransmission.		
		Out 1 function (when Out 1 is a digital output)	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; AL Alarm output; P.End Program end indicator; P.Hld Program hold indicator; P.uit Program wait indicator; P.run Program run indicator; P.Et1 Program Event 1; P.Et2 Program Event 2; or.bo Out of range or burn out indicator; P.FAL Power failure indicator; bo.PF Out of range/burn out/Power failure indicator; St.by Stand by status indicator; diF.1 The output repeats the digital input 1 status; diF.2 The output repeats the digital input 2 status; on Out 1 always ON; riSP Inspection request.	H.reG	
15	Ao1L	Initial scale for the analog retransmission	dP	-1999... Ao1H	-1999	
16	Ao1H	Full scale for the analog retransmission	dP	Ao1L... 9999	9999	
17	o1AL	Alarms linked up with the out 1	0	0... 63; +1 Alarm 1; +2 Alarm 2; +4 Alarm 3; +8 Loop break alarm; +16 Sensor Break (burn out); +32 Overload on output 4.	1	
18	o1Ac	Out 1 action	0	dir Direct action; rEU Reverse action; dir.r Direct with reversed LED; ReU.r Reverse with reversed LED.	dir	
19	o2F	Out 2 function	0	See O1F - Out 1 function (digital output)	AL	
20	o2AL	Alarms linked up with the out 2	0	See O1AL - Alarms linked up with the out 1	1	
21	o2Ac	Out 2 action	0	See O1Ac - Out 1 action	dir	
22	o3F	Out 3 function	0	See O1F - Out 1 function (digital output)	AL	
23	o3AL	Alarms linked up with the out 3	0	See O1AL - Alarms linked up with the out 1	2	
24	o3Ac	Out 3 action	0	See O1Ac - Out 1 action	dir	
25	o4F	Out 4 function	0	See O1F - Out 1 function (digital output)	AL	
26	o4AL	Alarms linked up with the out 4	0	See O1AL - Alarms linked up with the out 1	AL1 + AL2	
27	o4Ac	Out 4 action	0	See O1Ac - Out 1 action	dir	

Note: When a servomotor control is desired, **both Out2 and Out3** are to be selected as Heating or Cooling (o2F = o3F = H.rEG or o2F = o3F = c.rEG). Parameter [56] cont must be set as 3PE.

Alarm types



AL1 Group - Alarm 1 parameters

no.	Par.	Description	Dec.	Values	Default	Notes
28	AL1t	Alarm 1 type	0	nonE Alarm not used; LoAb Absolute low alarm; HiAb Absolute high alarm; LHAo Windows alarm in alarm outside the windows; LHAi Windows alarm in alarm inside the windows; SE.br Sensor Break; LodE Deviation low alarm (relative); HidE Deviation high alarm (relative); LHdo Relative band alarm in alarm out of the band; LHdi Relative band alarm in alarm inside the band.	HiAb	
29	Ab1	Alarm 1 function	0	0... 15; +1 Not active at power up; +2 Latched alarm (manual reset); +4 Acknowledgeable alarm; +8 Relative alarm not active at set point change.	0	
30	AL1L	- For High/low alarm, AL1 low limit; - For band alarm, AL1 low alarm	dp	From -1999 to AL1H (E.U.)	-1999	
31	AL1H	- For High/low alarm, AL1 high limit; - For band alarm, AL1 high alarm	dp	From AL1L to 9999 (E.U.)	9999	
32	AL1	AL1 threshold	dp	From AL1L to AL1H (E.U.)	0	
33	HAL1	AL1 hysteresis	dp	1... 9999 (E.U.)	1	
34	AL1d	AL1 delay	0	From 0 (oFF) to 9999 (s)	oFF	
35	AL1o	Alarm 1 enabling during Stand-by mode and out of range conditions	0	0 Alarm 1 disabled during Stand by and out of range; 1 Alarm 1 enabled in stand by mode; 2 Alarm 1 enabled in out of range condition; 3 Alarm 1 enabled in stand by and overrange.	0	

AL2 Group - Alarm 2 parameters

no.	Par.	Description	Dec.	Values	Default	Notes
36	AL2t	Alarm 2 type	0	See AL1t	LoAb	
37	Ab2	Alarm 2 function	0	See Ab1	0	
38	AL2L	- For High/low alarm, AL2 low limit; - For band alarm, AL2 low alarm	dp	See AL1L	-1999	
39	AL2H	- For High/low alarm, AL2 high limit; - For band alarm, AL2 high alarm	dp	See AL1H	9999	
40	AL2	AL2 threshold	dp	See AL1	0	
41	HAL2	AL2 hysteresis	dp	See HAL1	1	
42	AL2d	AL2 delay	0	See AL1d	oFF	
43	AL2o	Alarm 2 enabling during Stand-by mode and out of range conditions	0	See AL1o	0	

AL3 Group - Alarm 3 parameters

no.	Par.	Description	Dec.	Values	Default	Notes
44	AL3t	Alarm 3 type	0	See AL1t	nonE	
45	Ab3	Alarm 3 function	0	See Ab1	0	
46	AL3L	- For High/low alarm, AL3 low limit; - For band alarm, AL3 low alarm	dp	See AL1L	-1999	
47	AL3H	- For High/low alarm, AL3 high limit; - For band alarm, AL3 high alarm	dp	See AL1H	9999	
48	AL3	AL3 threshold	dp	See AL1	0	
49	HAL3	AL3 hysteresis	dp	See HAL1	1	
50	AL3d	AL3 delay	0	See AL1d	oFF	
51	AL3o	Alarm 3 enabling during Stand-by mode and out of range conditions	0	See AL1o	0	

LBA Group - Loop break alarm

no.	Par.	Description	Dec.	Values	Default	Notes
52	LbAt	LBA time	0	0 oFF; 1... 9999 (s).	oFF	
53	LbSt	Delta measure used by LBA during Soft start	dp	0 oFF; 1... 9999 (E.U.)	10	
54	LbAS	Delta measure used by LBA	dp	1...9999 (E.U.)	20	
55	LbcA	Condition for LBA enabling	0	uP Active when Pout = 100%; dn Active when Pout = -100%; both Active in both cases.	both	

rEG Group - Control parameters

no.	Par.	Description	Dec.	Values	Default	Notes
56	cont	Control type	0	Pid PID (heat and/or); On.FA ON/OFF asymmetric hysteresis; On.FS ON/OFF symmetric hysteresis; nr Heat/Cool ON/OFF control with neutral zone; 3Pt Servomotor control (when Out2 and Out 3 have been ordered with code "M").	Pid	
57	Auto	Autotuning selection	0	-4 Oscillating auto-tune with auto-restart at power ON and after all point change; -3 Oscillating auto-tune with manual start; -2 Oscillating tune with auto-start at first power ON only; -1 Oscillating auto-tune with auto-restart at all power ON; 0 Not used; 1 Fast auto tuning with auto-restart at all power ON; 2 Fast auto-tune with auto-start the first power ON only; 3 FAST auto-tune with manual start; 4 FAST auto-tune with automatic restart at power ON and after a set point change; 5 Evo-tune with auto-restart at all power ON; 6 Evo-tune with auto-start at first power ON only; 7 Evo-tune with manual start; 8 Evo-tune with auto-restart at power ON and after a set point change.	7	
58	Aut.r	Manual start of the Autotuning	0	oFF Not active; on Active.	oFF	
59	HSEt	Hysteresis of the ON/OFF control	dp	0... 9999 (E.U.)	1	
60	Pb	Proportional band	dp	1... 9999 (E.U.)	50	
61	ti	Integral time	0	0 oFF; 0... 9999 (s).	200	
62	td	Derivative time	0	0 oFF; 0... 9999 (s).	50	
63	Fuoc	Fuzzy overshoot control	2	0.00... 2.00	0.50	
64	tch	Heating output cycle time	1	0.1... 130.0 (s)	20.0	
65	rcG	Power ratio between heating and cooling action	2	0.01... 99.99	1.00	
66	tcc	Cooling output cycle time	1	0.1... 130.0 (s)	20.0	
67	rS	Manual reset (Integral pre-load)	1	-100.0... +100.0 (%)	0.0	
68	Str.t	Servomotor stroke time	0	5... 1000 seconds	60	
69	db.S	Servomotor dead band	0	0...100%	50	
70	od	Delay at power up	2	0.00 oFF; 0.01... 99.59 (hh.mm).	oFF	
71	St.P	Maximum power output used during soft start	0	-100... 100 (%)	0	
72	SSt	Soft start time	2	0.00 oFF; 0.01... 7.59 (hh.mm); inF Always ON.	oFF	
73	SS.th	Threshold for soft start disabling	dp	-1999... +9999 (E.U.)	9999	

SP Group - Set point parameters

no.	Par.	Description	Dec.	Values	Default	Notes
74	nSP	Number of used set points	0	1... 4	1	
75	SPLL	Minimum set point value	dp	From -1999 to SPHL	-1999	
76	SPHL	Maximum set point value	dp	From SPLL to 9999	9999	
77	SP	Set point 1	dp	From SPLL to SPHL	0	
78	SP 2	Set point 2	dp	From SPLL to SPHL	0	
79	SP 3	Set point 3	dp	From SPLL to SPHL	0	
80	SP 4	Set point 4	dp	From SPLL to SPHL	0	
81	A.SP	Selection of the active set point	0	From 1 (SP 1) to nSP	1	
82	SP.rt	Remote set point type	0	RSP The value coming from serial link is used as remote set point; trin The value will be added to the local set point selected by A.SP and the sum becomes the operative set point; PEr The value will be scaled on the input range and this value will be used as remote SP.	trin	
83	SPLr	Local/remote set point selection	0	Loc Local; rEn = Remote.	Loc	
84	SP.u	Rate of rise for POSITIVE set point change (ramp UP)	2	0.01... 99.99 (inF) engineering units per minute	inF	
85	SP.d	Rate of rise for NEGATIVE set point change (ramp DOWN)	2	0.01... 99.99 (inF) engineering units per minute	inF	

PAn Group - Operator HMI

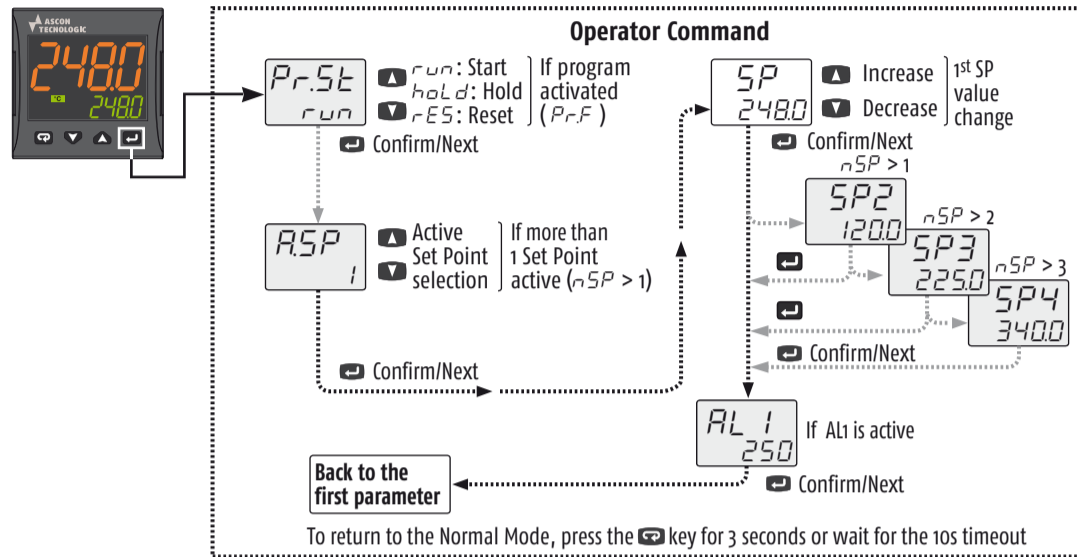
no.	Par.	Description	Dec.	Values	Default	Notes
86	PAS2	Level 2 password (limited access level)	0	oFF Level 2 not protected by password; 1... 200.	20	
87	PAS3	Level 3 password (complete configuration)	0	3... 200	30	
88	uSrb	button function during RUN TIME		nonE No function; tunE Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune; oPlo Manual mode. The first pressure puts the instrument in manual mode (oPlo) while a second one puts the instrument in Auto mode; AAc Alarm reset; ASi Alarm acknowledge; chSP Sequential set point selection; St.by Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto mode; P.run Program run; P.rES Program reset; P.r.H.r Program run/hold/reset.	tunE	
89	diSP	Display management		nonE Standard display; Pou Power output; SPF Final set point; Spo Operative set point; AL1 Alarm 1 threshold; AL2 Alarm 2 threshold; AL3 Alarm 3 threshold; Pr.tu - During a soak, the instrument shows the soak elapsed time; - During a ramp the display shows the operative set point. At program end, the instrument alternately displays P.End and the measured value; - When no program is running, the instrument shows the standard display; Pr.td - During a soak, the instrument shows the soak remaining time (count down); - During a ramp the display shows the operative set point. At program end, the instrument alternately displays P.End and the measured value; - When no program is running, the instrument shows the standard display; P.t.tu When the programmer is running, the display shows the total elapsed time. At program end, the instrument alternately displays P.End and the measured value; P.t.td When the programmer is running, the display shows the total remaining time (count down). At program end, the instrument alternately displays P.End and the measured value; PErc Percent of the power output used during soft start (when the soft start time is equal to infinite, the limit is always active and it can also be used when ON/OFF control is selected); PoS Valve position (servomotor control).	0	
90	di.cl	Display colour		0 The display colour shows the actual deviation (PV - SP); 1 Display red (fix); 2 Display green (fix); 3 Display orange (fix).	0	
91	AdE	Deviation for display colour management		1... 999 (E.U.)	5	

5. OPERATIVE MODES

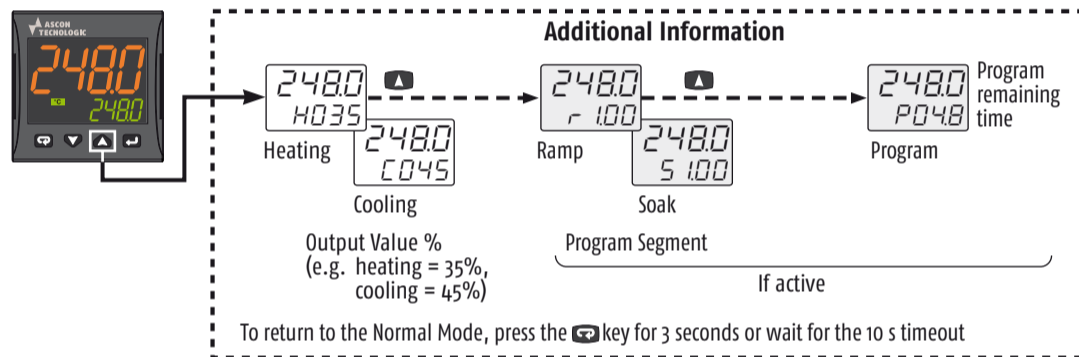
Keyboard function when the instrument is in Auto mode

Key	Operator Mode
	Access to: - Operator Commands (Setpoint selection ...) - Parameters - Configuration
	Access to Operator additional information (Output value, program running time ...)
	Set Point Access
	Start programmed function with <i>U_{SR}b</i> parameter (Autotune, Auto/Man, Program Run/Hold/Reset ...)

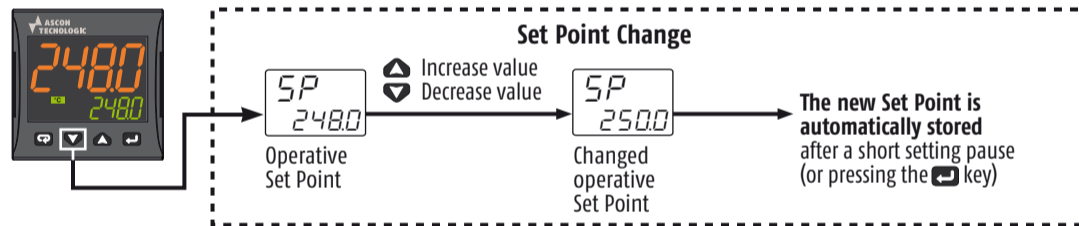
Operator Commands



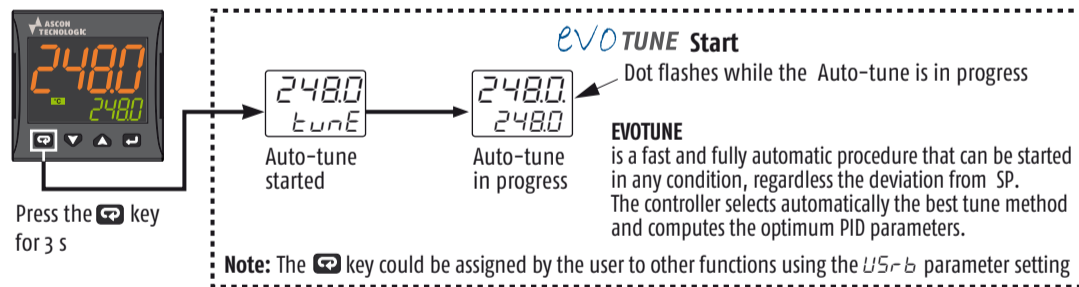
Additional information



Set Point Change



Running the Tuning functions



6. ERROR MESSAGES

Out of range signals

The instrument points out, on the upper display, the OVER-RANGE and UNDER-RANGE conditions using the following indications:

Over-range: **0000** Under-range: **U.U.U.U.**

The sensor break will be signalled as an out of range:

Note: When an over-range or an under-range is detected, the alarms operate as in presence of the maximum or the minimum measurable value respectively.

To check the out of span Error condition, proceed as follows:

1. Check the input signal source and the connecting line.
2. Make sure that the input signal is in accordance with the instrument configuration. Otherwise, modify the input configuration (see section 4).
3. If no error is detected, send the instrument to your supplier to be checked.

List of possible errors

- ErrA:** Fast Auto-tune cannot start. The measure value is too close to the set point. Push the [Enter] button in order to delete the error message.
- ouLd:** Overload on output 4. The message shows that a short circuit is present on Out 4 when it is used as output or transmitter power supply. When the short circuit disappears the output restarts to operate.
- noRt:** Auto-tune not finished within 12 hours.
- ErrEP:** Possible problem in the instrument memory. The message should automatically disappear, if the error persists, send the instrument to your supplier.
- ronE:** Possible problem of the firmware memory. If this error is detected, send the instrument to your supplier.
- ErrrE:** Possible problem of the calibration memory. If this error is detected, send the instrument to your supplier.

7. GENERAL NOTES

Proper use

Every possible use not described in this manual must be considered as a improper use.

This instrument is in compliance with EN 61010-1 "Safety requirements for electrical equipment for measurement, control and laboratory use"; for this reason it could not be used as a safety equipment.

Declaration of conformity and Manual retrieval

KM5 is a panel mounting, Class II instrument. It has been designed with compliance to the European Directives.

All information about the controller use can be found in the **Engineering Manual**:

ISTR-MKM5-ENG0x ("x" is the revision).

The Declaration of Conformity and the manual of the controller can be downloaded (free of charge) from the web-site:

www.ascontecnologic.com

Once connected to the web-site, search:

KM5

then click on **KM5**.

In the lower part of the product page (in any language) is present the download area with links to the documents available for the controller (in the available languages).

Maintenance

This instrument does not require periodical recalibration and it has no consumable parts so that no particular maintenance is required.

Sometimes it is advisable to clean the instrument.

1. SWITCH THE EQUIPMENT OFF (power supply, relay output, etc.).
2. Using a vacuum cleaner or a compressed air jet (max. 3 kg/cm²) remove all deposits of dust and dirt which may be present on the case and on the internal circuits being careful not to damage the electronic components.
3. To clean external plastic or rubber parts use only a cloth moistened with:
 - Ethyl Alcohol (pure or denatured) [C₂H₅OH] or
 - Isopropyl Alcohol (pure or denatured) [(CH₃)₂CHOH] or
 - Water (H₂O).
4. Make sure that there are no loose terminals.
5. Before turning ON the instrument make sure it is perfectly dry.
6. Apply the power supply to the instrument.

Warranty

This product is under warranty against manufacturing defects or faulty materials that are found within 18 months from delivery date. The warranty is limited to repairs or to the replacement of the instrument.

The tampering of the instrument or an improper use of the product will bring about the immediate withdrawal of the warranty effects.

In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company.

The faulty product must be shipped to Ascon Tecnologic with a detailed description of the faults found, without any fees or charge for Ascon Tecnologic, except in the event of alternative agreements.

8. ORDER CODE

Model: **KM 5 A B C D E F G H I**

Line	KM	5
Optional functions		A
Controller + programmer + Setpoint setter		P
Controller + programmer + Setpoint setter with white display		PW
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
Isolated Analogue Output (0/4... 20 mA, 0/2... 10 V)	I
Relay (1 SPST NO, 4 A/250 Vac)	R
VDC for SSR (12 Vdc/20 mA)	O
Output OP2	E
None	-
Relay (1 SPST NO, 2 A/250 Vac)	R
VDC for SSR VDC (12 Vdc/20 mA)	O
Servomotor drive Relay (1 SPST NO, 2 A/250 Vac)	M
Output OP3	F
None	-
Relay (1 SPST NO, 2 A/250 Vac)	R
VDC for SSR VDC (12 Vdc/20 mA)	O
Servomotor drive Relay (1 SPST NO, 2 A/250 Vac)	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 Output 2 and Output 3 codes must be selected as "M".