

ROELECTRONIC MKP.PKP

ADVANCED PROGRAMMER - CONTROLLERS



- SMART TUNE- PID CONTROL
- 200 STEP PROGRAMMER, UP TO 90 PROGRAMS, 5 PID GROUPS
- TRACKING AND GUARANTEED SOAK FUNCTIONS
- REAL TIME CLOCK AND CALENDAR
- UNIVERSAL, 3 WIRE- TC, RTD AND LINEAR INPUT
- AUX- REMOTE SET POINT/ TRIM INPUT
- 2x ISOLATED CONTROL AND RETRANSMISSION (mA) OUTPUTS
- 4x EVENT OR ALARM OUTPUTS (+10 OPTIONAL MKP)
- 3x LOGIC INPUTS (+8 OPTIONAL MKP)
- OUTPUT LINEARISATION
- 24V DC TRANSMITTER POWER SUPPLY
- RS 485 MODBUS SERIAL COMMS OPTION
- OPC BASED GRAPHICAL CONFIGURATION SOFTWARE

ROELECTRONIC

OVERVIEW

The MKP/ PKP is a versatile high performance ramp/soak programmer. A wide range of hardware combinations and special software functions make these instruments highly flexible and suitable for a wide range of advanced control and profiling applications. Designed to offer outstanding control performance and provide a comprehensive solution for a wide variety of applications such as furnace and atmosphere control, environmental and growth chambers and time activated flow and level control. Requiring precision heat/cool control and process protection alarms. The programmer facility has storage capacity of 200 segments in up to 90 programs. Each program may be linked for maximum pattern storage flexibility. The custom display provides a complete view of the process. Universal- thermocouple, RTD or process linear coupled with a responsive, SMART auto-tuning PID control algorithm that is equipped with special functions including, soft start and non-linear cooling. A complete set of process protection alarm functions, high and low limit, band and deviation are included. Optional features include: CT input- HBD OFD, Servo valve positioner, (mA) linear control or retransmission outputs, ModBus communication interface option, Up to 10 event inputs and 8 event outputs.

CONFIGURATION PROGRAM

The configuration software simplifies the instrument configuration, parameter adjustment and program editing. A complete instrument configuration may be saved from, and downloaded to the instrument providing a quick and reliable method to maintain instrument settings.

THE MKP AND PKP PROGRAMMER

Program format

Up to 90 simple programs are available, each program may contain:

- up to 99 segments
- up to 14 timed events

Program segments options

Up to 200 segments are available, for each segment it is possible to:

- set duration in hours and minutes (up to 99hours and 59minutes) or in minutes and seconds (up to 99minutes and 59 seconds)
- apply up to 5 different PID sets
- apply a wait band (10 available)
- apply one or more break events

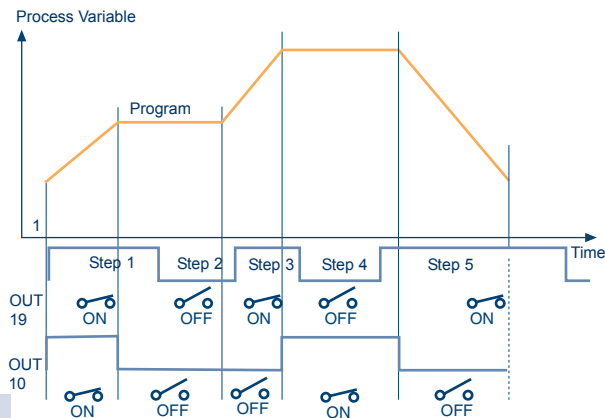
Linked programs

- Up to 9 programs may be linked

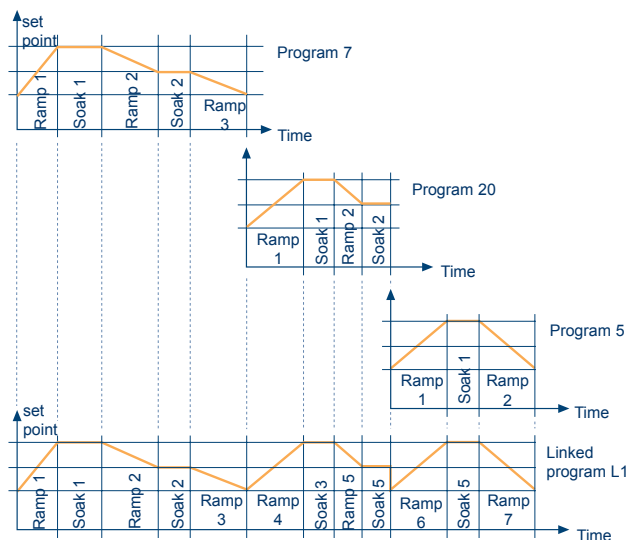
Break events

With this function it is possible to associate to each segment the state ON or OFF of one or more outputs selected as break event (ex. OUT 10).

BRAK EVENTS AND TIMER EVENTS



LINKED PROGRAMS



CLOCK CALENDAR

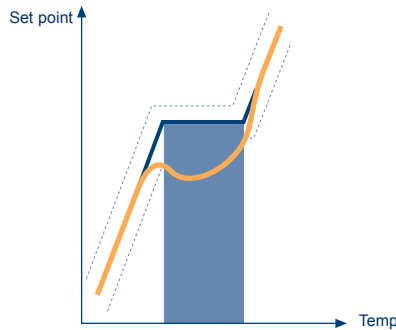
The inbuilt, lithium (10 year life) battery backed real time clock facility enables the program to be started or stopped on a pre-set time or day of the week.

WAIT AND GUARANTEED SOAK FUNCTIONS

Up to 10 program wait bands may be set. If the process variable is outside the programmed wait band, the ramp in progress will be stopped. The program will restart when the process variable is returned inside the wait band. During a program soak segment the material is maintained at the temperature set for the entire programmed time. If the process variable is outside the programmed wait band, the soak time will be stopped. The soak time will restart when the process variable is returned inside the wait band. Each segment may have different wait bands.

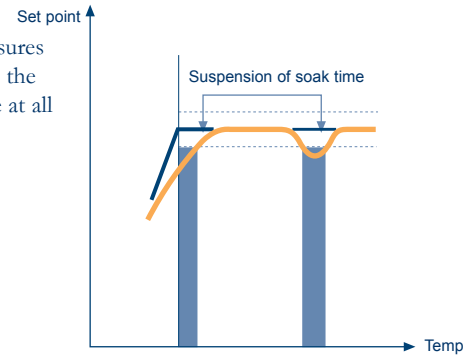
Ramp Tracking

If the process is interrupted during a ramp, the controller will continue the ramp after the process stabilizes at the target set point valve.



Guaranteed Soak

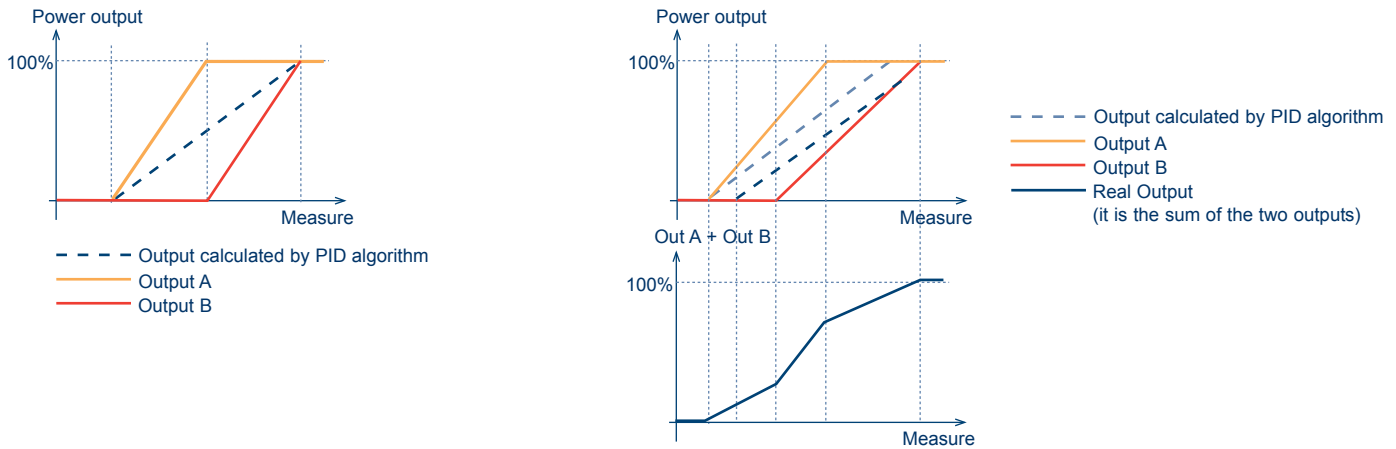
Guaranteed Soak assures the product receives the desired process time at all program segments.



SPLIT RANGE OF THE OUTPUT

Allows two different physical outputs, (two different actuators) to be driven from the same control output. Bias and gain settings for each output may be independently set to achieve optimal control precision.

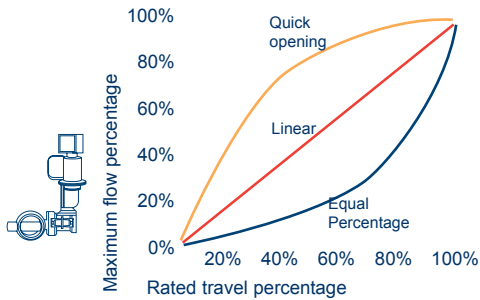
This feature may be used to improve flow control and reduce energy consumption when using two control valves or variable speed pumps of different size, as illustrated in the diagram.



SQUARE ROOT EXTRACTION ON THE MEASURED VALUE

A square root extraction function is available to calculate flow with a standard DP transmitter without additional signal conditioning hardware.

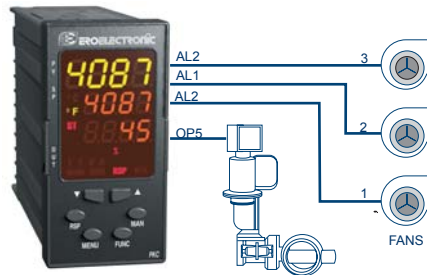
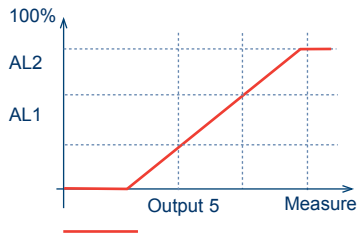
PREPROGRAMMED OUTPUT CHARACTERISTICS



Quick opening and equal percentage valve flow characteristic are automatically compensated by the output linearisation facility. This function linearises the ratio between flow rate and valve travel in order to obtain a better control of the process.

ALARM ON THE OUTPUT VALUES

Power output



The control output percentage is monitored by a configurable process alarm. Using this method it is possible to simplify the control of the process. In the example shown, the instrument is controlling a process by driving an airflow valve. The airflow generator uses 3 fans; the first one is always ON while the second and third are turned ON when the power output reaches the programmed value [33 % (AL 1) and 66% (AL 2)]. This solution reduces power consumption and improves process control.

LOGIC INPUTS

3 logic inputs are supplied as standard. These may be configured as:

- auto/ manual selection
- output limiter activation
- manual reset of alarm (acknowledgement)
- reverse/ direct control action
- run/ hold program selection (level or transition programmable)
- program selection, program abort

Up to 8 additional logic inputs are available (MKP option).

Input type: contact closure (voltage free)
Active contact: close or open configurable

ADDITIONAL OUTPUTS

Up to 10 additional digital outputs are available (MKP). These may be configured as program events.

Type: Relay type SPDT
Contact rating: 0.5A @ 250V AC (resistive)

PRODUCT SPECIFICATIONS

Case:	polycarbonate
Self extinguishing degree:	according to UL 746 C.
Front protection:	designed and tested for IP 65 and NEMA 4X for indoor locations (when panel gasket is installed). test performed in accordance with IEC 529, CEI 70-1 and NEMA 250-1991 STD.
Rear terminal board:	32 screw terminals for PKP 54 screw terminals for MKP.
Dimensions (according to DIN 43700):	48 x 96mm for PKP 96 x 96mm for MKP. Depth 128mm.
Weight:	500g for PKP. 700g for MKP.
Power supply (switching type):	from 100 to 240V AC 50/60Hz (from +10% to -15% of the nominal value) or 24V DC/AC (+10% of the nominal value).
Power consumption:	16VA max. for PKP 20VA max. for MKP.
Insulation:	a double or reinforced insulation is guaranteed between the power supply and all the instrument inputs and outputs.
Common mode rejection ratio:	> 120dB @ 50/60Hz.
Normal mode rejection ratio:	> 60dB @ 50/60Hz.
EMC/Safety:	This instrument is marked CE. It conforms to council directives 89/336/EEC (reference harmonized standard EN 50081-2 and EN 50082-2), 73/23/EEC and 93/68/EEC (reference harmonized standard EN 61010-1).
Sampling time:	125 mSec for linear inputs 250 mSec for TC or RTD.
Accuracy:	± 0.2% f.s.v., @ 25°C and nominal power supply.
Operating temperature:	from 0 to +50°C.
Storage temperature:	from -20 to +70°C.
Humidity:	from 20% to 85% RH not condensing.

MEASURING INPUTS

All inputs are factory calibrated and selectable by front keyboard. It is possible to apply a first order digital filter on the displayed value. The time constant of the filter may be programmed within 0 and 8 seconds.

RTD input

Type: Pt 100 3 wires connection.
Calibration: according to DIN 43760.

Line resistance: max. 20Ω/wire with no measurable error.

Sensor break: detection of the sensor open circuit and of one or more wires open circuit.

The instrument shows the short circuit indication when the sensor resistance is lower than 12Ω.

Standard range table

RTD type	°C	°F
Pt 100	-200/850	-330/1560
Pt 100	-199.9/850.0	-199.9/999.9

Thermocouples

<i>Line resistance compensation error:</i>	max. $\pm 0.1\%$ of input span with input impedance $<100\Omega$.
<i>Sensor break:</i>	detection of the open input circuit (wire or sensor) with underrange or overrange selectable indication.
<i>Cold junction:</i>	automatic compensation for an ambient temperature between 0 and 50°C.
<i>Cold junction compensation error:</i>	0.1°C/°C.
<i>Input impedance:</i>	$> 1M\Omega$.
<i>Calibration:</i>	according to IEC 584-1.

Linear inputs (mA and V)

<i>Input linearization:</i>	programmable square root extraction.
<i>Readout:</i>	keyboard programmable from -1999 to 9999.
<i>Decimal figure:</i>	programmable in any position.

Auxiliary input (optional)

<i>Function:</i>	this input can be used as trim function, or as remote set point input.
<i>Type:</i>	not isolated.
<i>Scaling:</i>	programmable from -1999 to 9999, the decimal figure is automatically positioned as for main input.
<i>Sampling time:</i>	500ms.
<i>Accuracy:</i>	$\pm 0.2\%$ f.s.v. ± 1 digit @ 25°C and nominal power supply voltage.
<i>Temperature drift:</i>	300 ppm/°C.

Standard range table

TC type	°C	°F
B	0/1820	+32/3300
C	0/2300	0/4170
D	0/2300	0/4170
E	-100/800	-150/1470
G	0/2300	0/4170
L	-100/900	-150/1650
J	-100/1000	-150/1830
K	-100/1370	-150/2500
N	-100/1400	-150/2550
Ni/nimMo	0/1100	0/2000
R	-50/1760	-60/3200
S	-50/1760	-60/3200
T	-200/400	-330/750
U	-200/600	-330/1100

Standard range table

Input	Impedance
0-20 mA	5 Ω
4-20 mA	5 Ω
0-60 mV	$>1M\Omega$
12-60 mV	$>1M\Omega$
0-5 V	>200 k Ω
1-5 V	>200 k Ω
0-10 V	>400 k Ω
2-10 V	>400 k Ω

Standard range table

Input	Impedance
0-20 mA	5 Ω
4-20 mA	5 Ω
0-5 V	>200 k Ω
1-5 V	>200 k Ω
0-10 V	>400 k Ω
2-10 V	>400 k Ω

OUTPUTS

These products may be supplied with up to 4 digital outputs (relay, SSR, TRIAC or servomotor drive) and up to 2 linear outputs (mA).

Digital outputs (Out 1 and 2)

<i>Function:</i>	singularly programmed as: - control output - alarm output - event output.
<i>Type:</i>	relay, SSR or TRIAC.

Out 1 and 2 - Relay

<i>Relay type:</i>	SPDT
<i>Contact rating:</i>	3A @ 250V AC on resistive load

Out 1 and 2 - SSR

<i>Type:</i>	not isolated voltage outputs. - Logic level 1: 14V @ 20mA max. 24V @ 1 mA. - Logic level 0: $< 0.5V$
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Out 1 and 2 - TRIAC

<i>Switching mode:</i>	isolated zero crossing type.
<i>Triac rating:</i>	from 50mA to 1A from 24V rms to 250V rms.

Out 3 and 4

<i>Function:</i>	singularly programmed as: <ul style="list-style-type: none"> - control output - alarm output - event output. - Servomotor drive (OUT 3 open, OUT 4 close).
<i>Type:</i>	relay SPST.
<i>Contact rating:</i>	3A @ 250V AC on resistive load. The OUT 3 and 4 commons are connected together with the same rear terminal.

Servomotor output

<i>Type:</i>	two relays interlocked (OUT 3 and 4).
<i>Servomotor output type:</i>	<ul style="list-style-type: none"> - Close loop - Open loop with valve position indication only. - Open loop without valve position indication.
<i>Feedback potentiometer input:</i>	from 100 W to 10 KW.
<i>Servomotor travel time:</i>	from 12 seconds to 3 minutes.
<i>Servomotor dead band:</i>	from 1% to 50% of the feedback span or of the valve travel time.

Analog outputs (Out 5 and 6)

<i>Function:</i>	programmable as <ul style="list-style-type: none"> - Control output - Analog retransmission of the measured value - Analog retransmission of the operative set point.
<i>Output type:</i>	Isolated output programmable as: <ul style="list-style-type: none"> 0-20mA 4-20mA.
<i>Scaling:</i>	programmable from -1999 to 9999.
<i>Maximum load:</i>	600 Ω .
<i>Accuracy:</i>	0.1% when it is used as control output. 0.05% when it is used as analog retransmission.
<i>Filter:</i>	it is possible to apply a first order digital filter on the retransmitted value. The time constant of the filter may be programmed within 0 and 8 seconds.

CONTROL ACTION

Types:	<ul style="list-style-type: none"> - one control output (digital or analog output) - one control output split on two outputs (split range). - two control outputs. <p>The outputs can be freely selected among analog, digital or servo.</p>
Digital output types:	relay, SSR or TRIAC.
Digital output control action:	proportional time
Analog output types:	linear (20mA).
Servomotor output:	two relays interlocked.
Proportional band:	programmable from 0.5% to 999.0% of the input span. Setting a PB equal to 0 the control action becomes ON/OFF.

Hysteresis	programmable from 0.1% to 10.0% of the input span.
(for ON/OFF control action):	
Integral time:	programmable from 1 second to 20 minutes or excluded.
Derivative time:	programmable from 1 second to 10 minutes or excluded.
Integral preload:	programmable <ul style="list-style-type: none"> - for one control output, from 0 to 100% of the output range. - for two control outputs, from -100% to +100% of the heating/cooling output range.
Main output cycle time:	from 1 second to 200 seconds.
Secondary output cycle time:	from 1 second to 200 seconds.
Relative secondary output gain:	programmable from 0.20 to 2.00 referred to proportional band.
Overlap/dead band:	programmable from -20% (dead band) to +50% (overlap) of the proportional band.
Output limiters:	for main and/or secondary control outputs it is possible to set: <ul style="list-style-type: none"> - output high limits - output low limits - output max. rate of rise.
AUTO/MANUAL mode:	selectable by front pushbutton or logic input.

ALARMS

Alarm action:	direct or reverse function programmable.
Alarm functions	each alarm can be configured as process alarm, band alarm, deviation alarm or process alarm on the output value.
Alarm reset:	automatic or manual reset programmable for each alarm.
Alarm masking:	each alarm can be configured as masked alarm or standard alarm. This function allows to delete not desired alarm indications at instrument start up and after a set point change.

Process alarm

<i>Operative mode:</i>	minimum or maximum programmable.
<i>Threshold:</i>	programmable in engineering units within input range.
<i>Hysteresis:</i>	programmable in engineering units from 1 to 200 digits.

Band alarm

<i>Operative mode:</i>	inside or outside programmable.
<i>Threshold:</i>	two thresholds are programmable: <ul style="list-style-type: none"> low - from 0 to -1000 digits. high - from 0 to +1000 digits.
<i>Hysteresis:</i>	programmable in engineering units from 1 to 200 digits.

Deviation alarm

<i>Operative mode:</i>	high or low programmable.
<i>Threshold:</i>	programmable from -1000 to +1000 digits.
<i>Hysteresis:</i>	programmable in engineering units from 1 to 200 digits.

Alarm on the main output values	It is possible to obtain an alarm condition when the main control output is lower or higher than a programmed value.
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Operative mode: minimum or maximum programmable.
Threshold: programmable from 0.1 to 100.0% of the output.
Hysteresis: programmable in engineering units from 0.1 to 20.0% of the output.

Alarm on the secondary output values

Operative mode: minimum or maximum programmable.
Threshold: programmable from 0.1 to 100.0% of the output.
Hysteresis: programmable in engineering units from 0.1 to 20.0% of the output.

Output failure detection (OFD)

the instruments equipped with this feature are capable of measuring, by means of a CT, the running current of one control output.

Input range: 50mA AC.
Scaling: programmable from 10A to 100 A.
Resolution: - for full scale up to 20A : 0,1A
 - for full scale from 21A to 100A: 1A
Active period: - for relay output: NO or NC programmable.
 - for SSR output: logic level 1 or 0.

Minimum active period to perform the measurement:

120 mSec.
 this function is applicable only to a control output programmed as proportional time output (relay or SSR).

SERIAL INTERFACE (optional)

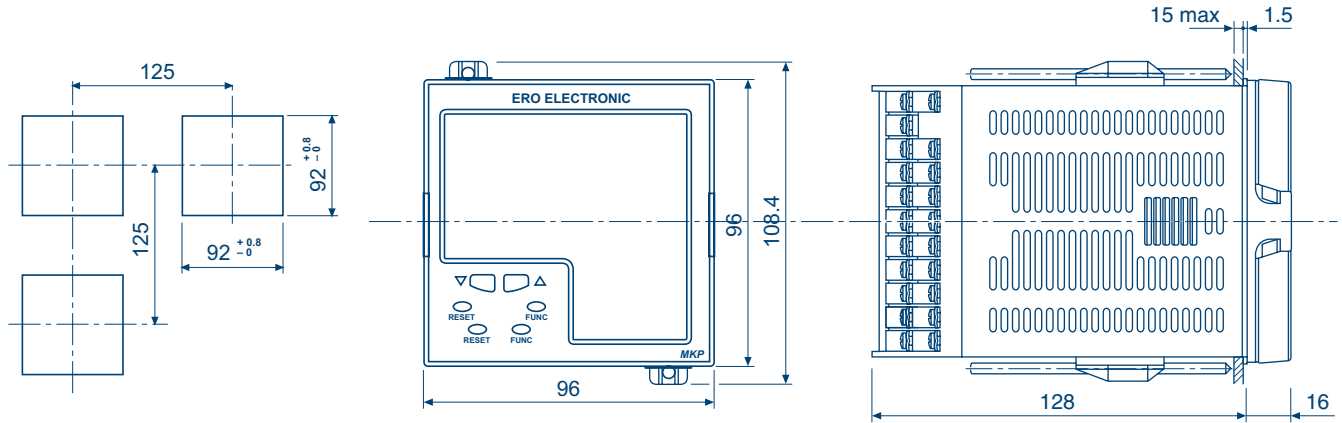
Type: RS 485 isolated.
Protocol type: MODBUS, JBUS.
Baud rate: programmable from 600 to 19200 BAUD.
Byte format: 8 bit.
Parity: even, odd or none programmable.
Stop bit: one.
Address: from 1 to 255.
Output voltage levels: according to EIA standard.

AUXILIARY POWER SUPPLY (optional)

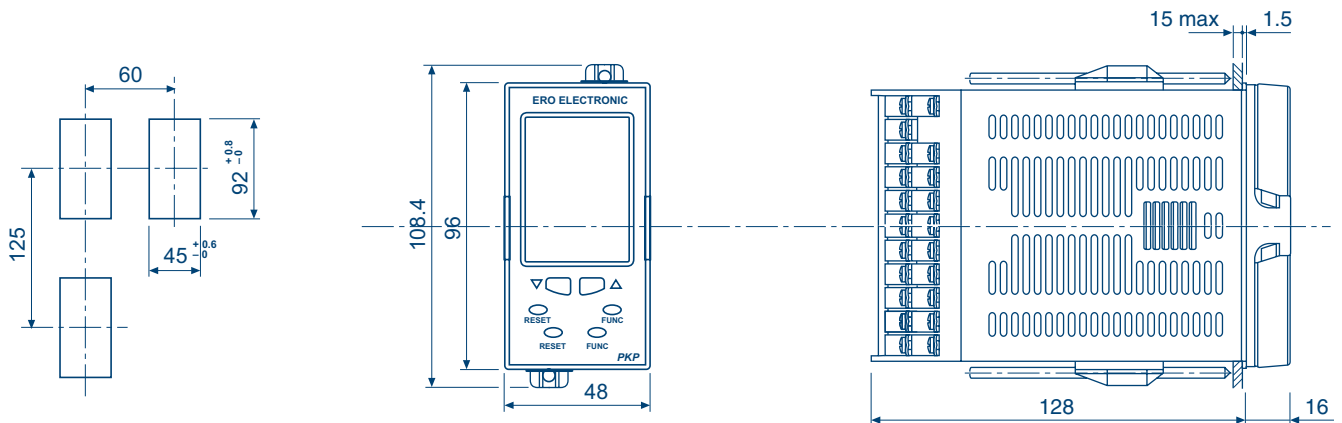
An un-isolated auxiliary power supply option enables direct connection of a 2, 3 or 4-wire transmitters and eliminates the need for an additional, separate power supply unit.

Type: 24V DC \pm 20% not isolated.
Max. current: 25mA.

DIMENSIONS AND PANEL CUT - OUT MKP

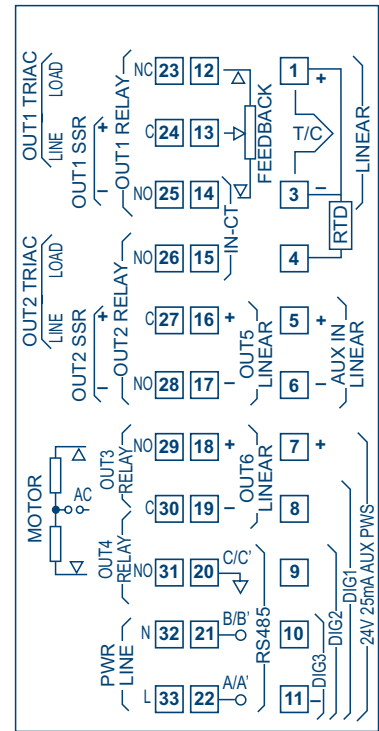
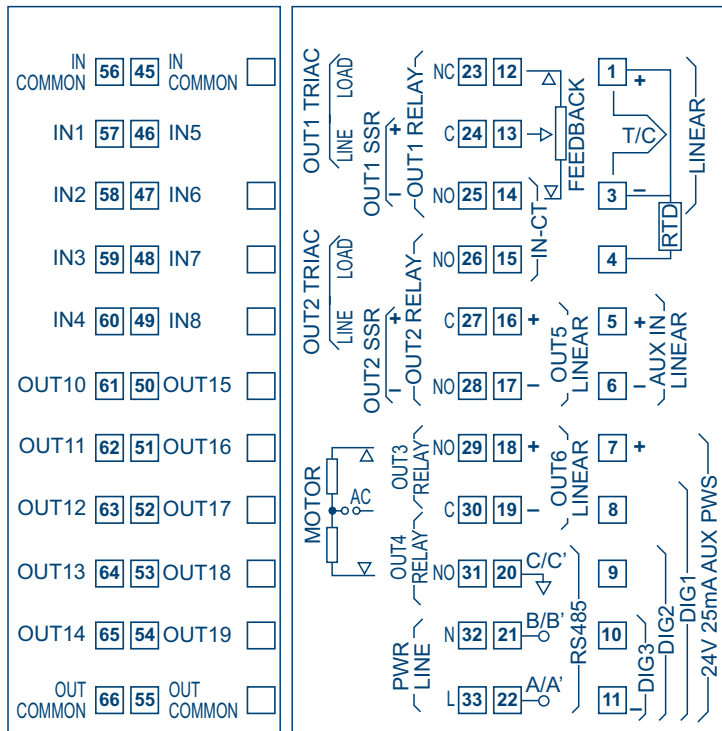


DIMENSIONS AND PANEL CUT - OUT PKP



REAR TERMINAL BLOCK MKP

REAR TERMINAL BLOCK PKP

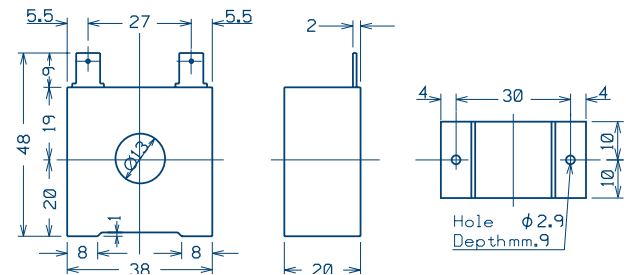


HOW TO ORDER

Current transformer (for instrument with OFD option only)

MODEL	PRIMARY CURRENT
CTR current transformer	1 10A
	2 25A
	3 50A
	4 100A
CTR	

DIMENSIONS



HOW TO ORDER

MODEL	INPUT	OUT 1 and OUT 2	OUT 3 and OUT 4	OUT 5 and OUT 6	OPTIONS	POWER SUPPLY
MKP 1/4 DIN	1 main + Aux-in. + logic inputs	11 two relay outputs	1 two Relay outputs	0 not provided	0 not provided	3 100/240V AC
PKP 1/8 DIN	6 Main + Aux-in + Logic inputs + OFD (or Feedback)	44 two TRIAC outputs 61 one SSR + one relay output 66 two SSR outputs	2 two relay outputs interlockable by jumper	5 two mA outputs 7 One mA output (Out 5)	1 aux.PWS 2 RS485 + Aux. PWS 4 Clock calendar + RS485 + Aux. PWS 5 Clock calendar + Aux.PWS 6* RS485 +Aux.PWS + 4 logic inputs + 5 Digital outputs 7* RS485+Aux.PWS + 8 logic inputs +10 Digital outputs 8* Clock calendar + RS485 +Aux.PWS + 4 Logic inputs + 5 Digital outputs 9* Clock calendar + RS485 +Aux.PWS + 8 Logic inputs + 10 Digital outputs * only for MKP	5 24V AC/DC