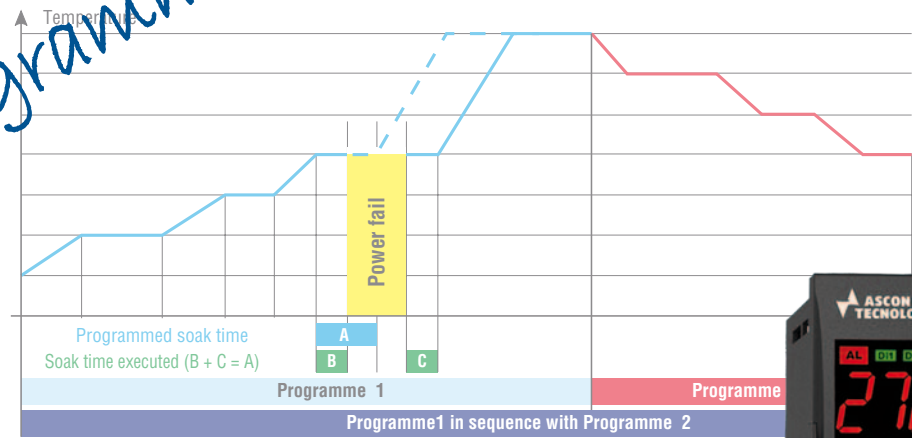


Programmer



# KUBE SERIES

## 3 DYNAMIC COLOUR LED DISPLAY

THE COLOUR CHANGES DEPENDING ON PROCESS VALUE

### PROGRAMMERS

- COMPACT SIZE
- 96 segments splitted into 8 programmes;
- "Segment recovery" + "Elapsed time recovery" (minute resolution) for restart after a power failure;
- Sequences up to 4 programmes, with different timebase (h/min - min/s);
- Up to 999 cycles;
- *evoGreen* - for energy saving;
- *evoTune* - auto-tune PID parameters "push and forget";
- Universal Input (TC, mV, V, mA, Pt100-Pt1000 / PTC-NTC);
- Universal Output (relay, SSR, linear mA/V, servomotor);
- User calibration for sensor position compensation;
- Parameters sequence fully customisable;
- *evoTools* - programming key for instant parameterisation.

#### FIELDS OF APPLICATION

- PAINTING ROOMS
- CLIMATIC CHAMBERS AND INCUBATORS
- GLASS BENDING FURNACES
- OVENS FOR GOLDSMITHS
- CERAMIC KILNS
- THERMAL TREATMENT FURNACES
- DENTAL OVENS

## PROGRAMMER FUNCTION

This function allows to set:

- 96 segments splitted into 8 programmes;
- 12 segments per programme (6 ramps and 6 soaks);
- Timebase selectable between h/min or min/s;
- 4 start-up modes: at power-up, at power-up with initial delay, and on command with or without initial delay (from keyboard, digital input or serial line);
- 3 output modes at the end of the programme: process continues with the last programmed set-point, the last active set-point, switching to stand-by;
- 2 programmable events for each programme segment;
- "Programme running" indicator;
- "Programme end" indicator;
- Two digital inputs and/or the button "↺" can be programmed to perform Start/Hold/Reset commands.

## PROGRAMME SEQUENCES

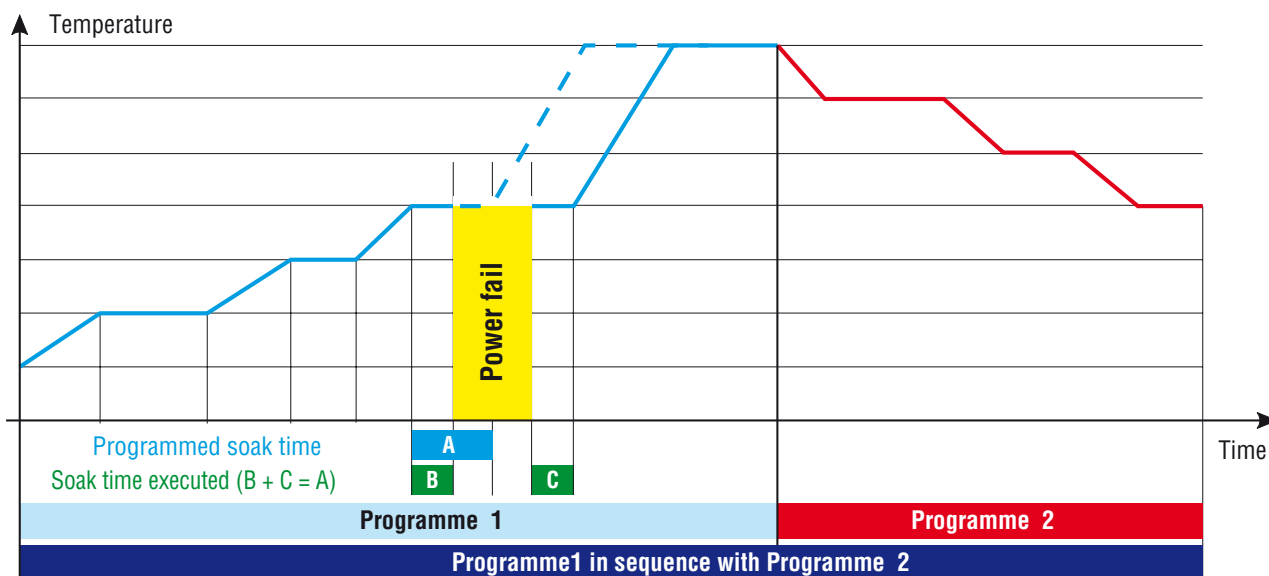
This function allows to:

- Execute sequences of up to 4 programmes each;
- Compose programme sequences, even with a different timebase (h/min – min/s);
- Execute up to 999 times the selected programme cycle.

Programme A	Programme B	Programme C	Programme D
12 segments	12 segments	12 segments	12 segments
Programme A	Programme B	Programme C	Programme D
24 segments		12 segments	12 segments
Programme A	Programme B	Programme C	Programme D
24 segments		24 segments	
Programme A	Programme B	Programme C	Programme D
36 segments			12 segments
Programme A	Programme B	Programme C	Programme D
12 segments			48 segments

## SEGMENT + ELAPSED TIME RECOVERY

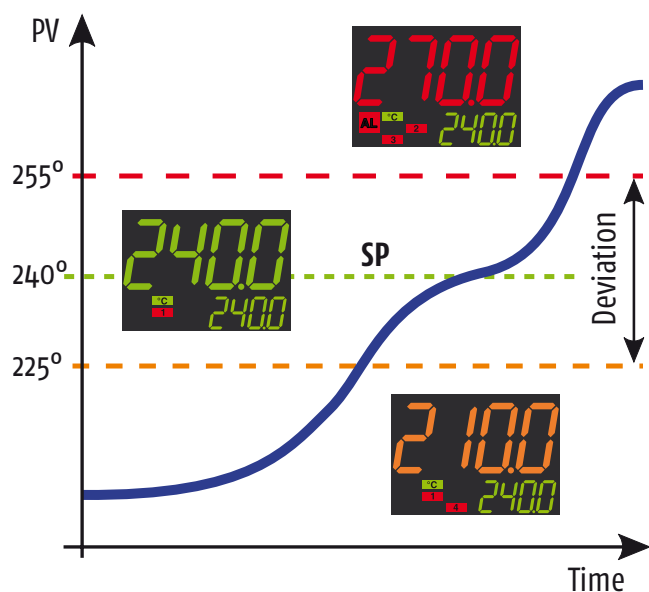
- Restart after power fail: the programme may restart from the segment in execution and run it for the remaining time, then it may proceed with the programme, including the missing repetitions.
- In case of power fail during a ramp, at the power-on, the instrument sets the operative setpoint as the measured value and restarts the ramp.
- In case of power failure during a soak, the instrument restarts from the failure point (accuracy 1 minute). At power recovery, if the measured value is "far" from setpoint and a wait band has been configured, the time counting will restart only when the measured value will be within the wait band.





### 3 COLOUR DISPLAY

The colour of the main display changes depending on process value.  
Color change thresholds are programmable.



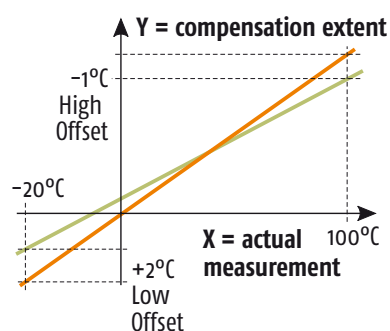
Immediate and intuitive process status acknowledgement, from a distance.  
This function may be disabled by the user.

### USER CALIBRATION

This function allows the manufacturer of the equipment to **calibrate the entire measurement values** compensating for errors due to:

- Sensor position;
- Sensor accuracy class;
- Accuracy of the instrument.

The "User calibration" **DOES NOT** change factory calibration and can be removed at any time.



### evoTUNE

evoTune is a technological evolution of the "classic" auto-tuning method. Performs auto-tuning in all operating conditions.

At evoTune start-up the instrument evaluates the current situation (set point, current process measurements etc.) and establishes the best tuning solution.

Set point change made during auto-tuning, restarts process according to the new conditions.



### CUSTOMISED PARAMETER SEQUENCE

Provision of user-defined operator interface has been, until now, only available in 'custom solutions'.

The KUBE Line allows to customise operator parameters making safe and easy the instrument use.

### evoGREEN ENERGY SAVING

The user selectable function allows reduction of energy consumption while indicating the presence of alarms and process deviations, from a distance.

Once the function is activated, the display acts as follows:

- If no button is pressed within the user defined time, the display turns off and 4 display segments remain lit and alternate to report that the system is in operation;
- If an alarm is detected or a button is pressed, the display turns on again immediately.



Normal operation



Alarm or operator command

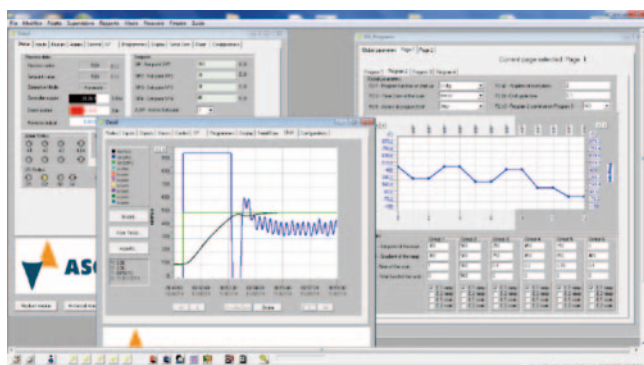
## ACCESSORIES

### A01 – Programming key

- A PC is NOT necessary to "copy and paste" a configuration (during production, startup or service);
- Copy an instrument configuration (to another key or a PC) even if the instrument is damaged (power supply or display not working);
- Configure / connect the instrument easily (even without a proper serial port) by using our configurator or a third party software;
- Configure the instrument safely from your desk (no high power connection on the instrument);
- Serial communication test (RS485);
- During startup, real time data monitoring allows easy and fast reaction (dynamic configurator);
- With a key preconfigured for a specific job, mistakes cannot be made by the operator. Just a buttonclick is required.

In other words you can:

- Copy the configuration from instrument to key, without a PC;
- Copy the configuration from key to instrument, without a PC;
- Use the key as USB/RS485 converter, with or without our SW;
- Use the key as USB/TTL converter, with or without our SW;
- Link with a PC, even if the instrument is not provided with RS485 port (is also possible to read a saved configuration).



### Configuration software

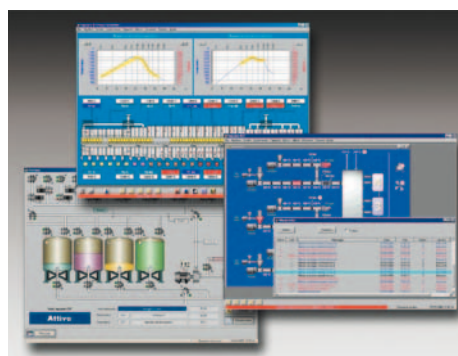
Supplied free of charge, once loaded on the PC, provides:

- Easy configuration of an instrument;
- Upload and download previously saved configurations;
- Simplify the start-up, using the real time update of variables and parameters.

### WinTec – Supervisor

Based on simple and flexible SCADA, it provides:

- Data acquisition;
- Centralized control;
- Alarm and recipes management;
- Trend;
- Report.





## SPECIFICATIONS

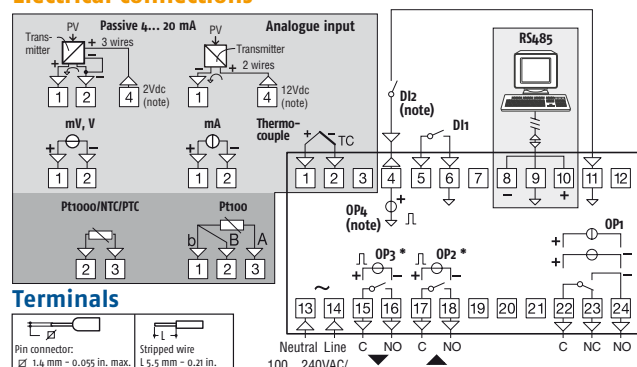
DISPLAY		KR5P/KM5P	KX5P
Dual LED	Main display:	4 digit h 10.9 mm (KR5P) or 15.5 (KM5P and KX5P) dynamic three colours red, green and amber or 1 fixed selectable colour	
	Secondary display:	4 digit h 6 mm (KR5P), 7.6 mm (KM5P) or 10 mm (KX5P) green colour	
	Bargraph:	-	20 segment bar graph
INPUTS			
Universal Input	Thermocouples:	J (-50... +1000°C/-58... +1832°F), K (-50... +1370°C/-58... +2498°F), S/R (-50... +1760°C/-58... +3200°F), T (-70... +400°C/-94... +752°F)	
	Infrared sensors:	J or K	
	RTD:	Pt100 3 wires and Pt1000 2 wires (-200... +850°C/-328... +1562°F)	
	Thermistors:	PTC KTY81-121 (-50... +150°C/-58... +302°F), NTC 103-AT2 (-50... +110°C/-58... +230°F)	
	Linear signals:	0/12... 60mV, 0/4... 20mA, 0/1... 5V, 0/2...10V	
Measurement accuracy	±0.5% span ±1 digit, (±1% span ±1 digit for T/c type S)		
Digital inputs	1 contact input + 1 (available when I/O 4 = DI2) programmable as voltage (24 VDC) or contact input		
OUTPUTS			
Up to four	OUT1:	Relay SPST-NO 4A/240 Vac (SPDT for KR5P) or voltage output for SSR driving 13V max. @ 1mA, 10.5V min. @ 15 mA ±10% or analogue 0/4... 20 mA, 0/2... 10 V galvanically isolated	
	OUT2 and OUT3 (*):	Relay SPST-NO 2A/240 Vac or Voltage output for SSR driving 13V max. @ 1mA, 10.5 V min. @ 15 mA ±10% or Relay SPST-NO 2A/240 Vac (for servomotor drive)	
	OUT4 programmable:	Voltage output for SSR driving 13V max. @ 1mA, 10.5 V min. @ 22 mA ±10% or transmitter power supply or 2 <sup>nd</sup> Digital Input	
FUNCTIONAL			
Control	PID single or double action, On/Off, On/Off with Neutral Zone, Servomotor. Autotune, Selftune and <i>evoTune</i> . Overshoot control		
Alarms	3 alarms configurable as absolute, deviation, band		
Set Point	4 set Points selectable		
Serial communications	TTL (standard) + RS485 (optional), protocol: MODBUS RTU		
Communications speed	1200... 38400 baud selectable (8 bit + 1 stop bit, no parity)		
Evogreen	Time based Display switch-off, selectable		
Programmes	Up to 12 segments with “guaranteed soak”		
Programme memory	8 programmes		
Programme sequence	Up to 4 programmes can be executed in sequence		
GENERAL			
Power supply	24 Vac/dc ±10%, 100... 240 Vac/dc (-15... +10%), 50/60 Hz, power consumption 7 VA max.		
Temperature	Operating: 0... 50°C (32... 122°F); Storage: -20... +70°C (-4... +158°F);		
Relative humidity	20... 95 RH% with no condensation		
Conformity	EN 61010-1, EN 61326		

\*: For servomotor drive, both OUT2 and OUT3 are relay output (see "How to order": OUT2 and OUT3 = code M).

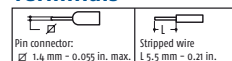
## CONNECTIONS AND DIMENSIONS

### KR5

#### Electrical connections



#### Terminals

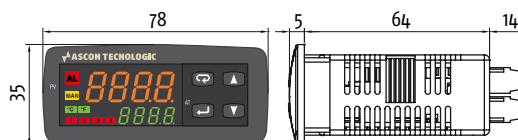


Note: Terminal 4 can be programmed as:  
 - Digital Input (DI2) connecting a free of voltage contact between terminals 4 and 11  
 - 0...12 V SSR Drive Output (OP4) connecting the load between terminals 4 and 11  
 - 12 Vdc (20 mA) transmitter power supply connecting the transmitter between terminals 4 and 1

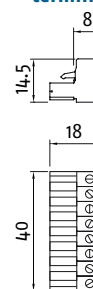
\*: For servomotor drive: OUT2 = open, OUT3 = close.

#### Dimensions (mm)

##### Instrument with non-removable terminals

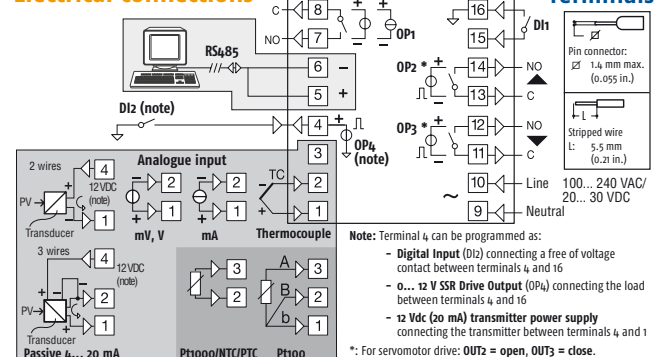


##### Removable terminals

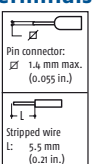


### KM5

#### Electrical connections



#### Terminals

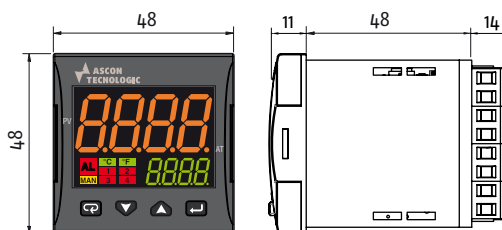


Note: Terminal 4 can be programmed as:  
 - Digital Input (DI2) connecting a free of voltage contact between terminals 4 and 16  
 - 0...12 V SSR Drive Output (OP4) connecting the load between terminals 4 and 16  
 - 12 Vdc (20 mA) transmitter power supply connecting the transmitter between terminals 4 and 1

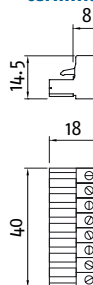
\*: For servomotor drive: OUT2 = open, OUT3 = close.

#### Dimensions (mm)

##### Instrument with non-removable terminals

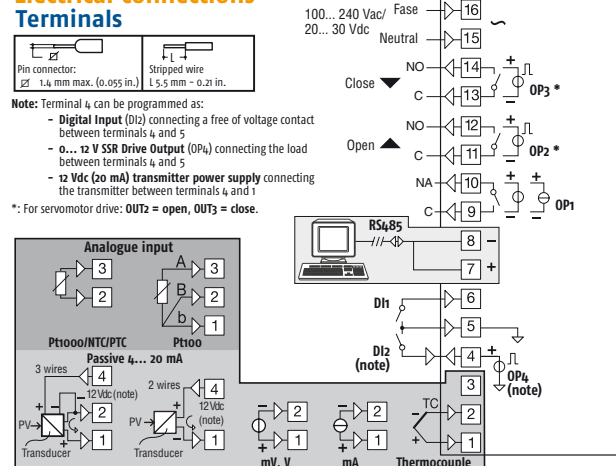


##### Removable terminals



### KX5

#### Electrical connections

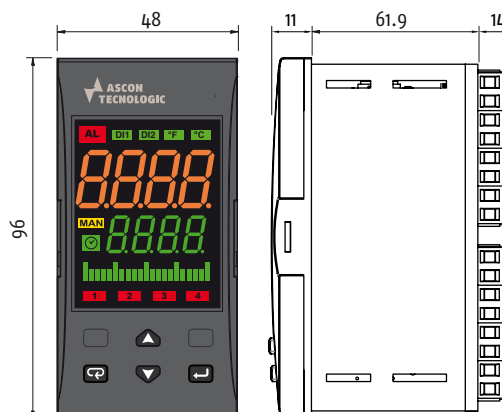


Note: Terminal 4 can be programmed as:  
 - Digital Input (DI2) connecting a free of voltage contact between terminals 4 and 5  
 - 0...12 V SSR Drive Output (OP4) connecting the load between terminals 4 and 5  
 - 12 Vdc (20 mA) transmitter power supply connecting the transmitter between terminals 4 and 1

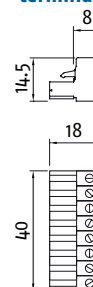
\*: For servomotor drive: OUT2 = open, OUT3 = close.

#### Dimensions (mm)

##### Instrument with non-removable terminals



##### Removable terminals





## HOW TO ORDER

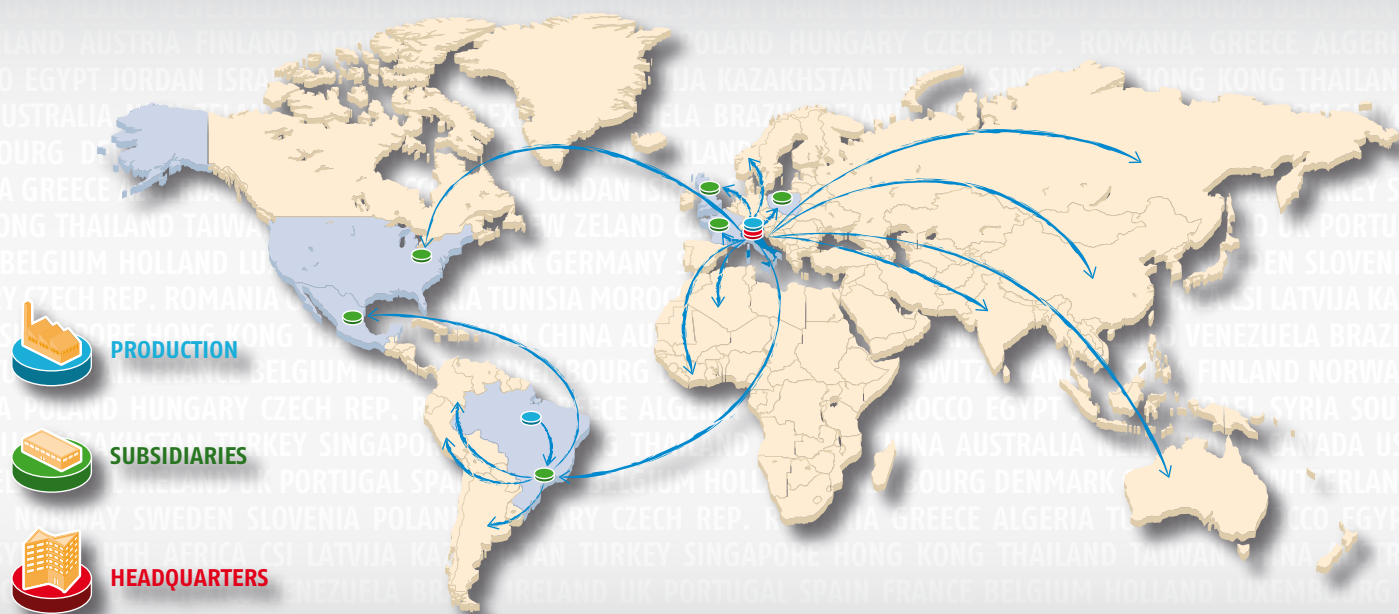
### Order Code

<b>Model</b> <b>KR5P</b> = Programmer + Controller 78 x 35 x 78 <b>KM5P</b> = Programmer + Controller 48 x 48 x 64 <b>KX5P</b> = Programmer + Controller 48 x 96 x 75.9
<b>Power supply</b> <b>H</b> = 100... 240 VAC <b>L</b> = 24 VAC/DC
<b>Analogue input + digital input DI (standard)</b> <b>C</b> = J, K, R, S, T, PT100, PT1000 (2 wires), mA, mV, V <b>E</b> = J, K, R, S, T, NTC, PTC, mA, mV, V
<b>Output 1</b> <b>I</b> = 0/4... 20 mA, 0/2... 10 V <b>R</b> = Relay SPST 4 A resistive load (KR5P: relay SPDT 4A/240 Vac) <b>O</b> = VDC for SSR
<b>Output 2</b> - = Not available <b>R</b> = Relay SPST 2 A resistive load <b>O</b> = VDC for SSR <b>M</b> = Relay SPST 2 A (servomotor drive only)*
<b>Output 3</b> - = Not available <b>R</b> = Relay SPST 2 A resistive load <b>O</b> = VDC for SSR <b>M</b> = Relay SPST 2 A (servomotor drive only)*
<b>Input/Output 4</b> <b>D</b> = Output 4 (VDC for SSR)/Transmitter Pws/Dig. Input DI2
<b>Serial communication</b> - = TTL Modbus <b>S</b> = RS485 Modbus + TTL Modbus
<b>Connection type</b> - = Standard (non-removable screw terminal block) <b>E</b> = With removable screw terminal block <b>M</b> = With removable spring terminal block <b>N</b> = With removable terminal block (fixed part only)

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

### Mechanical characteristics

PARAMETER	
Housing	Self-extinguishing plastic UL 94 v0
Mounting	Front panel
Dimensions (L x A x P)	KR5P: 78 x 35 x 78 mm KM5P: 48 x 48 x 62 mm KX5P: 48 x 96 x 75.9 mm
Panel cut-out	KR5P: 71 x 29 mm (-0... +0.6 mm) KM5P: 45 x 45 mm (-0... +0.6 mm) KX5P: 45 x 89 mm (-0... +0.6 mm)
Weight	KR5P: 140 g approx. KM5P: 120 g approx. KX5P: 160 g approx.
Terminals	16 terminals (24 for the KR5P) for cables from 2.5 mm <sup>2</sup> (AWG22... AWG14): - on fixed or removable terminal block with screw terminals; - on removable terminal block with spring-load terminals
Protection degree	IP 65 panel mounted with gasket (IP20 for screw terminals) In conformity with En 60070-1 (internal use only)



Ascon Tecnologic s.r.l.  
viale Indipendenza, 56 · 27029 Vigevano (PV) Italy  
tel +39 0381 69 871 · fax +39 0381 69 87 30

info@ascontecnologic.com  
www.ascontecnologic.com

Ascon Tecnologic France  
BP 76 · 77202 – Marne La Vallée Cedex 1  
tel +33 1 64 30 62 62 · fax +33 1 64 30 84 98  
info@ascontecnologic.fr  
www.ascontecnologic.com/fr

Tecnologic uk Ltd  
Unit Number 1, Farnborough Business Centre  
Eelmoor Road, Farnborough  
Hampshire GU14 7XA  
tel +44 125 2377 600 · fax +44 125 2377 60  
sales@tecnologicuk.co.uk  
www.t-uk.co.uk

Ascon Polska Sp. z o.o.  
KOCHCICE ul. Kochanowicka 43  
42-713 Kochanowice  
tel +48 34 35 33 619 · fax +48 34 35 33 884  
info@ascon.pl  
www.ascon.pl

Ascon Tecnologic – North America  
111 Brook Park Road  
Cleveland, OH 44109  
tel. +1 216 485 8350 ext. 229  
info@ascontec-na.com  
www.ascontecnologic.com/en

Coelmatic Ltda  
Al. Vicente Pinzon, 173 – 9º andar  
Sao Paulo · SP – CEP 04547 – 130  
tel. / fax +55 11 2066-3211  
info@coel.com.br  
www.coelmatic.com.br

Coelmatic SAPI SA de CV  
Paseo De los Cipreses, 3720  
Del Paseo Residencial,  
Monterrey, Nuevo León – CEP 64920  
tel. +52 81 8104 1012  
info@coelmatic.com.mx  
www.coelmatic.com.mx



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