

ECA60 Process Controller Series



The ECA series is a family of general purpose process controllers suitable for industrial applications for controlling temperature, pressure, flow, level, etc. The ergonomic design and operation concept makes the series restful to the eye and easy to use. All functions, including configuration, can be accessed from the controller front.

FEATURES

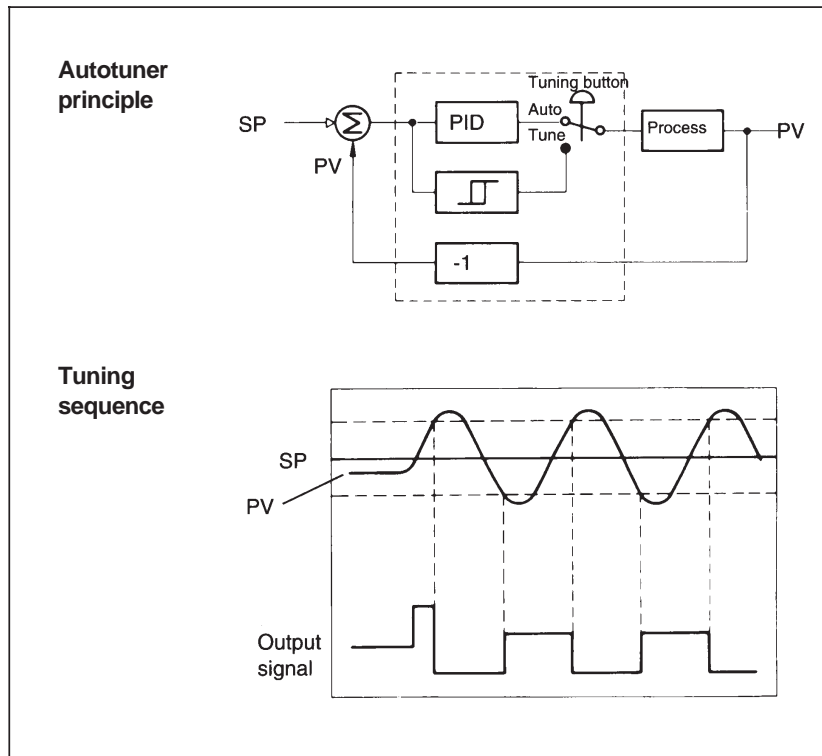
- Series consists of 4 devices:
 - ECA6 Standard controller
 - ECA60 Universal controller
 - ECA600 Multi Loop controller
 - EMA60 Multi-Instrument
- Inputs / Outputs:
 - Up to 5 analog inputs and 3 outputs
 - Up to 4 digital inputs and 6 outputs
 - Controller output analog or pulse
 - Serial interfaces RS 232 and RS 485
- Power supply:
 - 120 / 230 VAC, 50-60 Hz
 - 24 VDC
- Bright bargraphs and comfortable LCD display for easy operation
- Alarms for process size and control deviation
- PID parameters:
 - Autotuner for automatic setting
 - Gain scheduling for non-linear process
 - Adaptive control for variable conditions
 - pPi control for dead time compensation
 - Feed forward for disturbance control
- Process value or deviation alarms
- Arithmetic and logical functions
- Cascade or dual loop with ECA600
- Short sample time
- Configuration
 - Structure combines simplicity with power
 - At front or with configuration software
 - English or German
- Several mounting kits

Autotuner

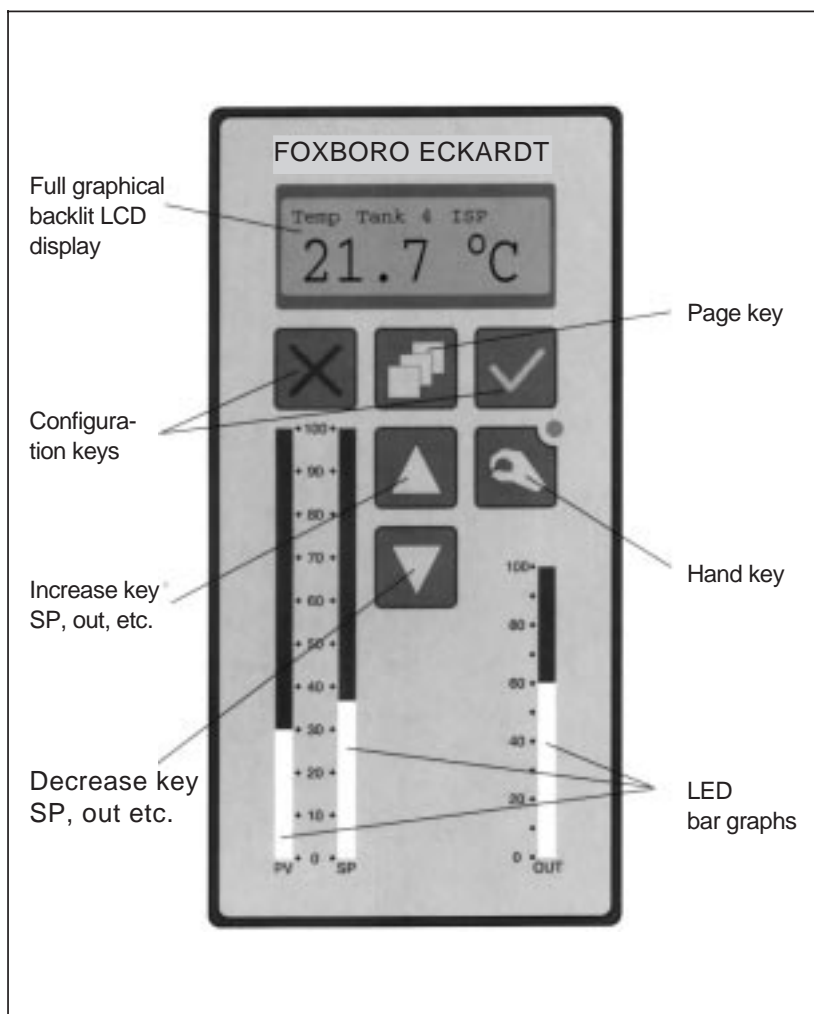
The autotuner is used for automatic setting of the PID parameters. The tuner sets the control loop in a state of controlled oscillation. The oscillation amplitude is correlated to the process noise level. After tuning, the PID parameters are determined and stored automatically. If the process changes the system can be re-tuned.

Gain Scheduling

This feature enables optimal control of non-linear processes. The process is controlled by using different sets of PID parameters for different values of a freely chosen reference signal. Three parameter sets are available.



Operation



Feed Forward

This feature enables the controller to compensate for disturbances before they affect the process. The Feed Forward signal is received from an ordinary sensor. Feed Forward can be either static or adaptive.

CLPM

The Control Loop Performance Monitor (CLPM) continuously supervises the control loop. Abnormal oscillations are automatically detected. The function works without any parameters.

pPI Control

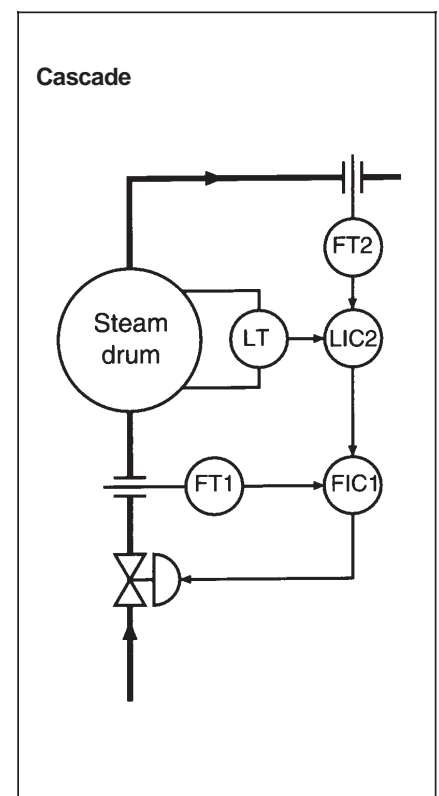
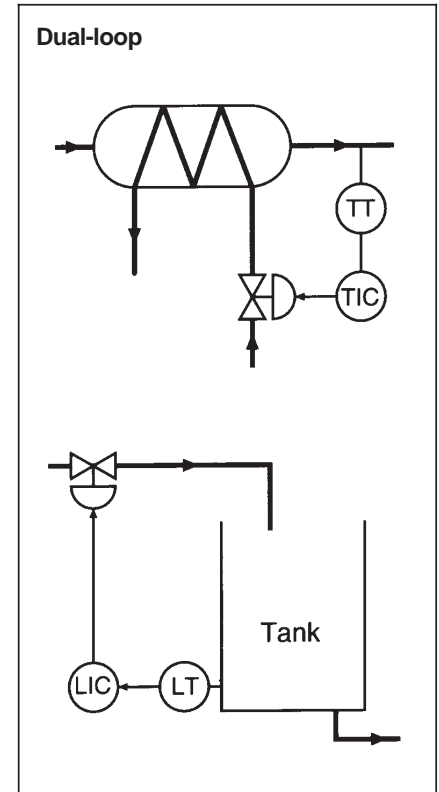
The predictive PI controller is a dead-time-compensating controller. The pPI controller differs from other dead-time controllers in the number of parameters. Only three parameters need be set:

Gain, Integral Time and Dead-Time. These parameters can easily be determined by a simple step response test on the process. The close resemblance to the PID controller makes the pPI controller easy to use, pPI control can be successfully combined with Gain Scheduling.

Functionality	ECA6	ECA60	ECA600	EMA60
Hardware				
Analog inputs	2	3	5	3
Analog outputs	1	2	3	1
Digital inputs	1	3	4	2
Digital outputs	2	4	6	4
RS 232	x	x	x	x
RS 485	x	x	x	x
Control features				
Autotuner	x	x	x	
Adaptive control			x	
pPI control			x	
Gain scheduling		x	x	
Feed forward		x	x	
CLPM			x	
Cascade control			x	
Dual-loop control			x	
Function blocks				
Analog input	2	3	5	3
Analog input communication	4	8	12	4
Analog user	–	2	8	4
Digital input	1	3	4	2
Digital input communication	4	8	12	4
Digital user	–	2	8	4
Operator	1	1	2	1
PV alarm	1	1	2	1
Deviation alarm	–	1	2	1
Arithmetic	2	4	16	8
Logic	–	2	8	8
Other	–	2	8	4
Control	1	1	2	–
Analog output	1	2	3	1
Analog output communication	4	8	12	4
Digital output	2	4	6	4
Digital output communication	4	8	12	4
System	1	1	1	1

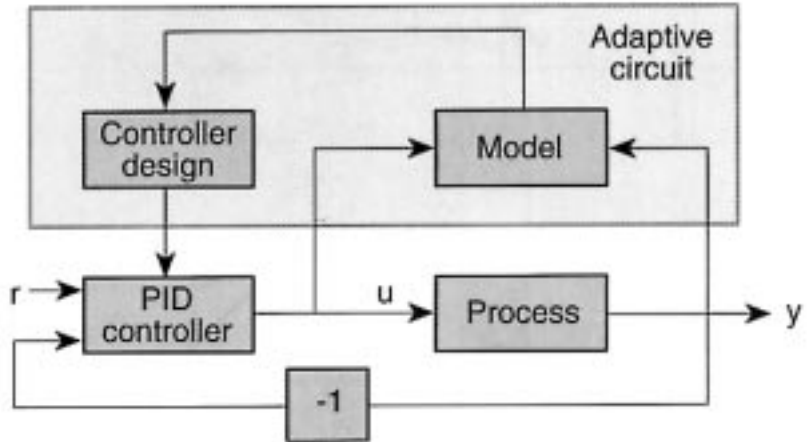
Multiple Loop Control

The ECA600 controller unit has two complete controller blocks which can operate either independently (dual-loop) or be combined in cascade. Both blocks have the functionality mentioned above.

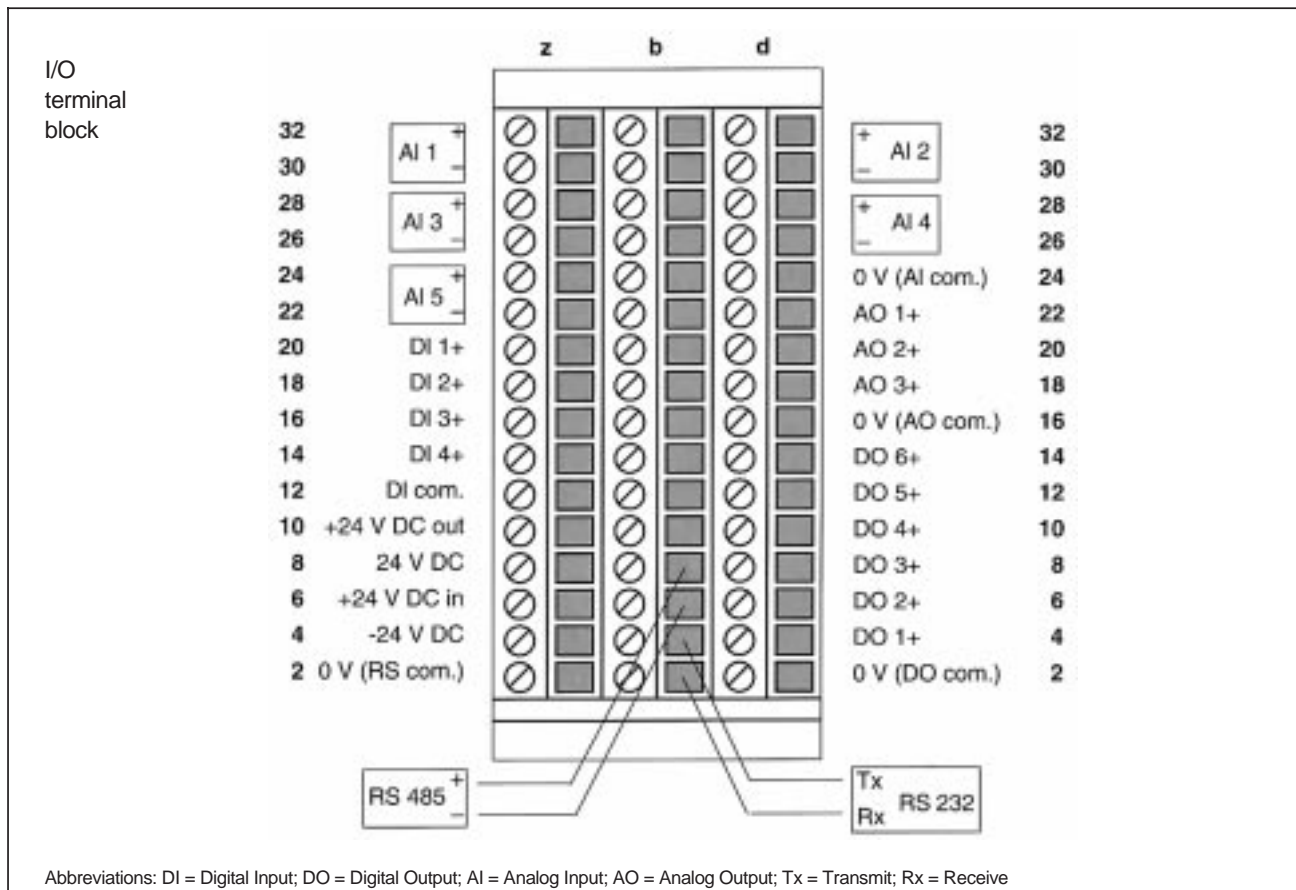
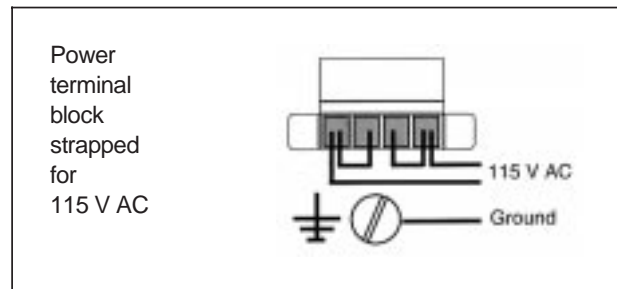
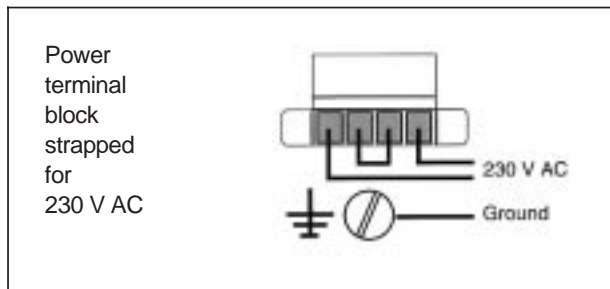


Adaptive Control

This type of control forces the controller to change its parameters continuously to adjust to a changing process. Adaptive control is activated in configuration mode and is initiated by starting the Autotuner. Adaptive control can be successfully combined with gain scheduling. While gain scheduling works with the static characteristics of the process (e. g. valve non-linearity), adaptive control works with the dynamic characteristics (e. g. load changes).



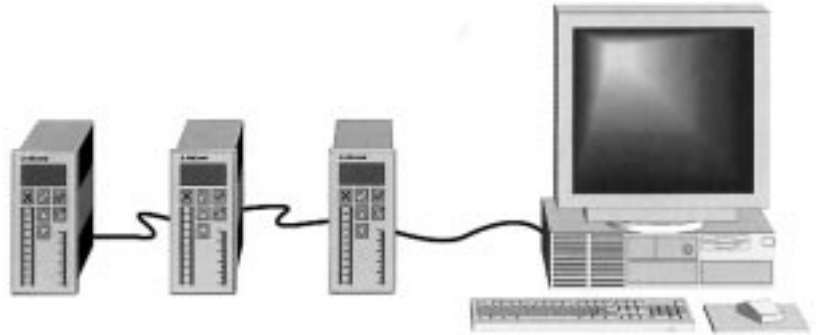
Connections



Abbreviations: DI = Digital Input; DO = Digital Output; AI = Analog Input; AO = Analog Output; Tx = Transmit; Rx = Receive

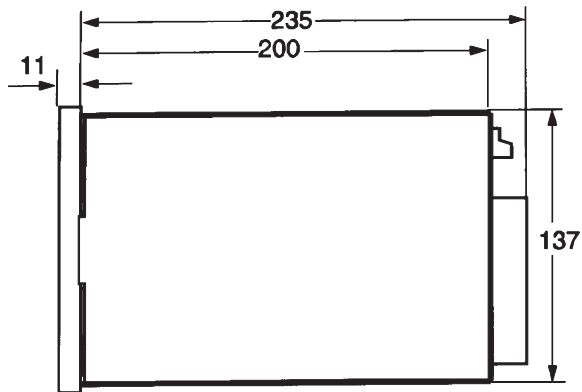
Communication

All units in the new ECA family are able to communicate with a computer using the standard COMLI protocol. Both realtime data and configuration information can be transferred via the communication link. The Baud rate is adjustable.

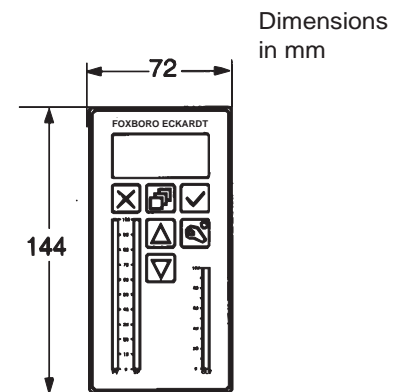


Mounting

The controllers are delivered with a kit for panel mounting. A cassette is available as an option.

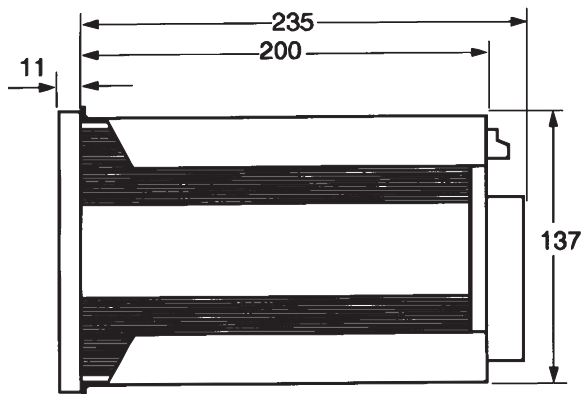


Plates (Mounting kit -A)

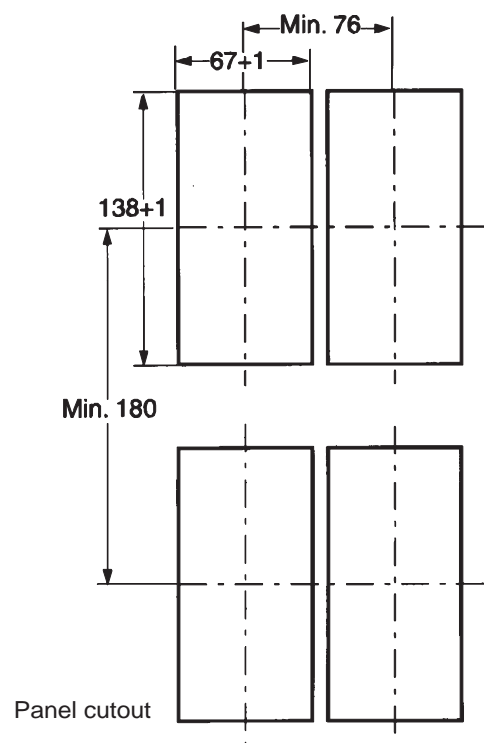


Dimensions in mm

Front



Cassette (Mounting kit -B)



Panel cutout

Technical Data

Controller

Control functions	P, PD, PI, PID, pPI
Gain	0.01 – 99.99
Integral time	0.1 – 9999.9 seconds
Derivative time	0.0 – 9999.9 seconds
Control action	Direct, reversed
Set point	Internal, external, ramp
Control output	Analogue, pulse
Alarms	Process value, deviation
Sample time	30 – 500 ms

Analogue Inputs

Input ranges	0 ... 20 mA, 4 ... 20 mA, 0 – 5 V, 1 – 5 V, 0 – 10 V, 2 – 10 V
Input types	Differential or single ended (jumper selectable)
Input impedance	Current 250 Ω Voltage 200 k Ω
Alarm function for out-of-range signal	Yes, for 4 ... 20 mA 1 ... 5 V and 2 ... 10 V, when the signal drops below the lower limit
Functions	First-order software filter, linear/square root
Resolution	12 bits
Inaccuracy	Max. ± 0.2 % of FS within 0 – 50 $^{\circ}\text{C}$
Temperature stability	0.01 % FS per $^{\circ}\text{C}$ within 0 – 50 $^{\circ}\text{C}$

Analogue Outputs

Output ranges	0 ... 20 mA, 4 ... 20 mA
Type	Current source
Max. output current	22 mA
Load resistance on current output	Max. 650 Ω
Short circuit protection	Yes
Resolution	12 bits
Output signal break detection	Yes
Inaccuracy	Max. ± 0.2 % of FS within 0 – 50 $^{\circ}\text{C}$

Communication

Number of ports	2, RS 232 and RS 485 (2-wire)
Bus system, communication protocol	COMLI
Speed of transfer	Max. 19.2 Kbaud

Operator Interface

Display	Backlit LCD with 120 x 32 pixels
Bar graphs	LED, Process value 30 segments, Controller output 20 segments

Keys	Six keys: Cancel, Page, OK, Hand, Increase and Decrease
Presentation	Process value, set point, controller output indicated on bar graphs and on LCD display. Alarms indicated on process value bar graph. Set point type (internal/ external) indicated on LCD display. Computer/local status indicated on LCD display.

Digital Inputs

Type	24 V DC, common digital input ground, current sink, opto-isolated
Voltage	Max. 35 V, min. –0.5 V
Logic levels	0 < 3 V (IEC 1131-2, type 1) 1 > 15 V (IEC 1131-2, type 1)

Digital Outputs

Type	24 V DC, current source
Load current	Max. 250 mA per output Max. 500 mA total
Short-circuit current	Max. 500 mA transient current during 1 μs

Power supply

AC	115/230 V AC ± 10 %, 50 – 60 Hz, 20 V A or 19 V AC ± 10 %, 50 – 60 Hz, 1 A
DC	24 V DC ± 10 %
Protection	Secondary side of transformer and direct supply fused via thermo type fuse
Transmitter	Max. 24 V DC/150 mA

Environmental specifications

Operating temperature	+5 to +55 $^{\circ}\text{C}$ (IEC 68-2-1/2)
Non-operating temperature	–25 to +70 $^{\circ}\text{C}$ (IEC 68-2-1/2)
Non-operating damp heat steady state	93 % relative humidity at +40 $^{\circ}\text{C}$ (IEC 68-2-3)
Protection class	IP 20 generally, IP 65 for front, IP 65 for front against IP 65 compliant panel with panel mounting kit

Electrical

environment	Fulfills ElectroMagnetic Compatibility, EMC, directive 89/336/EEC
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MODEL CODES

Model Codes ECA6

Standard Controller	ECA6	
Mounting kit		
order as auxiliary		-Z
Options		
Custom Configuration		-T
Master Instruction		
German		-D
English		-E

Model Codes ECA60

Universalregler	ECA60	
Montagekit		
Bestellung als Zubehör		-Z
Optionen		
Kundenspezifische Einstellung		-T
Inbetriebnahme- und Wartungsanleitung		
Deutsch		-D
Englisch		-E

Model Codes ECA600

Multi Loop Controller	ECA600	
Mounting kit		
order as auxiliary		-Z
Options		
Custom Configuration		-T
Master Instruction		
German		-D
English		-E

Model Codes EMA60

Multi-Instrument	EMA600	
Mounting kit		
order as auxiliary		-Z
Options		
Custom Configuration		-T
Master Instruction		
German		-D
English		-E

Model Codes Auxiliaries

PC-Software	DOX60	
for configuration via RS232 interface (for all devices)		
Adapter for Shelf Housing compact E/P	ADA	
for shelf cE/cP 400		-400
for shelf cE/cP 600		-600
Mounting kit	KIT	
Plates		-A
Cassette		-B

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