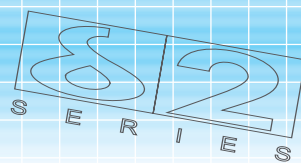
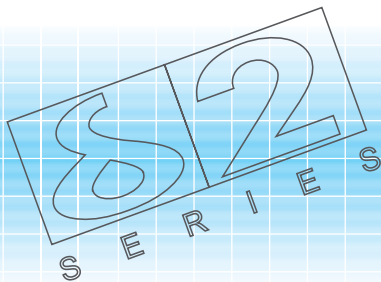
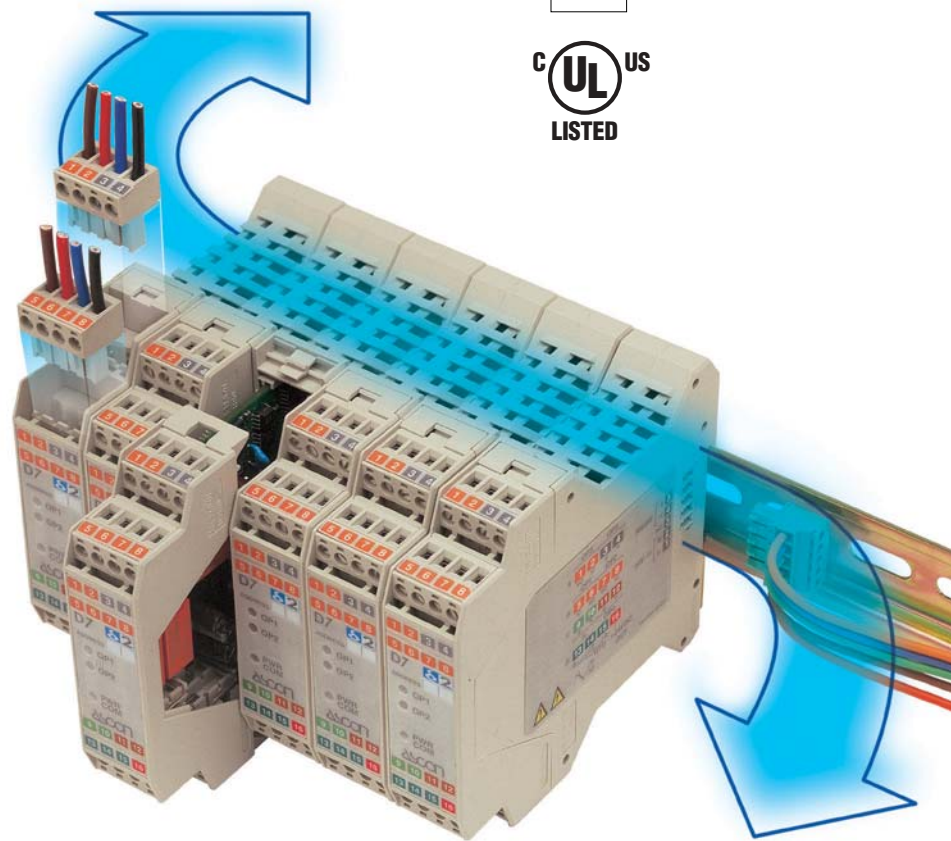


# DIN rail mounting double action controller with analogue output, delta<sup>due</sup><sup>®</sup> series **D3 line**

## Continuous control on DIN rail

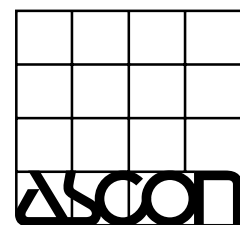
The delta<sup>due</sup><sup>®</sup> series includes one of the most advanced line of DIN rail mounting controller modules. The D3 line can satisfy almost every control application with the following features:

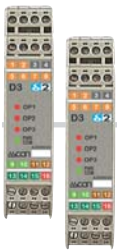
- Common bus for power supply and serial communications
- Totally withdrawable
- Easy replacement without switching off the power supply
- Digital input for remote commands
- Timer and Start-Up function
- Automatic tuning
- Open/Stop/Close output for electric actuators
- Singol action as well as heat/cool control
- Full integration with the delta<sup>due</sup><sup>®</sup> series data acquisition and control modules
- Easy integration with PC and PLC system
- Easy and simplified installation and maintenance



E

ISO 9001 Certified





# deltaDue®

distributed control/acquisition

## Advantages and peculiarities

### Keeping costs low



- Modular construction and compact dimensions
- Quick mounting on DIN rail
- Possibility of prewiring
- Common bus for power supply and serial communications



### Wiring error reduction

- Polarised connectors
- Coloured Terminal identification



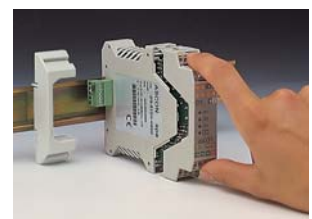
### High integration

- Mounting on the machine or real panel
- Remote/centralised control
- RS485/CanBus
- Communications interface



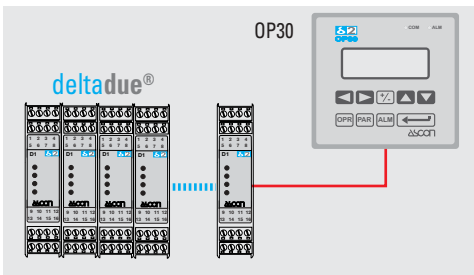
### Easy maintenance

- Withdrawable
- Easy replacement without switching off the power supply

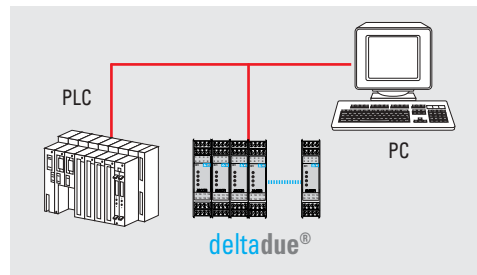


### Typical applications

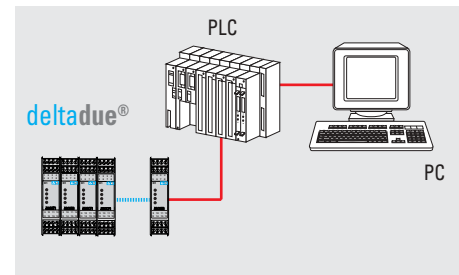
#### Local control with operator panel OP30



#### Distributed control with PLC and with dedicated modules for critical loops



#### Distributed control with PC supervision



### Resources

**Main universal input**

12 TC, Pt100, ΔT, mA V, Custom → PV

**Digital input**

→ IL

**Setpoint** LOC, 2 MEM, START UP, TIMER

**Special functions (option)**

**IL connected functions** 2 MEM, HOLD PV



**OP1** → [Switch] [Diode]

**OP2** → [Switch] [Diode]

**OP3** → [Switch]

**OP4** → [Relay]

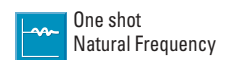
**OP5 (option)** → [mA]

Modbus RS485  
Parameterisation  
Supervision

### Operating mode

	Control	Alarms	Retransmission
			PV/SP
1	Single action	OP1	OP2 OP3 OP5
2		OP4	OP1 OP2 OP3 OP5
3		OP5	OP1 OP2 OP3
4	Double action	OP1 OP2	OP3 OP5
5		OP1 OP4	OP2 OP3 OP5
6		OP4 OP2	OP1 OP3 OP5
7		OP1 OP5	OP2 OP3
8		OP5 OP2	OP1 OP3
9		OP5 OP4	OP1 OP2 OP3
10	Valve (Option)	OP1 OP2	OP3 OP5

Fuzzy tuning with automatic selection



## Technical data

Features at env. 25°C	Description			
Total configurability	By means of the configuration tool it is possible to select: - type of input - the type of control input - type of output - type and functionality of the alarms - type of Setpoint - control parameter values			
PV input	Common characteristics	A/D converter with resolution of 50000 points Update measurement time: 0.2 s Sampling time: 0.5 s Input bias: - 60...+ 60 digit Input filter: 1...30 s OFF = 0		
	Accuracy	0.25% ±1 digit (for temperature sensor) 0.1% ±1 digit (for mA e mV)	Between 100...240Vac the error is minimal	
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wires connection Burnout (with any combination)	Line: 20Ω max. (3 wire) Input drift: 0.35°C/10°C Env. Temp. <0.35°C/10Ω Wire Res.
	Thermocouple	L, J, T, K, S, R, B, N, E, W3, W5 (IEC 584) °C/°F selectable	Internal cold junction compensation with NTC Error 1°C/20°C ±0.5°C Burnout	Line 150Ω max. Input drift: <2μV/°C Env. Temp. <5μV/10Ω Wire Res.
	DC input (current)	0/4...20mA, 2.5Ω ext. shunt Rj >10MΩ	Burnout. Engineering units, decimal point position configurable low range: -999...9999 high range: -999...9999 (min. range of 100 digits)	Input drift: <0.1%/20°C Env. Temp. <5μV/10Ω Wire Res.
	DC input (voltage)	10...50mV, 0...50mV Rj >10MΩ		
Digital input	The closure of external contact produces any of the following actions: Auto/Man mode change, Stored Setpoints activation, measure hold, Timer activation (if option installed)			
Operating mode	1 single or double action PID loop or ON/OFF with 1, 2 or 3 alarms			
Control mode	Algorithm	PID with overshoot control or ON/OFF PID with valve algorithm, for controlling motorised positioners		
	Proportional band (P)	0.5...999.9%		
	Integral time (I)	0.1...100.0 min		
	Derivative time (D)	0.01...10.00 min		
	Error dead band	0.1...10.0 digit		
	Overshoot control	0.01...1.00		
	Manual reset	0.0...100.0%		
	Cycle time (Time proportioning only)	1...200 s		
	Control output high limit	10.0...100.0%		
	Soft-start output value	0.1...100.0%	OFF=0	
	Output safety value	0.0...100.0% (-100.0...100.0% for Heat/Cool)		
	Control output hysteresis	0.1...10.0%		
	Dead band	-10.0...10.0%		
	Relative cool gain	0.1...10.0		
	Cycle time (Time proportioning only)	1...200 s		
	Control output high limit	10.0...100.0%		
Cool output hysteresis	0.1...10.0%			
Motor travel time	15...600 s	Valve drive PID algorithm without feedback potentiometer		
Motor minimum step	0.1...5.0%			

## Fuzzy-Tuning

Two methods of tuning are available:

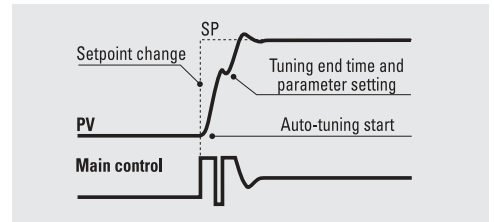
- **Auto-Tuning "one shot"**
- **Natural frequency "one shot"**

The **Fuzzy-Tuning** automatically selects one of the two methods which assures the best result for each condition.

The **Auto-Tuning** method works best on the step response basis.

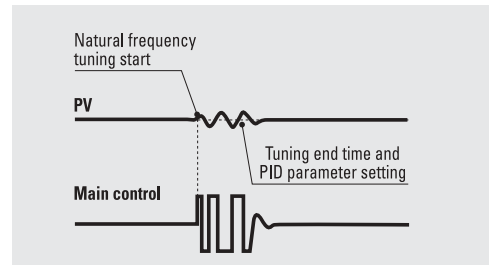
When activated, if a deviation exists between the Setpoint and process variable larger than 5% of scale range, the controller modifies the output value. Then, in a short time, it calculates the PID parameters and the new algorithm is operational immediately.

The main advantages of this method are fast calculation and quick implementation.



The **Natural frequency** method works best when the process variable is very near to the Setpoint. When activated, it causes a process oscillation around the Setpoint value.

The main advantage of this method is a reduced disturbance to the process.



## Heat/Cool control

By a sole PID control algorithm, the controller handles two different outputs, one of these performs the Heat action, the other one the Cool action. It is possible to overlap the outputs. The Cool action can be adjusted using the relative cool gain parameter. The Heat and Cool outputs can be limited separately.

## Technical data

Features at env. 25°C	Description		
OP1-OP2 outputs	SPST Relay NO, 2A/250Vac (4A at 120 Vac) for resistive load SSR, 1A/250Vac for resistive load <b>To meet the double isolation requirements, OP1 and OP2 must have the same load voltage</b>		
OP3 output	SPST Relay NO 2A/150Vac for resistive load		
OP4 output	Logic not isolated: 0/5Vdc, ±10% 30 mA max.		
OP5 Analogue output (option)	Control or PV/SP retransmission	Galvanic isolation: 500Vac/1 min Resolution: 12 bit Accuracy: 0.1%	In current: 0/4...20mA, 750Ω /15V max.
AL1- AL2 - AL3 alarms	Hysteresys	0.1...10.0%	
	Action	Active High	Action Type Deviation threshold ±range Band threshold 0...range Absolute threshold whole range
		Active low	
		Special functions	Sensor break, Loop break; Acknowledge (latching), Activation inhibit (blocking) Connected to Timer (if option installed)
Setpoint	Local	Up and down ramps 0.1...999.9 digit/min (OFF=0)	
	Local plus 2 stored with tracking or Stand-by	Low limit: from low range to high limit. High limit: from low limit to high range	
Special functions (options)	Timer	Automatic start at the power on, manual start by digital inputs or serial comm.s Setting time: 1...9999 s/min Stand-by Setpoint: $SLLO \leq SP \geq SLHI$	
	Start-up	Start-up Setpoint: $SLLO \leq SP \geq SLHI$ Hold time: 0...500 min Control output high limit: 5.0...100.0%	
One shot Fuzzy-Tuning	The controller selects automatically the best method according to the process conditions	One shot Auto Tuning One shot Natural Frequency	
Auto/Man station	Standard with bumpless function, by digital input or serial communications		
Serial Comm.s	RS485 isolated, Modbus/Jbus RTU protocol, 1,200, 2,400, 4,800, 9,600 bit/s, two wires		
Auxiliary Supply	+24Vdc ±20% 30mA max. - for external transmitter supply		
Operational Safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies	
	Control output	Safety value: -100...100%	
	Parameters	Parameter and configuration data are stored	
	Outputs lock	in a non volatile memory for an unlimited time	
General characteristics	Power supply (PTC protected)	24Vac (-25...+12%) 50/60Hz and 24Vdc (-15...+25%)	Power consumption 3W max.
	Safety	EN61010-1 (IEC1010-1), installation class 2 (2.5kV) pollution class 2, instrument class II	
	Electromagnetic compatibility	Compliance to the CE standards	
	UL and cUL approval	File E176452	
	Protection	Terminal strip IP20	
	Dimensions	Pitch: 22.5 mm - depth: 114.5 mm - width: 53 mm	
Weight	161 g approx.		

### Digital input

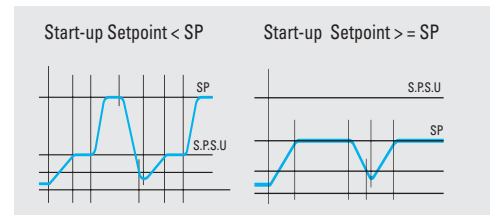
The digital input can be configured to have one of the following functions:

- Measure hold
- Auto/Man switching
- Stored Setpoint activation
- Timer activation

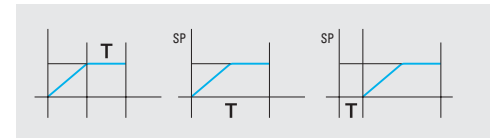
### Special functions

To improve the instrument performance and to reduce the wiring and installation costs, two special functions are available:

#### - Start-up



#### - Timer



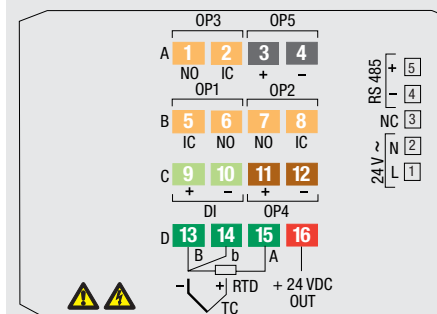
The use of these functions avoids additional device installation (e.g. external timer), therefore allowing a significant costs reduction.

Moreover there are

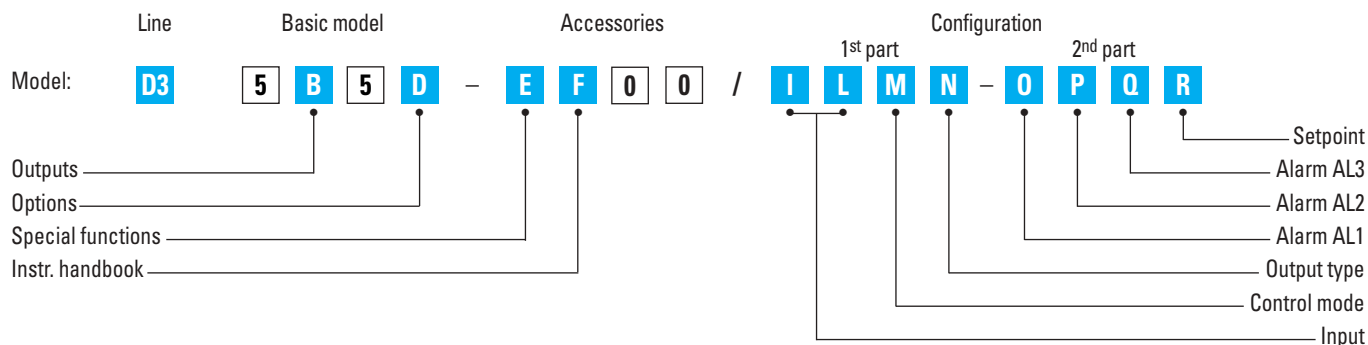
- **Output lock** function,

The outputs can be switched to the OFF status via serial communications.

### Electrical connections



## Ordering codes



Outputs	OP1	OP2		B
Relay	Relay			1
SSR	SSR			5
Options				D
None				0
Valve drive output				2
Analogue output				5
Valve drive output + Analogue output (retransmission only)				7
Special functions				E
Not fitted				0
Start-up + Timer				2
Instruction handbook				F
Italian-English (std)				0
French-English				1
German-English				2
Spanish-English				3

Inpt type	Range scale		I	L
TR Pt100 IEC751	-99.9...300.0 °C	-99.9...572.0 °F	0	0
TR Pt100 IEC751	-200...600 °C	-328...1112 °F	0	1
TC L Fe-Const DIN43710	0...600 °C	32...1112 °F	0	2
TC J Fe-Cu45% Ni IEC584	0...600 °C	32...1112 °F	0	3
TC T Cu-CuNi	-200...400 °C	-328...752 °F	0	4
TC K Chromel -Alumel IEC584	0...1200 °C	32...2192 °F	0	5
TC S Pt10%Rh-Pt IEC584	0...1600 °C	32...2912 °F	0	6
TC R Pt13%Rh-Pt IEC584	0...1600 °C	32...2912 °F	0	7
TC B Pt30%Rh-Pt Pt6%Rh IEC584	0...1800 °C	32...3272 °F	0	8
TC N Nichrosil-Nisil IEC584	0...1200 °C	32...2192 °F	0	9
TC E Ni10%CR-CuNi IEC584	0...600 °C	32...1112 °F	1	0
TC NI-NiMo 18%	0...1100 °C	32...2012 °F	1	1
TC W3%Re-W25%Re	0...2000 °C	32...3632 °F	1	2
TC W5%Re-W26%Re	0...2000 °C	32...3632 °F	1	3
0...50mV linear	Engineering units		1	4
10...50mV linear	Engineering units		1	5
mV "Custom" scale	On request		1	6

Control mode		M
ON-OFF reverse action		0
ON-OFF direct action		1
PID single reverse action		2
PID single direct action		3
PID double action	Linear cool output	4
	ON-OFF cool output	5
	Water cool output	6
	Oil cool output	7

Output type - Single action	Output type - Double action	N
OP1	Heat OP1, Cool OP2	0
OP4	Heat OP1, Cool OP4	1
OP5	Heat OP4, Cool OP2	2
Valve drive (OP1 and OP2)	Heat OP1, Cool OP5	3
	Heat OP5, Cool OP2	4
	Heat OP4, Cool OP5	5
	Heat OP5, Cool OP4	6


AL1-AL2-AL3 type and function		O-P-Q
Disabled or (AL3 only) used by Timer		0
Sensor break/Loop break alarm	absolute active high	1
	absolute active low	2
	Deviation active high	3
Deviation	Deviation active low	4
	Band active out	5
Band	Band active in	6

Setpoint type		R
Local only		0
Local and 2 tracking stored Setpoints		1
Local and 2 Stand-by stored Setpoints		2


### Installation kit

Each set of interconnected controllers requires one model **AD3-KIT/BA.RT.PC.CD** kit:


Power supply and serial comm.s connector code AD3/BA




Couple of connector protections code AD3/PC



Connector with termination resistor for serial comm.s code AD3/RT



CD Rom with configuration software tool code AD3/CD



**If not differently specified the controller will be supplied with standard version Model: D3 5150-0000**



# DX line - Manager Gateway

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Fax +39 02 350 4243  
<http://www.ascon.it>  
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[www.asconcorp.com](http://www.asconcorp.com)  
info@asconcorp.com

**WORLDWIDE NETWORK OF DIRECT SALES CENTRES, DISTRIBUTORS AND VARs**

**Europe**

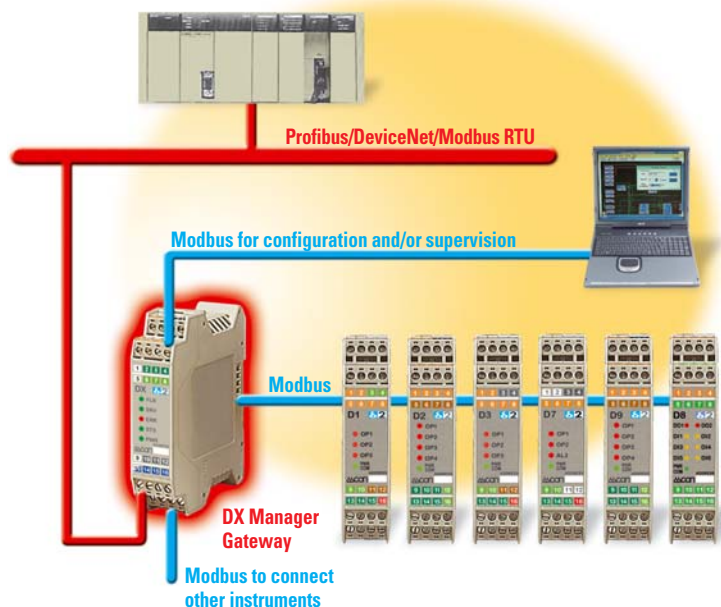
Belgium, Croatia, Czech Rep., Denmark, Esthonia, Finland, France, Germany, Great Britain, Greece, Holland, Ireland, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine

**Americas**

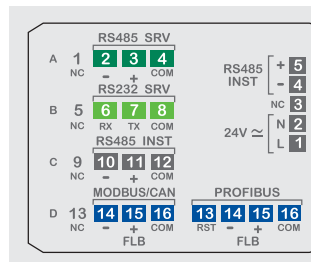
Argentina, Brazil, Canada, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela

**Rest of the world**

Algeria, Australia, China, Egypt, Hong Kong, India, Indonesia, Iran, Israel, Malaysia, Morocco, New Zeland, Pakistan, Saudi Arabia, Singapore, Taiwan, Thailand, Tunisia, South Africa & South East Africa, UAE



## Electrical connections



## Ordering codes

Line: **DX** Basic model: **5 B C 0** Accessories: **0 F 0 0** Configuration: **0 0 0 0**

Model: **DX 5 B C 0 - 0 F 0 0 / 0 0 0 0**

No. of instruments backed up: **5** Instructions handbook: **F**

Fieldbus communications: **C**

Number of instruments to be backed up	<b>B</b>
0	0
4	1
8	2
16	3
32	4

Fieldbus communications	<b>C</b>
None	0
Devicenet	1
RS 485 Modbus/Jbus RTU	5
Profibus DP slave	7

Instructions handbook	<b>F</b>
Italian-English (standard)	0
French-English	1
German-English	2
Spanish-English	3

**If not differently specified the instrument will be supplied with standard version Model: DX 5000-0000**

**Note:** the instrument executes the RS232/485 converter hardware function only for the Modbus RTU protocol.

## Technical data

Features at env. 25°C	Description	
Functions	Manager OFF line configuration and parameterization. Backup of the configuration and parameter data of the connected modules. Hot swapping, automatic configuration and parameterization of the replaced modules	
	Gateway Network adapter for Profibus DP, DeviceNet, Modbus RTU and RS485/RS232 converter	
Communications ports	Instruments Bus RS485 Modbus protocol master replicated on the terminal connectors (max. 19200 baud)	
	Support RS485, RS232 Modbus RTU protocol slave, isolated (max. 38400 baud)	
	Fieldbus	RS485 Modbus RTU protocol slave, isolated (max. 57600 baud)
		Profibus DP slave DP control: SPC3 DP interface: RS485 isolated, max. 12 Mb/s
General characteristics	CAN 2.0b, isolated, max. 1Mb/s (for DeviceNet) See the entry "General characteristics" of the other module for details	