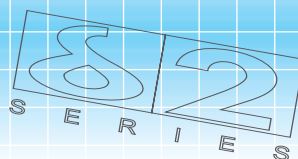
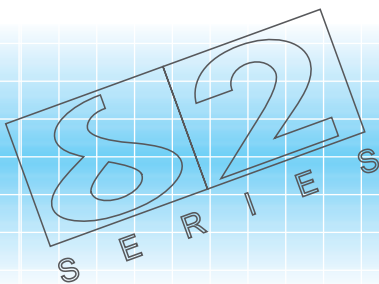
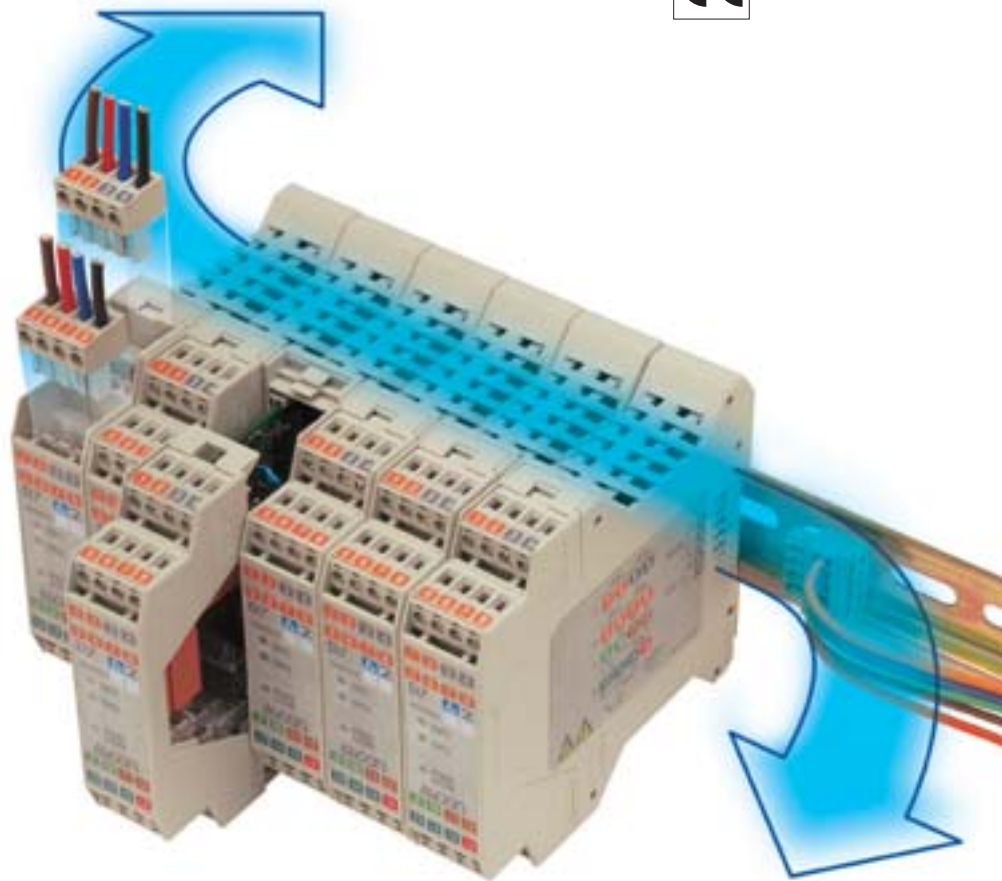


# DIN rail mounting dual loop controller/analogue acquisition module deltadue<sup>®</sup> series **D2 line**



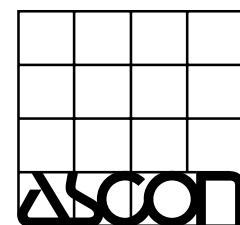
## Two loops in the space of one

A common bus for serial power supply and communications, total withdrawability, ease of replacement even with the power supply on, digital inputs for remote commands, the option of acquiring or controlling two analogue variables makes the delatadue<sup>®</sup> D2 line a powerful and flexible instrument, suitable for solving the most diverse problems of field signal management. Together with the DX module, it can be used in PROFIBUS DP<sup>®</sup> and DeviceNet<sup>®</sup> networks, with the automatic reconfiguration option (hot swapping).



E

ISO 9001 certified



## 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.



- Polarised connectors;  
 - Coloured Terminal identification.



### High integration

- On-machine or rear panel mounting
- Remote/centralised control;
- RS485/CanBus;
- PROFIBUS DP, DeviceNet (with DX module).



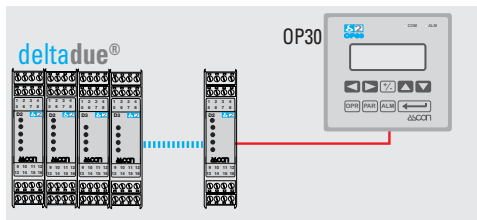
### Easy maintenance

- Withdrawable;
- Easy replacement without switching off the power supply;
- Hot swapping, automatic configuration of the new or replaced modules (with DX module).

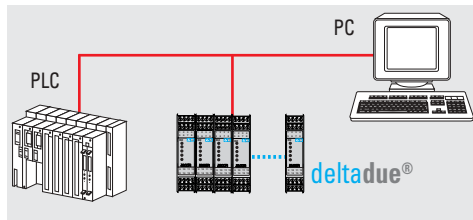


### Typical applications

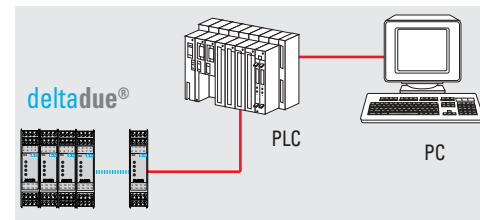
#### Local control with operator panel OP30



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



#### Distributed control with PC supervision



### Resources

**Main universal inputs**

PV1: 12 TC, Pt100, ΔT, mA V, Custom

PV2: 12 TC, Pt100, ΔT, mA V, Custom

**Digital input for external commands**

IL1

**Digital outputs [1]**

OP1, OP2, OP3, OP4

**Digital inputs [2]**

**Setpoint** | **IL1 connected functions**

LOC | MEM | HOLD PV | ACK

Modbus RS485  
Parameterisation  
Supervision

**Available functions**

Not

**Fuzzy tuning with automatic selection**

One shot Auto tuning | One shot Natural Frequency

### Operating modes

		Control	Alarms	
PV1	0 Acquisition only		OP1	OP3
	1 Single action	OP1		OP3
	2 Single action	OP3	OP1	
PV2	3 Acquisition only		OP2	OP4
	4 Single action	OP2		OP4
	5 Single action	OP4	OP2	
PV1	6 Single action	OP1	OP2	OP3
PV2	7 Single action	OP4		

Notes: 1. Each output (OP1...OP4) can freely be associated with one of the two inputs (PV1 or PV2).  
 2. When outputs OP3 and OP4 are not used as such, they can be used as voltage free or voltage inputs.

## 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			
PV1 and PV2 inputs	Common characteristics	A/D converter with resolution of 50,000 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 and mV)	Between 100...240Vac the error is minimal	
	Resistance thermometer (for ΔT: R1+R2 dmust be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wires connection Burnout (with any combination)	Line: 20Ω max. (3wires) 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...20°C ±0,5°C Burnout	Line 150Ω max. Input drift <2μV/1°C Env. Temp. <5μV/10Ω Wire Res.
	DC input (current)	0/4...20mA, 2.5Ω ext. shunt Rj >10MΩ	Burnout. Engineering inputs, decimal point position configurable low range: -999...9999 high range: -999...9999 (min range: 100 digits)	Input drift: <0.1%/20°C Env. Temp. <5μV/10Ω Wire Res.
	DC input (voltage)	10...50mV, 0...50mV Rj >10MΩ		
Mutual isolation	Isolation voltage 500V			
Digital input	Closing the external contact allows:	Auto/Man mode change, switching between 2 stored setpoints, measure hold, alarms acknowledge, outputs lock		
Operating mode	2 acquisition channels, 2 single action loops PID or ON/OFF with 1, 2, 3 or 4 alarms			
Control mode	Algorithm	PID with overshoot control or ON/ OFF		
	Proportional band (P)	0.5...999.9%	Single action PID algorithm	
	Integral time (I)	0.1...100.0 min		
	Derivative time (D)	0.01...10.00 min		OFF = 0
	Error dead band	0.1...10.0 digit		
	Overshoot control	0.01...1.00		
	Manua reset	0.0...100.0%		
	Cycle time (time proportional only)	1...200s		
	Control output high limit	10.0...100.0%		
	Control output low limit	0.0...90.0%		
Soft start output value	0.1...100.0%	OFF = 0		
Output safety value	0.0...100.0%			
Control output hysteresis	0.1...10.0%	ON/OFF algorithm		
OP1-OP2 outputs	SPST relay NO, 2A/250Vac (4A/110 Vac) for resistive load SSR, 1A/250Vac for resistive load SSR drive: 0/5Vdc, ±10% 30 mA max. Too meet the double isolation requirements, OP1 and OP2 must have the same load type			
OP3-OP4 outputs	Non isolated logic: 0/5Vdc, ±10% 30 mA max.			
Outputs functions	For all the outputs the inversion function (NOT) is available			
AL1 - AL2 - AL3 - AL4 alarms	Hysteresys	0.1...10.0%		
	Action	Active high	Action type	Deviation threshold ±range
		Active low		Band threshold 0...range
		Special functions	Sensor break, Loop break Alarm acknowledge (latching), activation inhibit (blocking)	
	Alarm source	Assigns the alarms to the Present Value of LOOP 1/LOOP 2 (PV1 or PV2). If set as deviation or band, the alarms are assigned to the Setpoint of LOOP 1 or LOOP 2		
	Alarm output	Assigns the alarm condition to an output (OP1, OP2, OP3, OP4). If not configured, the alarm status is available on the coil		
Setpoint (for each loop)	Local	Up and down ramps 0.1...999.9 digit/min. (OFF=0)		
	Local + 2 stored	Low limit: from low range to high limit High limit: from low limit to high range		

## Fuzzy-Tuning

Two methods of tuning are available:

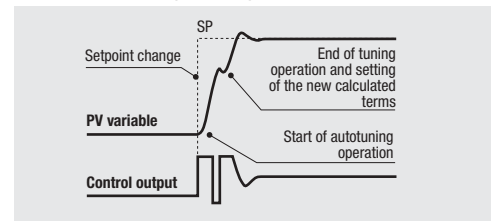
- **Auto-Tuning "one shot"**
- **Natural frequency "one shot"**

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

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

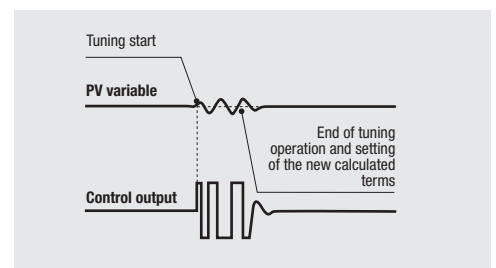
When activated, if a deviation exists between the Setpoint and process variable larger than 5% of scale range, the controller modifies the output value. Then, in a short time, it calculates the PID parameters and the new algorithm is operational immediately.

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



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

The main advantage of this method is the better definition of PID parameters.



## Technical data

Features at 25°C Env. Temp.	Description		
Fuzzy-Tuning one shot (1 loop at a time)	The controller automatically selects the best method according to the process conditions	One shot Auto Tuning One shot Natural Frequency	
Auto/Man station	Standard with bumpless function, Switched by digital input or serial communications		
Serial communications	RS 485 isolated, Modbus/Jbus protocol, 1,200, 2,400, 4,800, 9,600 bit/s 2 wires		
Operational safety	Measure input	Detection of out of range, or input problems causes automatic activation of the safety strategies	
	Control output	Safety value: -100...100%	
	Parameters Outputs lock	Parameters and configuration data are stored in a non volatile memory for an unlimited time	
General characteristics	Power supply (PTC protected)	24Vac (-20...+12%) 50/60Hz and 24Vdc (-15...+25%)	Power consumption 3 W max.
	Safety	EN61010-1 (IEC1010-1) installation class 2 (2.5kV), pollution class 2, instrument class II	
	Electromagnetic compatibility	Compliance to the CE standards	
	Protection	Terminal blocks IP20	
	Dimensions	Pitch: 22.5 mm - height: 99 mm - depth 114.5 mm	
	Weight	156 g approx	

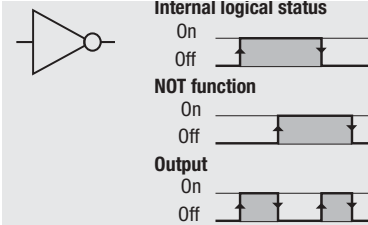
### Digital input

During the configuration procedure, to the IL digital input can be connected one of the following functions:

- Measure Hold: PV1, PV2 or PV1 and PV2.
- Auto/Man mode change: PV1, PV2 or PV1 and PV2.
- Recall of the 2<sup>nd</sup> stored Setpoint: 1° setpoint LOOP 1, 1° setpoint LOOP 2 or 2° setpoint LOOP 1 and LOOP 2.
- Alarm acknowledge;
- Outputs block.

### Output functions

Is possible to enable, separately for each output (OP1... OP4), the negate (NOT) function of the internal status.



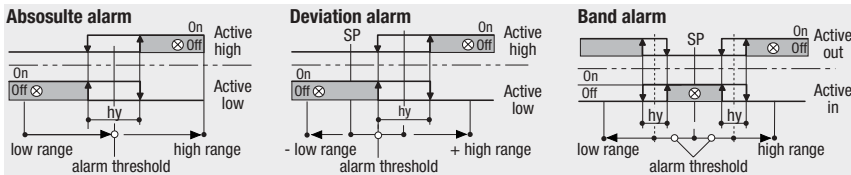
### Alarms

Four thresholds can be addressed to the four outputs. For each alarm can be configured:

#### A - Alarm source

Each alarm can be associated to one of the input loops. If configured as absolute alarm the threshold is compared with the present value of the selected loop (PV1 or PV2). If configured as deviation or band alarm, the threshold is compared with the selected loop Setpoint (SP1 or SP2).

#### B - Alarm type and function



#### C/D - Alarm acknowledge and Start-up disable

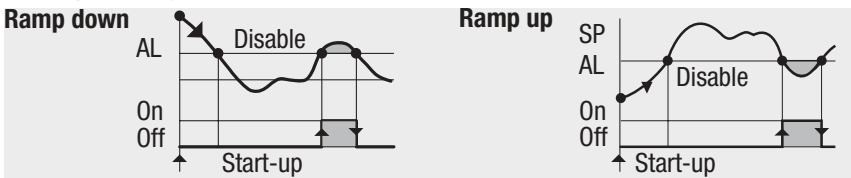
*Alarm acknowledge and disabling function for AL1, AL2, AL3 and AL4 alarms*

For each threshold can be configured, using the correct parameter value: none, alarm acknowledge, start-up disable or both active (acknowledge + start-up disable).

##### Alarm acknowledge

The alarm status remains until the acknowledge signal arrives through the serial communications port or the digital input. After this operation alarm status disappears only when the alarm condition is no longer present.

##### Start-up disabling



#### E - "Loop Break Alarm" (LBA) or sensor break functions

##### LBA operation delay

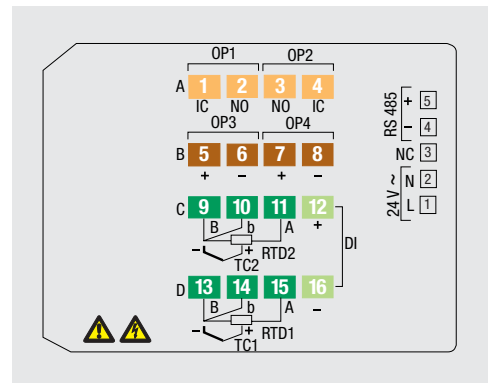
Set "None" to obtain an immediate action to a sensor break detection.  
 Set a value between 1...9999 s to obtain a delayed action to a loop break detection.  
 Also with the LBA operation delay set, if the error detected is caused by a sensor break, the action is immediate. When the cause of the alarm disappears, the alarm status stops.

#### F - Alarm output

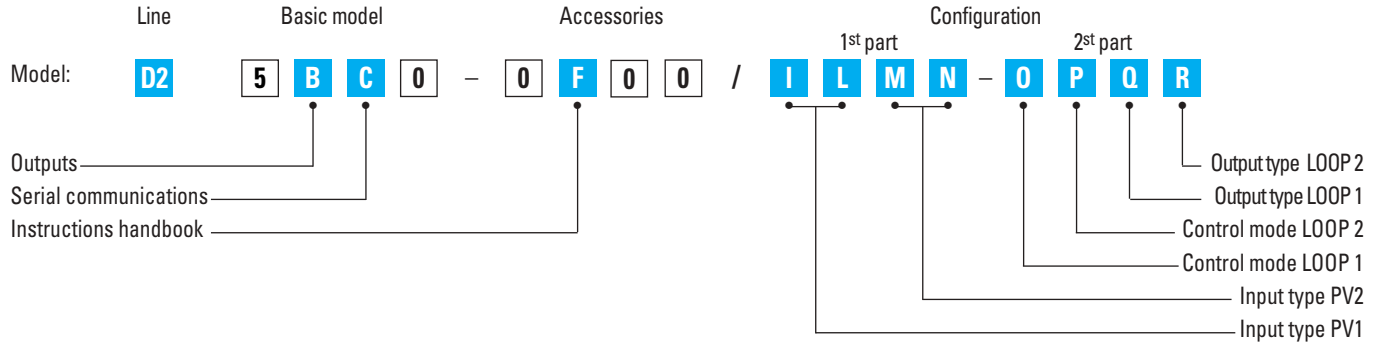
##### Physical output of the alarm

When not used as control outputs, one or more alarms (OR function) can be linked to OP1/OP2/OP3/OP4. This parameter can be set as: Coil (internal status), OP1, OP2, OP3, OP4.

### Electrical connections



# Ordering codes



Option	Code
OP1 and OP2 Outputs	<b>B</b>
Relay/Relay	<b>1</b>
Relay/SSR drive	<b>2</b>
SSR drive/SSR drive	<b>3</b>
SSR/SSR	<b>4</b>
SSR/SSR drive	<b>5</b>
Serial communications	<b>C</b>
CanBus	<b>3</b>
RS 485 Modbus/Jbus SLAVE	<b>5</b>
Instructions handbook	<b>F</b>
Italian-English (standard)	<b>0</b>
French-English	<b>1</b>
German-English	<b>2</b>
Spanish-English	<b>3</b>

Input type	Range scale	PV1	<b>I</b>	<b>L</b>
Input type	Range scale	PV2	<b>M</b>	<b>N</b>
TR Pt100 IEC751	-99.9...300.0 °C -99.9...572.0 °F		<b>0</b>	<b>0</b>
TR Pt100 IEC751	-200...600 °C -328...1112 °F		<b>0</b>	<b>1</b>
TC L Fe-Const. DIN43710	0...600 °C 32...1112 °F		<b>0</b>	<b>2</b>
TC J Fe-Cu45% Ni IEC584	0...600 °C 32...1112 °F		<b>0</b>	<b>3</b>
TC T Cu-CuNi	-200...400 °C -328...752 °F		<b>0</b>	<b>4</b>
TC K Chromel -Alumel IEC584	0...1200 °C 32...2192 °F		<b>0</b>	<b>5</b>
TC S Pt10%Rh-Pt IEC584	0...1600 °C 32...2912 °F		<b>0</b>	<b>6</b>
TC R Pt13%Rh-Pt IEC584	0...1600 °C 32...2912 °F		<b>0</b>	<b>7</b>
TC B Pt30%Rh-Pt Pt6%Rh IEC584	0...1800 °C 32...3272 °F		<b>0</b>	<b>8</b>
TC N Nichrosil-Nisil IEC584	0...1200 °C 32...2192 °F		<b>0</b>	<b>9</b>
TC E Ni10%Cr-CuNi IEC584	0...600 °C 32...1112 °F		<b>1</b>	<b>0</b>
TC Ni-NiMo 18%	0...1100 °C 32...2012 °F		<b>1</b>	<b>1</b>
TC W3%Re-W25%Re	0...2000 °C 32...3632 °F		<b>1</b>	<b>2</b>
TC W5%Re-W26%Re	0...2000 °C 32...3632 °F		<b>1</b>	<b>3</b>
0...50mV linear	Engineering units		<b>1</b>	<b>4</b>
10...50mV linear	Engineering units		<b>1</b>	<b>5</b>
mV "Custom" scale	On request		<b>1</b>	<b>6</b>

Action type	Code
LOOP 1	<b>O</b>
LOOP 2	<b>P</b>
ON/OFF reverse action	<b>0</b>
ON/OFF direct action	<b>1</b>
PID reverse single action	<b>2</b>
PID direct single action	<b>3</b>


Control output type	Code
LOOP 1	<b>Q</b>
None	<b>0</b>
OP1	<b>1</b>
OP3	<b>2</b>

Control output type	Code
LOOP 2	<b>R</b>
None	<b>0</b>
OP2	<b>1</b>
OP4	<b>2</b>

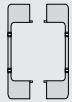
### Installation kit

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


Power supply and serial communications connector code AD3/BA




Couple of connector protections code AD3/PC



Connector with termination resistor for serial communications code AD3/RT



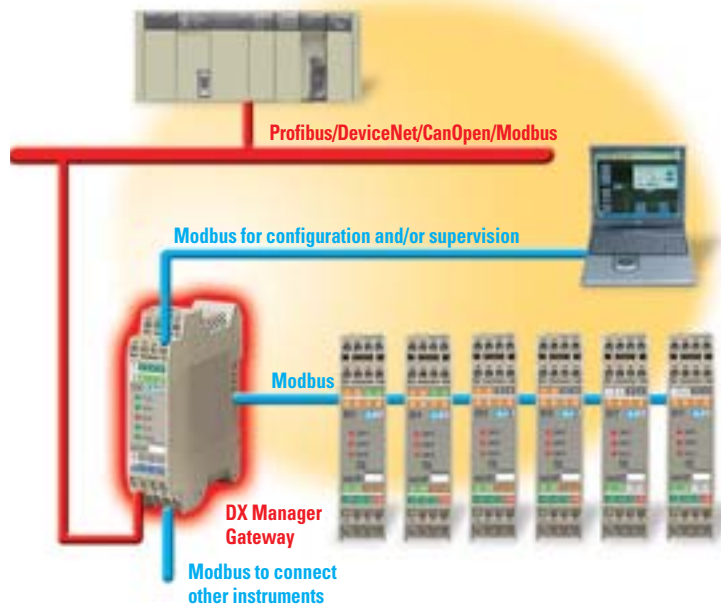
CD Rom with configuration software tool code AD3/CD



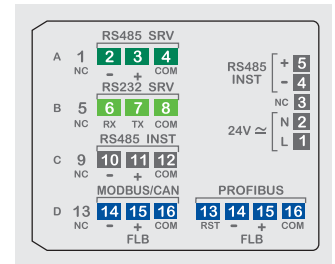
**If not differently specified the controller will be supplied with standard version**  
**Model: D2 5350-0000**

# DX line - Manager Gateway

**ASCON spa**  
 Via Falzarego, 9/11  
 20021 Bollate  
 (Milan) Italy  
 Tel. +39 02 333 371  
 Fax +39 02 350 4243  
<http://www.ascon.it>  
[sales@ascon.it](mailto:sales@ascon.it)



## Electrical connections



## Ordering codes

Line                      Basic model                      Accessories                      Configuration

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

N° of instruments backed up ————

Fieldbus communications ————

Instructions handbook

Number of instruments to be backed up	B	Instructions handbook	F
4	1	Italian-English (standard)	0
8	2	French-English	1
16	3	German-English	2
32	4	Spanish-English	3

Fieldbus communications	C
None	0
CANopen	3
RS 485 Modbus/Jbus	5
Profibus DP slave	7

**If not differently specified the controller will be supplied with standard version**  
**Model: DX 5100-0000**

## 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, CANopen and RS485/RS232 converter
Communications ports	Instruments Bus	RS485 Modbus protocol master replicated on the terminal connectors (max. 19200 baud)
	Support	RS485, RS232 Modbus protocol slave, isolated (max. 38400 baud)
		RS485 Modbus protocol slave, isolated (max. 57600 baud)
	Fieldbus	Profibus DP slave
DP interface: RS485 isolated, max. 12 Mb/s		
		CAN 2.0b, isolated, max. 1Mb/s
General characteristics	See the entry "General characteristics" of the other module for details	