

# LEVEL MONITOR

WITH LINEARIZATION AND ONE HIGH / LOW ALARM OUTPUT



## D-Series advantages

- Unique, robust IP66, IP67 (NEMA Type4X) panel mount front enclosure made of die cast aluminum, allowing even **big jets** of water and **total immersion**.
- Programming can be done by your own crew with the exact same, plain and sensible menu-driven structure like the F-Series, saving cost and irritation. **Know one, know them all!**

## Features

- Displays level, height and percentage filled.
- Eight point linearization of the tank shape - with interpolation.
- Two alarm values can be entered: low and high level alarm.
- Red flashing LED backlight in case of a level alarm.
- Large 17mm (0.67") digits.
- Selectable on-screen engineering units; volumetric or mass.
- Ambient temperature -40°C up to +80°C (-40°F up to 176°F).
- Input loop powered, battery powered or 8 - 30V DC, 24V AC and 115 - 230V AC.
- Sensor supply 8.2 / 12 / 24V DC.

## Signal output

- One free configurable alarm output, available as passive signal, active signal or a robust, highly isolated (NO/NC) relay.

## Signal input

### Level

- (0)4 - 20mA.
- 0 - 10V DC.

## Applications

- The D-Series is a DIN-sized display and the **better alternative** for your existing, not waterproof, front panel mount indicators in extreme weather outdoor applications or e.g. in food industries where working environments are often cleaned with powerful water jets.
- The Do77 fits in level measurement applications where continuous level monitoring and linearization due to the shape of the tank is important. Alternative basic models Do70, Do73, Do74 or the F-Series level indicators.

## General information

### Introduction

The Do77 is a versatile, panel mount level monitor with linearization and continuous level monitoring feature. In addition to the average Span, eight linearization points can be entered to compensate for the shape of the tank. The unit will interpolate between these points to increase the accuracy. This linearization affects all displayed information as well as the alarm output. With the level monitoring feature, one low level and one high level alarm value can be set.

### Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show level, height or percentage and alarm values. The display is a transfective type, which means that a high contrast reading is guaranteed, even in full sunlight. The Do77 has a smart display update function incorporated. Related to the lower temperatures, the update frequency of the LCD is tuned automatically to achieve a readable display even at -40°C / -40°F.

### Backlight

The white backlight in combination with the Do77 offers a unique feature: in case of a level alarm, the backlight can be set to be red or flashing red. The intensity can be adjusted in the configuration menu.

### Configuration

All configuration settings are accessed via a simple operator menu which can be password protected. Each setting is clearly indicated with an alphanumerical description, which avoids confusing abbreviations. Once familiar with one D-series product, you will be able to program **all models in all series** without a manual. All settings are safely stored in EEPROM memory in the event of sudden power failure.

### Alarm output

One alarm output is available to transmit the level alarm. It can be set to switch for a low, high or both alarms! The output signal can be a passive NPN, active PNP or a robust, highly isolated electro-mechanical relay (NO/NC).

### Signal input

The Do77 does accept (0)4 - 20mA and 0 - 10V input signals from any type of level measurement device. The input signal type can be selected by the user in the configuration menu without having to adjust any sensitive mechanical dip-switches, jumpers or trimmers. Also a 4 - 20mA input loop powered model is available.

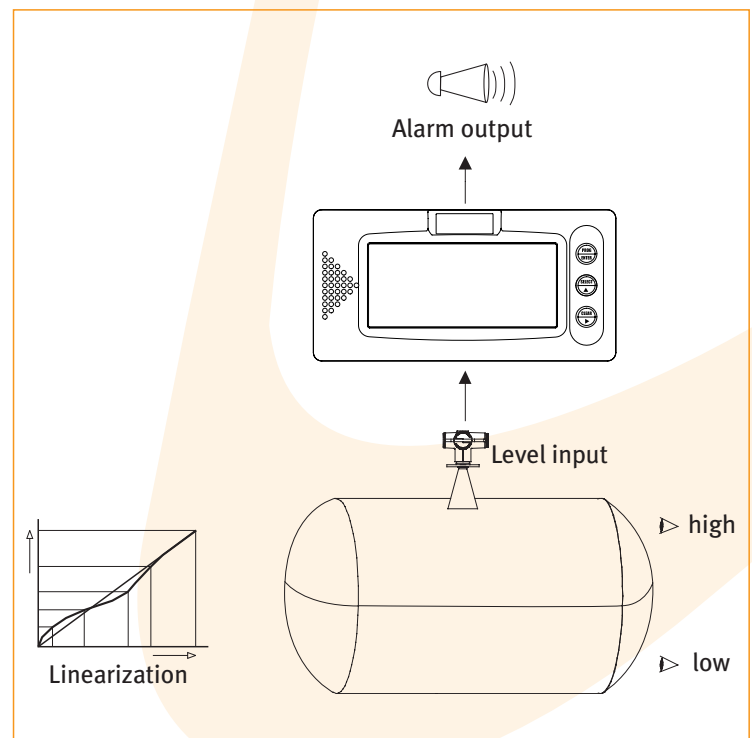
### Power requirements

The basic power supply for the Do77 is 8 - 30V DC. Several other power supplies are possible: With the 24V AC/DC and 115 - 230V AC power supplies, an 8.2 / 12 / 24V DC sensor supply is offered. For analog sensors, a 4 - 20mA input loop powered version is available. Finally we offer a long life lithium battery with a life expectancy that will last up to five years.

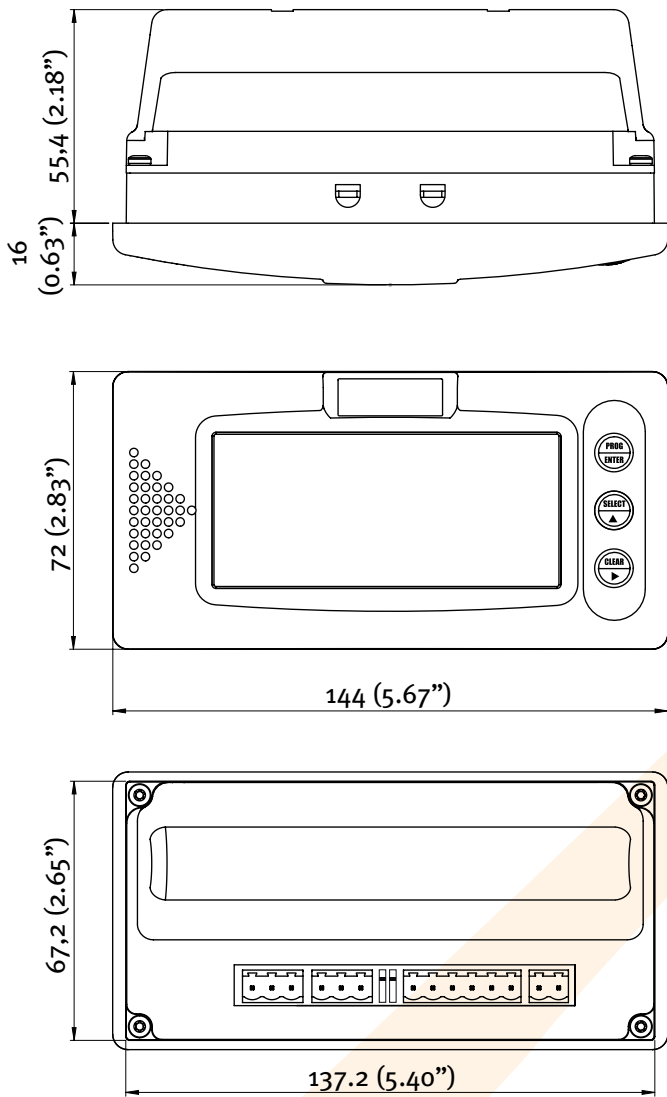
### Enclosure

The Do77 is supplied in a unique, robust IP66, IP67 (NEMA Type4X) class panel mount front enclosure made of die cast aluminum, based on a popular DIN sized enclosure of 144 x 72mm. The front enclosure withstands powerful water jets and even total immersion. The maximum thickness of the panel is 6mm (1/4"). The D-Series is the better alternative for your existing, not waterproof, front panel mounted indicators.

## Overview application Do77

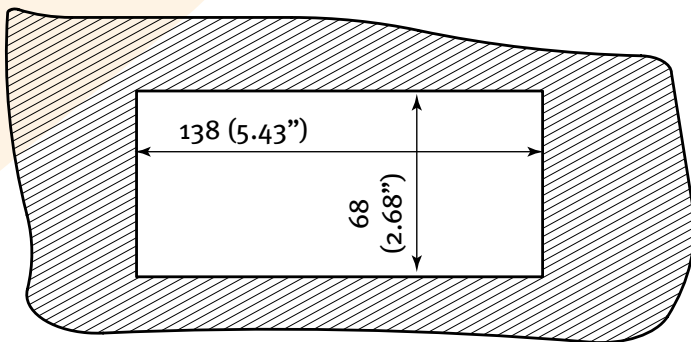


## Dimensions enclosure



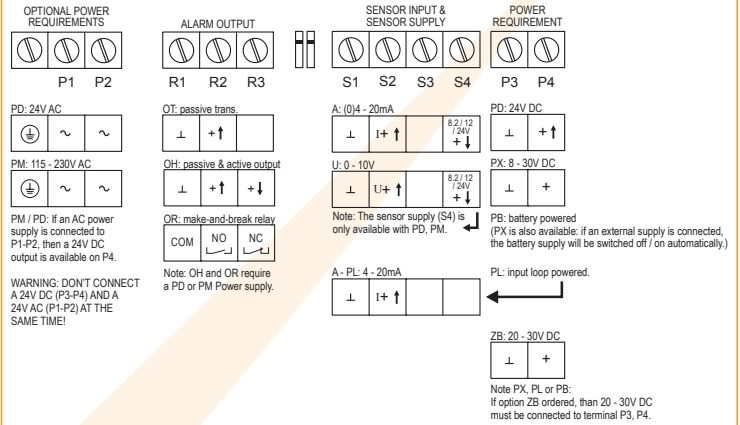
Dimensions according DIN 43700 / IEC 61554

## Dimensions panel cut-out



Maximum panel thickness: 6mm (1/4")

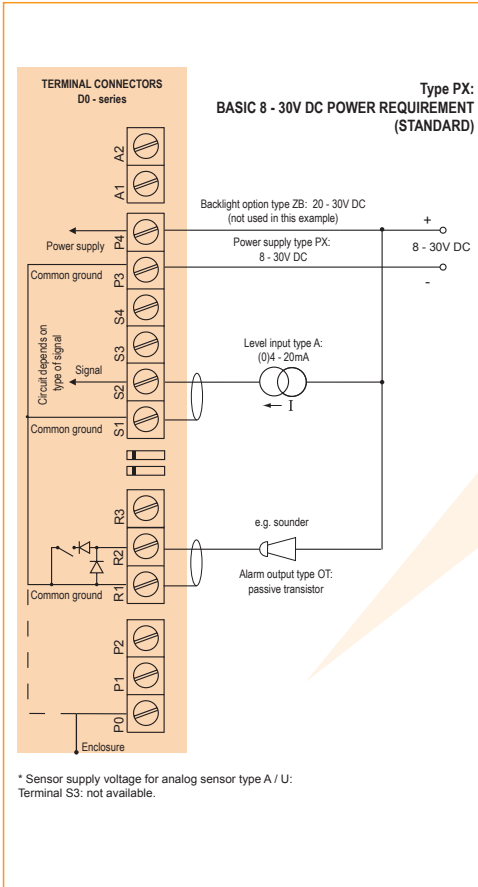
## Terminal connections Do77



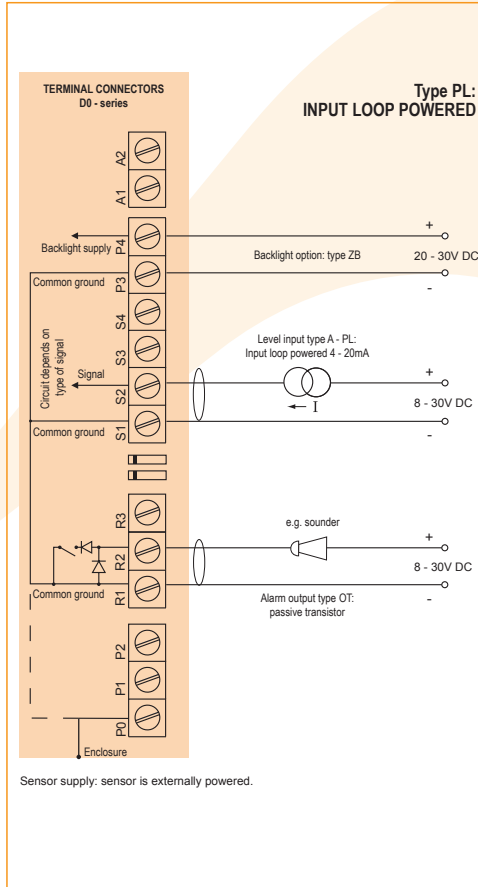
## Display example - 90 x 40mm (3.5" x 1.6")



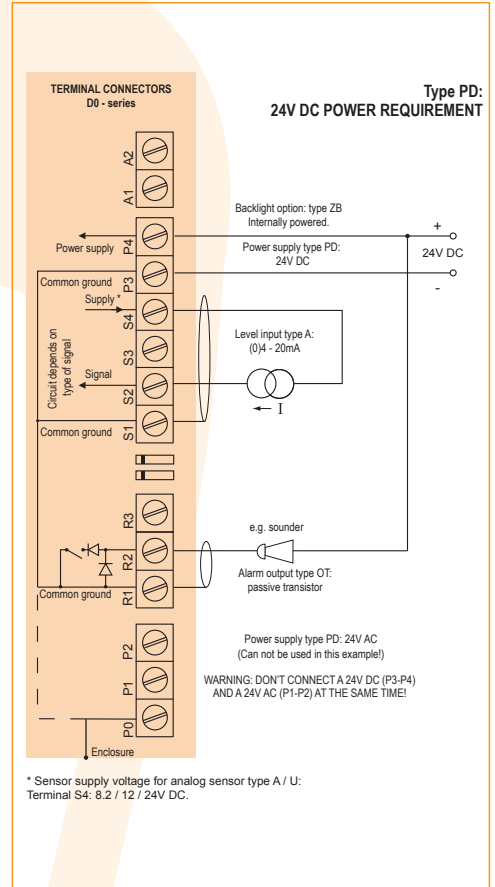
### Wiring diagram Do77-A-OT-PX-(ZB)



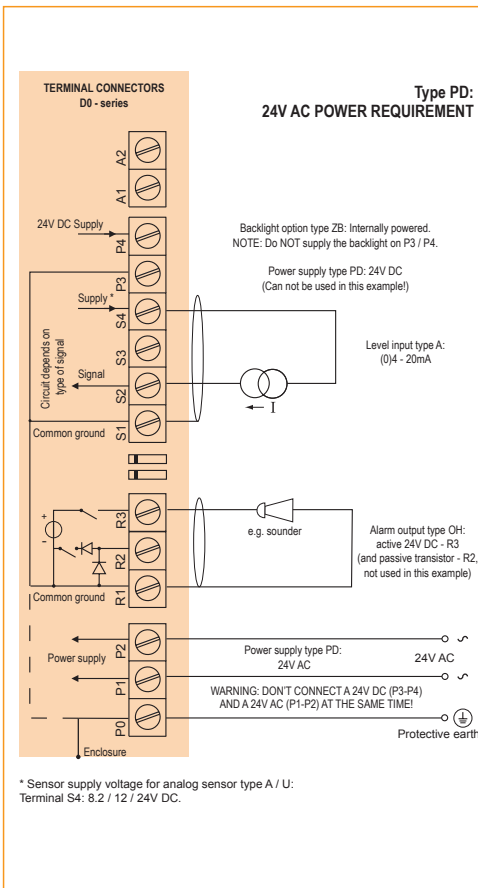
### Wiring diagram Do77-A-OT-PL-ZB



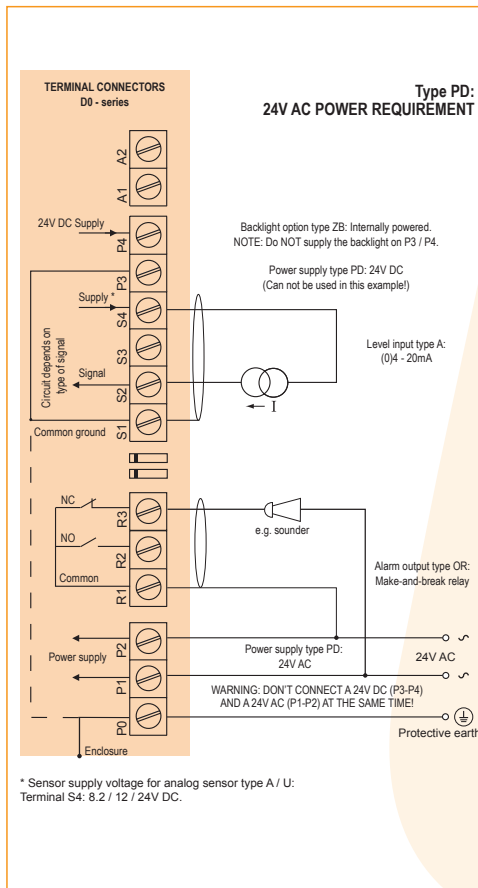
### Wiring diagram Do77-A-OT-PD-ZB



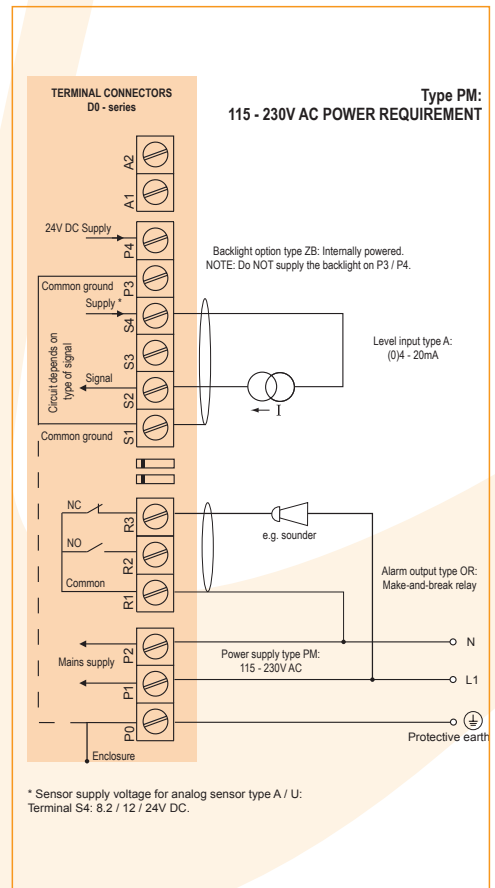
### Wiring diagram Do77-A-OH-PD-ZB



### Wiring diagram Do77-A-OR-PD-ZB



### Wiring diagram Do77-A-OR-PM-ZB



## Technical specification

### General

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Dimensions	90 x 40mm (3.5" x 1.6").
Digits	Seven 17mm (0.67") and eleven 8mm (0.31") digits. Various symbols and measuring units.
Refresh rate	User definable: fast, 1sec, 3sec, 15sec, 30sec, off.
Option ZB	Transflective LCD with white LED-backlight. Red (flashing) backlight during alarm conditions. Intensity and alarm response can be adjusted in the configuration menu.

### Ambient temperature

Safe areas	-40°C to +80°C (-40°F to +176°F).
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### Power requirements

Type PB	Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years. (requires PL or PX)
Type PD	24V AC/DC ± 10%. Power consumption max. 10 Watt.
Type PL	Input loop powered from sensor signal 4 - 20mA (requires type A).
Type PM	115 - 230V AC ± 10%. Power consumption max. 15 Watt.
Type PX	8 - 30V DC. Power consumption max. 0.3 Watt.
Type ZB	20 - 30V DC. Power consumption max. 1 Watt. With type PD / PM: internally powered.

### Sensor excitation

Type PB/PX	Not available.
Type PD / PM	Dipswitch adjustable sensor supply: 8.2V DC, I <sub>out</sub> max. 35mA @ 20°C. 12V DC, I <sub>out</sub> max. 50mA @ 20°C. 24V DC, I <sub>out</sub> max. 75mA @ 20°C. (this voltage can vary depending on the input supply voltage)
Note PD/PM	Total consumption of sensor, active output OH and backlight may not exceed 75mA @ 24V DC @ 20°C.

### Data protection

Type	EEPROM backup of all settings. Data retention at least 10 years.
Password	Configuration settings can be password protected.

### Directives & Standards

EMC	Directive 2014/30/EU, FCC 47 CFR part 15.
Low voltage	Directive 2014/35/EU.
RoHS	Directive 2011/65/EU.
IP & NEMA	EN 60529 & NEMA 250.

### Enclosure

Panel mount enclosure	
Dimensions	144 x 72 x 71.4mm (5.67" x 2.83" x 2.81") - W x H x D according DIN 43700 / IEC 61554.
Panel cut-out	138 x 68mm (5.43" x 2.68") L x H.
Material	Die-cast aluminum front panel + GRP back enclosure
Protection	IP66, IP67 (NEMA Type4X) at the front-side.
Weight	325 gr.
Panel thickness	Max. 6mm (1/4").

### General

Window	Polycarbonate window.
Sealing	Silicone.
Control keys	Three industrial micro-switch keys. UV-resistant silicone keypad.

### Signal input

Level sensor	
Type A	(0) <sub>4</sub> - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
Type U	0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.
Accuracy	Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. Low level cut-off programmable.
Span	0.001 / 999,999 with variable decimal position.
Offset	-999,999 / +999,999 units.
Update time	Four times per second.
Voltage drop	Type A: max. 1V DC @ 20mA.
Voltage drop	Type A - PL (loop powered): max. 2.6V DC @ 20mA.
Load impedance	Type U: 3kΩ.
Relationship	Linear and square root calculation.
Note	For signal type A and U: external power to sensor is required; e.g. type PD / PM.

### Signal output

Digital output	
Function	User defined: low, high or both alarms output.
Type OH	<ul style="list-style-type: none"> <li>Active 24V DC transistor output (PNP); Load max. 75mA. Requires PD/PM.</li> <li>Passive transistor output (NPN) - not isolated; Max. 24V DC - 300mA per output. Requires PD/PM.</li> </ul>
Type OR	Isolated electro-mechanical relay (NO/NC). Req. PD/PM. Maximum resistive load: 2A @ 250V AC / 30V DC. Maximum inductive load: 0.5A (pilot duty applications)
Note OR	In case of inductive load, use RC snubbers.
Type OT	Passive transistor output (NPN) - not isolated. Max. 50V DC - 300mA per output.

### Operational

#### Operator functions

Displayed functions	<ul style="list-style-type: none"> <li>Level.</li> <li>Height or percentage (or no indication).</li> <li>Low alarm value.</li> <li>High alarm value.</li> <li>Alarm values can be set (or only displayed).</li> </ul>
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#### Level

Digits	7 digits.
Units	L, m <sup>3</sup> , GAL, USGAL, kg, lb, bbl, no unit.
Decimals	0 - 1 - 2 or 3.

#### Height

Digits	6 digits.
Units	mm, cm, m, mtr, inch, ft, mmwk, mmwc, cmwk, cmwc, mwk, mwc, inwc, ftwc, mbar, bar, psi, no unit.
Decimals	0 - 1 or 2.

#### Percentage

Digits	3 digits.
Decimals	1.

#### Alarm values

Digits	7 digits.
Units	According to the settings for level.
Decimals	According to the settings for level.
Time units	According to the settings for level.
Type of alarm	Low and high level alarm. Includes alarm delay time and configurable alarm output.

## Ordering information

Standard configuration: D077-A-HB-OT-PX-XX-ZX.

ordering information:	D077	-	-HB	-O	-P	-XX	-Z
<b>Level input signal</b>							
A	(0)4 - 20mA input.						
U	0 - 10V DC input.						
<b>Panel mount front enclosure - IP66, IP67 (NEMA Type4X)</b>							
HB	Aluminum DIN 43700 / IEC 61554 front panel.						
<b>Digital output signal</b>							
OH	Active and passive transistor output - requires PD / PM.						
OR	Highly isolated mechanical relay output - requires PD / PM.						
OT	Passive transistor output - standard configuration.						
<b>Power requirements</b>							
PD	24V AC / DC + sensor supply.						
PL	Input loop powered from sensor signal 4 - 20mA - requires type A.						
PM	115 - 230V AC + sensor supply.						
PX	Basic power supply 8 - 30V DC (no real sensor supply).						
<b>Additional battery supply (optional)</b>							
PB	Lithium battery powered - requires PL or PX.						
<b>Hazardous area</b>							
XX	Safe area only.						
<b>Other options</b>							
ZB	Backlight.						
ZX	No options.						

The bold marked text contains the standard configuration.

Specifications are subject to change without notice.



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