



Ex II 3G Ex ec IIC T4 Gc

Ex II 3D Ex tc IIIB T125°C Dc



IO-Link Modbus

CE

**UK
CA**

EAC

**RoHS III
COMPLIANT**

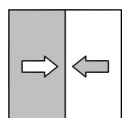


Datasheet

DD90

Differential pressure transmitter
PRO-LINE ®

09015485 • DB_EN_DD90 • Rev. ST4-A • 10/25



1 Product and functional description

1.1 Performance characteristics

Typical applications

- Level monitoring / level measurement
- Heating technology
- Refrigeration technology / cooling
- Flow measurement
- Filter monitoring / filter status
- Worst point measurement
- Process monitoring
- Pressure generators (compressors)

Main features

- Piezoresistive sensor element (channel 1) for differential pressure measurement
- Robust, resistant to overpressure and maintenance-free
 - Pressure chamber, sensor made of stainless steel
 - FKM O-rings
 - Process connections made of stainless steel or nickel-plated brass
- Multi-line LC display
 - Full graphic
 - With colour backlighting for visualisation of the operating modes
 - Multilingual plain text menu
- Characteristic curve implementation via table with max. 30 measuring points
- Turn down 4:1
- 2 or 4 switch outputs depending on the version
- USB interface OTG
- Configuration via optional 'inTouch' PC software
- Silicone-free (see Materials)

Options

- Piezoresistive sensor element (channel 2) for measuring the system pressure (0 ... 40 bar)
- ATEX zones 2 and 22
- Two pre-set analogue outputs (can be switched subsequently)
 - 0 ... 10 V
 - 0 ... 20 mA
 - 4 ... 20 mA
- Modbus interface with switch outputs
- Modbus interface without switch outputs
- IO-Link interface with switch outputs

1.2 Intended use

The DD90 is a differential pressure transmitter with an optional additional pressure measurement channel for system pressure measurement. It is suitable for measuring overpressure, underpressure and differential pressure for the following media:

- Air
- Water
- Exhaust air, acidic
- Steam
- Heated drinking water
- Hot water
- Cold water
- Cooling water
- Brine (max. 2.5% salt content)
- Water-glycol mixture

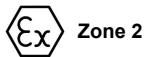
The device may only be used for the purpose stipulated by the manufacturer. The manufacturer will not be liable for damage arising from incorrect or improper use.

1.2.1 Explosion hazard area classification

Eurasian Economic Union (EAC):

The device does not have ATEX approval for this market. It may only be used there as an industrial device.


1.2.1.1 Gas explosion protection



Zone 2

Devices with the order code **DD90 ## ## ## # 00 000 R1 # #** are suitable as 'Electrical equipment for use in potentially explosive atmospheres', Zone 2 – Gases and vapours.

Designation as per Directive 2014/34/EU:

 II 3G Ex ec IIC T4 Gc


1.2.1.2 Dust explosion protection



Zone 22

Devices with the order code **DD90 ## ## ## # 00 # 000 R1 # #** are suitable as 'Electrical equipment for use in areas with combustible dust', Zone 22 – Dry dusts.

Designation as per Directive 2014/34/EU:

 II 3D Ex tc IIIB T125°C Dc

$-20^{\circ}\text{C} \leq T_{\text{amb}} \leq 60^{\circ}\text{C}$

1.2.2 External application

If the device is intended for outdoor use, we recommend permanently protecting the membrane keypad against UV radiation and using a suitable enclosure or at least the erection of a sufficiently dimensioned canopy as a protection measure against constant rain or snow.

You can find a suitable protective cover in the Accessories [[▶ 19](#)].

1.3 Function diagram

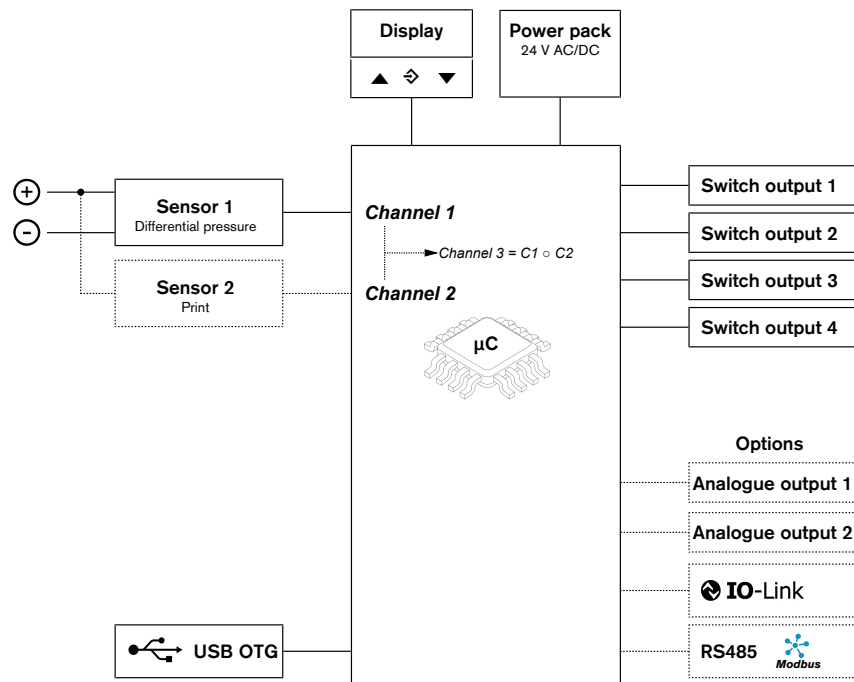


Fig. 1: Function diagram

1.4 Design and mode of operation

The device is based on a piezoresistive sensor element with a stainless steel diaphragm and is suitable for measuring overpressure, underpressure and differential pressure (channel 1).

The pressures to be compared act directly on a diaphragm equipped with a measuring bridge. When the pressure is equal, the measuring diaphragm is in its idle state. If a pressure difference occurs, the diaphragm is deflected, causing a change in resistance. This change is evaluated and displayed by the electronics integrated in the device and converted into up to four switching contacts.

Optionally, the device can be equipped with a second piezoresistive sensor element with a stainless steel diaphragm for measuring static pressure (channel 2 for system pressure measurement). With these devices, it is possible to mathematically combine the two input channels into one virtual channel (channel 3).

Overall, the device can be delivered with the following equipment.

	1-channel	2-channel	Modbus RTU ^{*)} (Opt1)	IO-Link (Opt2)
Switch output 1	x	x	x	x
Switch output 2	x	x	x	x
Switch output 3		x	x	x
Switch output 4		x	x	x
USB interface	x	x	x	x
Options:				
RS485 Modbus RTU			x	x
IO-Link				x
Analogue output 1	x	x		
Analogue output 2		x		

^{*)} Opt1: without switch outputs; Opt2: with switch outputs

1.5 Device versions

In the standard version, the device is equipped with a green lid and an anthracite-coloured lower housing section.

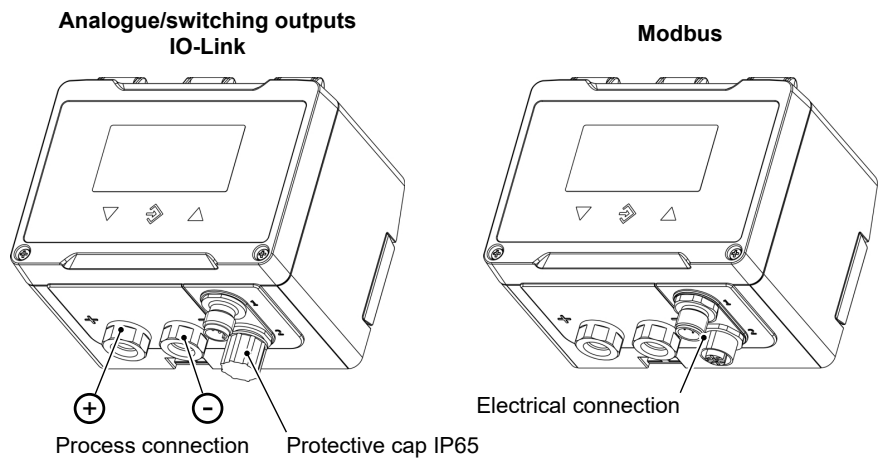


Fig. 2: Basic versions

1.5.1 Process connections

NOTICE! Pneumatic push-in fittings may only be used up to a maximum of 10 bar.

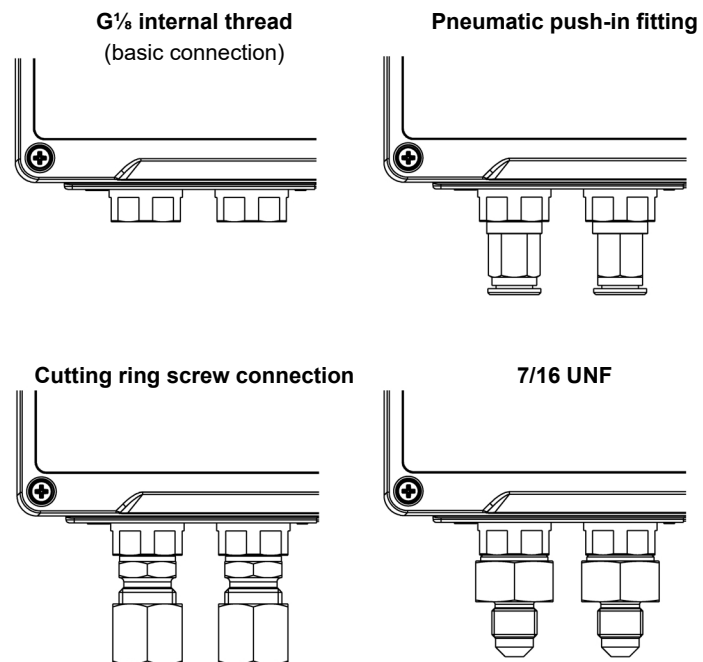


Fig. 3: Process connections

1.5.2 Electric connections

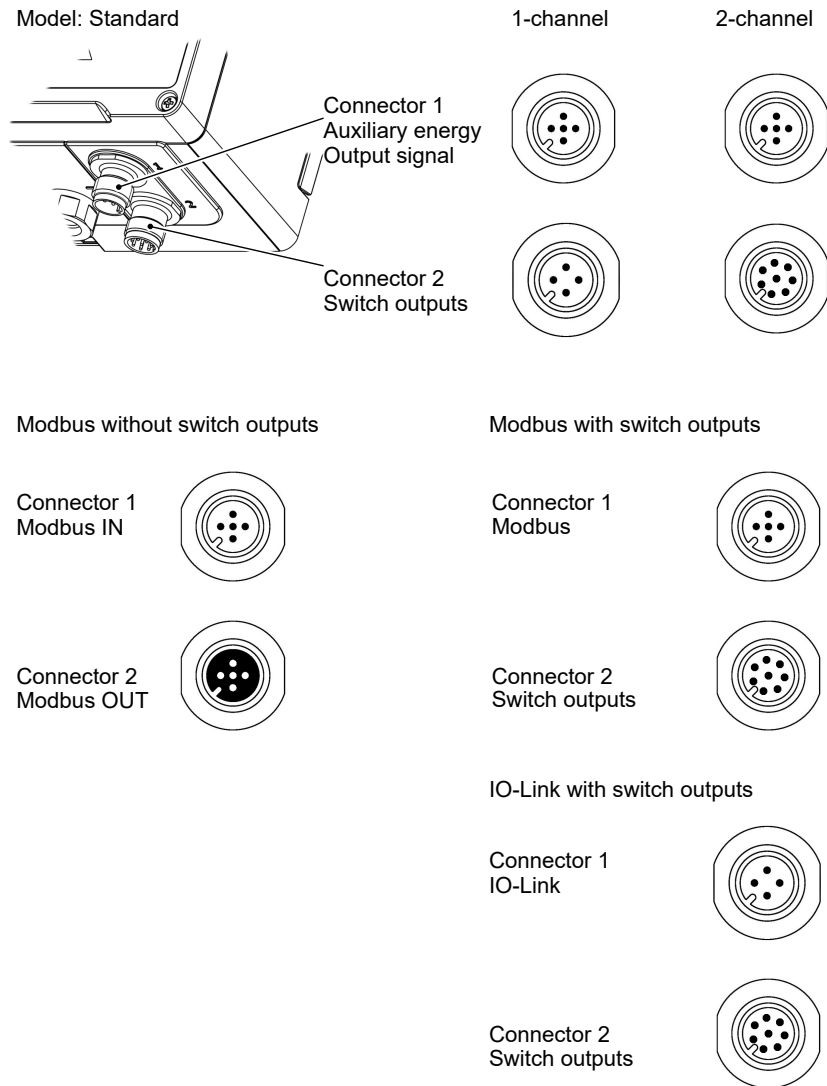


Fig. 4: Electric connections

1.5.3 ATEX model

In the ATEX version, the device is equipped with a black conductive housing.

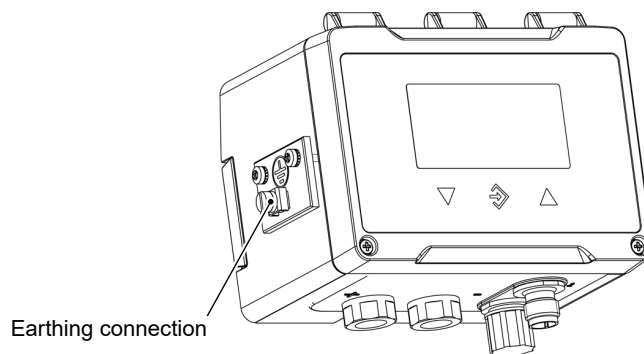


Fig. 5: ATEX model

2 Technical data

2.1 General

General information		
Type designation	DD90	
Channel 1		
Pressure type	Differential pressure	
Measurement principle	Piezoelectric	
Channel 2		
Pressure type	Relative pressure	
Measurement principle	Piezoelectric	
interface	Modbus RTU	
	IO-Link	
Reference conditions (acc. to IEC 61298-1)		
Temperature	+15 ... +25 °C	
Relative humidity	45 ... 75 %	
Air pressure	86 ... 106 kPa	860 ... 1060 mbar
Installation position	User-defined	

2.2 Input variables

Channel 1

[mbar]	Max. overload	Max. system pressure	Bursting pressure
	on one side	on both sides	on both sides
0 ... +60	6 bar	40 bar	> 70 bar
0 ... +100			
0 ... +160			
0 ... +250			
0 ... +400			
-60 ... +60			
-100 ... +100			
-160 ... +160			
-250 ... +250			
-400 ... +400			

[bar]	Max. overload	Max. system pressure	Bursting pressure
	on one side	on both sides	on both sides
0 ... +0.6	6 bar	40 bar	> 70 bar
0 ... +1	6 bar		
0 ... +1.6	16 bar		
0 ... +2.5	16 bar		
0 ... +4	16 bar		
0 ... +6	20 bar		
0 ... +10	20 bar		
0 ... +16	40 bar		
0 ... +25	40 bar		
-0.6 ... +0.6	6 bar		
-1.6 ... +1.6	16 bar		
-2.5 ... +2.5	16 bar		
-4 ... +4	16 bar		
-6 ... +6	20 bar		
-1 ... 0	6 bar		
-1 ... 0.6	6 bar		
-1 ... +1	6 bar		
-1 ... +1.5	16 bar		
-1 ... +3	16 bar		
-1 ... +5	20 bar		

Channel 2

[bar]	Max. overload	Max. system pressure	Bursting pressure
	on both sides	on both sides	on both sides
0 ... +40	70 bar	40 bar	> 70 bar

2.3 Output variables

Analogue outputs

The number of analogue outputs depends on the device version.

Device version	1-channel	2-channel
Number of analogue outputs	1	2

The output signal can be set in the configuration. Upon delivery, both analogue outputs are set to the same signal (see the type plate).

Output signal	0 ... 20 mA 4 ... 20 mA	0 ... 10 V 2 ... 10 V 1 ... 5 V
Signal range	0.0 ... 21.5 mA	0.0 ... 10.5 V
Load impedance	≤ 600 Ω	≥ 2 kΩ
Turn down	4:1	
Step response (T90)	< 100 ms	

Switch outputs

The number of switch outputs depends on the device version. The assignment of the switch outputs to the channels can be configured freely.

Standard version	1-channel	2-channel
Number of switch outputs	2	4
Assignment on delivery	SP1-> channel 1 SP2-> channel 1	SP1-> channel 1 SP2-> channel 1 SP3-> channel 2 SP4-> channel 2

Modbus (Opt1)	1-channel	2-channel
Number of switch outputs	0	0
Assignment on delivery	---	--

Modbus (Opt2)	1-channel	2-channel
Number of switch outputs	4	4
Assignment on delivery	SP1-> channel 1 SP2-> channel 1 SP3-> channel 1 SP4-> channel 1	SP1-> channel 1 SP2-> channel 1 SP3-> channel 2 SP4-> channel 2

IO-Link	1-channel	2-channel
Number of switch outputs	4	4
Assignment on delivery	SP1-> channel 1 SP2-> channel 1 SP3-> channel 1 SP4-> channel 1	SP1-> channel 1 SP2-> channel 1 SP3-> channel 2 SP4-> channel 2

Type	Potential-free semiconductor switch (MOSFET)
Progr. switching function	1-pole normally open (NO) 1-pole normally closed (NC)
Max. switching voltage	3...32 V AC/DC
Max. switching current	0.25 A
Max. switching output	8 W / 8 VA $R_{ON} \leq 4 \Omega$

2.4 Measuring accuracy

- The specifications for the measurement error incl. linearity and hysteresis.
- All specifications refer to the basic measuring range (see type plate).

Measurement deviation	< 0.5%
Repeatability at 20°C	< 0.05% FS
Long-term stability	≤ 0.5% FS / year

2.4.1 Impact of the static pressure

Channel 1	
[mbar]	[%FS/bar]
0 ... +60	< 0.12
0 ... +100	< 0.07
0 ... +160	< 0.05
0 ... +250	< 0.03
0 ... +400	< 0.02
-60 ... +60	< 0.06
-100 ... +100	< 0.04
-160 ... +160	< 0.03
-250 ... +250	< 0.02
-400 ... +400	< 0.02
[bar]	
0 ... +0.6	< 0.04
0 ... +1	< 0.02
0 ... +1.6	< 0.05
0 ... +2.5	< 0.03
0 ... +4	< 0.02
0 ... +6	< 0.04
0 ... +10	< 0.02
0 ... +16	< 0.05
0 ... +25	< 0.03
-0.6 ... +0.6	< 0.02
-1.6 ... +1.6	< 0.03
-2.5 ... +2.5	< 0.02
-4 ... +4	< 0.02
-6 ... +6	< 0.02
-1 ... 0	< 0.02
-1 ... 0.6	< 0.02
-1 ... +1	< 0.02
-1 ... +1.5	< 0.03
-1 ... +3	< 0.02
-1 ... +5	< 0.04

2.4.2 Impact of ambient temperature

Channel 1	Zero point	Span
[mbar]	%FS/10 K	%FS/10 K
0 ... +60	< 1.7	< 0.5
0 ... +100	< 1.1	
0 ... +160	< 0.7	
0 ... +250	< 0.5	
0 ... +400	< 0.5	
-60 ... +60	< 0.9	
-100 ... +100	< 0.6	
-160 ... +160	< 0.5	
-250 ... +250	< 0.5	
-400 ... +400	< 0.5	
[bar]	%FS/10 K	%FS/10 K
0 ... +0.6	< 0.5	< 0.5
0 ... +1		
0 ... +1.6		
0 ... +2.5		
0 ... +4		
0 ... +6		
0 ... +10		
0 ... +16		
0 ... +25		
-0.6 ... +0.6		
-1.6 ... +1.6		
-2.5 ... +2.5		
-4 ... +4		
-6 ... +6		
-1 ... 0		
-1 ... 0.6		
-1 ... +1		
-1 ... +1.5		
-1 ... +3		
-1 ... +5		
Channel 2	Zero point	Span
[bar]	%FS/10 K	%FS/10 K
0 ... 40	< 0.1	< 0.5

2.5 Digital interfaces

USB interface

USB On The Go	2.0
Data rate	12 Mbit/s (Full Speed)
Connection	Micro USB type B
Communication	Host/Device mode

Modbus RTU interface

interface	RS 485
Report	Modbus RTU
Modbus specification	Application Protocol Specification V1.1b3 (26 April 2012)
Address	1 ... 247
Baud rate	2400 ... 115200 baud
Parity	Even, uneven, parity
Stop bits	1...2

IO-Link Interface

Connection	M12-4 Class A
IO-Link specification	V1.1
Pin assignment	as per IEC 60974-5-2
Device energy supply	max. 200 mA
Data transmission rates	COM 2 = 38.4 kBd

2.6 Auxiliary energy

NOTICE! Only a CE-compliant mains adapter with a slow 200 mA fuse may be used in the power supply circuit for ATEX devices.

Rated voltage	24 V AC/DC	
Admissible operating voltage U_b	19.2 to 28.8 V AC/DC	Default Modbus RTU
	18 to 30 V DC	IO-Link
Power consumption	Typ. 2W (VA) Max. 3W (VA)	

2.7 Operating conditions

	Standard	ATEX
Ambient temperature range	-20 ... +70 °C	-20 ... +60 °C
Media temperature range	-20 ... +70 °C	-20 ... +60 °C
Storage temperature range	-20 ... +70 °C	-20 ... +70 °C
Protection class	IP65	IP65
EMC	EN 61326-1:2013 EN 61326-2-3:2013	
ATEX	EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018 EN 60079-31:2014	
RoHS	EN IEC 63000:2018	

2.8 Display

Display	Full graphic LC display
Resolution	128 x 64 Pixel
Back lighting	RGB
Meas.data display	6 digits

2.9 Construction design

Process connection

NOTICE! Pneumatic push-in fittings may only be used up to a maximum of 10 bar.

G 1/8 internal thread made of stainless steel (1.4404)			
7/16-20 UNF brass connection spigot			
		Outer Ø	Inner Ø
Pneumatic push-in fitting made of nickel-plated brass	Hose	6 mm	4 mm
	Hose	8 mm	6 mm
Cutting ring screw connection made of stainless steel (1.4404)	Pipe	6 mm	
	Pipe	8 mm	

Electrical connection

Standard version	1-channel	2-channel
Plug 1: Auxiliary energy, output	5-pin male	5-pin male
Plug 2: Switch outputs	4-pin male	8-pin male
Modbus without switch outputs	1-channel	2-channel
Plug 1: Modbus IN	5-pin male	5-pin male
Plug 2: Modbus OUT	5-pin female	5-pin female
Modbus with switch outputs	1-channel	2-channel
Plug 1: Modbus	5-pin male	5-pin male
Plug 2: Switch outputs	8-pin male	8-pin male
IO-Link with switch outputs	1-channel	2-channel
Plug 1: IO-Link	4-pin male	4-pin male
Plug 2: Switch outputs	8-pin male	8-pin male

General activities

Installation position	User-defined
Dimensions (without connections)	120 x 81.5 x 95 mm
Weight	Max. 920 g

2.9.1 Materials

The device is silicone-free, i.e. we declare that there is no silicone on any surfaces or on any components or assemblies installed in the device.

NOTICE! We accept no liability for contamination caused by damage to the transport packaging or improper handling after unpacking!

Materials of parts in contact with medium

Pressure chamber, sensor, screw connections	Stainless steel 1.4404
O-rings	FKM (fluorine rubber)
Process connections ^{*)}	Nickel-plated brass, stainless steel

^{*)} depending on the version (see order code)

Materials of parts in contact with surroundings

Polyester, PET, polyamide 6.6, aluminium, nickel-plated brass, stainless steel

2.9.2 Dimensional drawings

All dimensions in mm unless otherwise stated

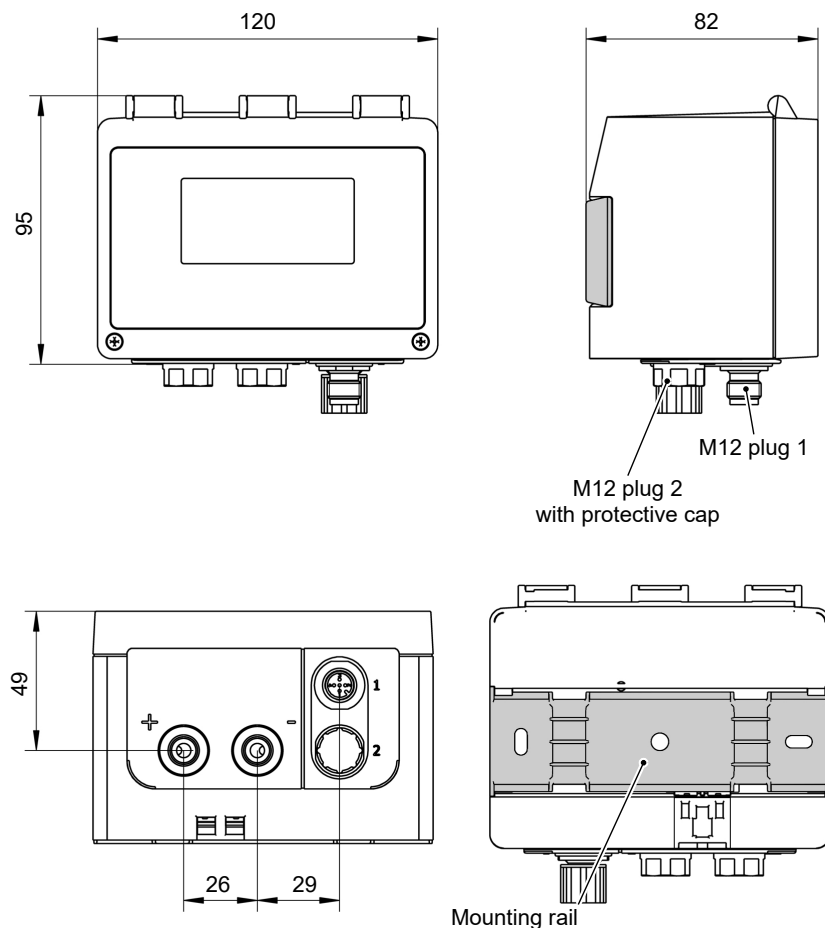


Fig. 6: Dimension drawing (standard)

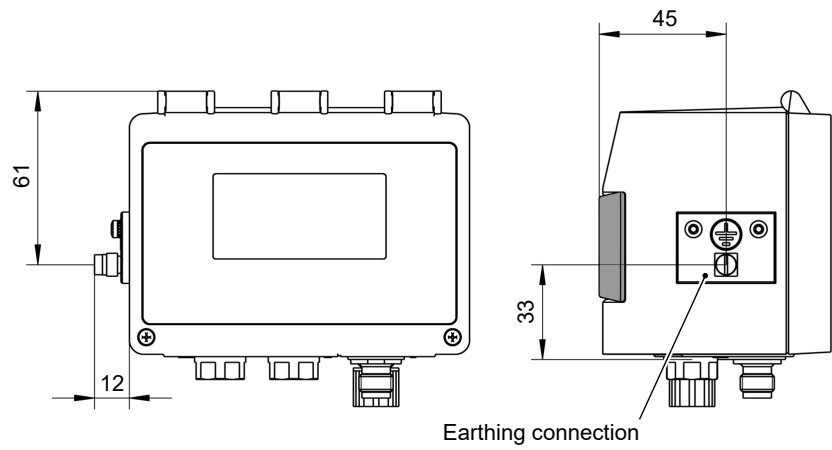


Fig. 7: Dimension drawing (ATEX)

Mounting rail

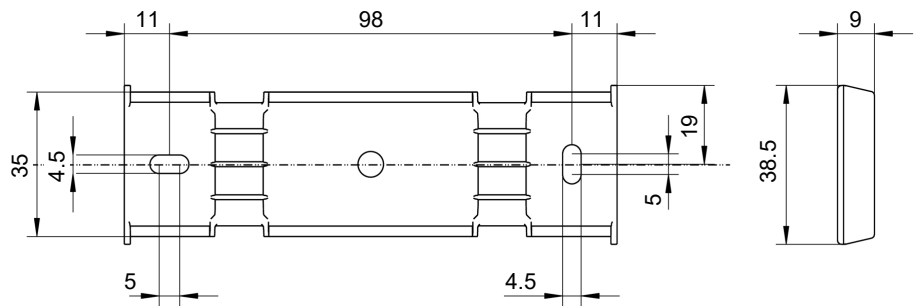
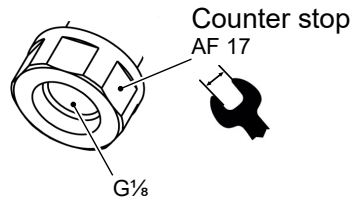
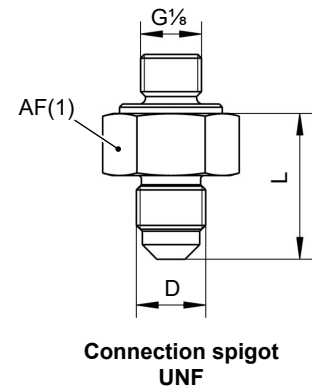
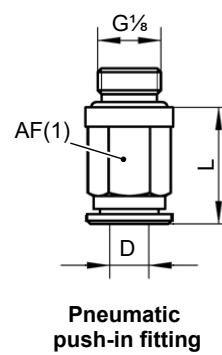
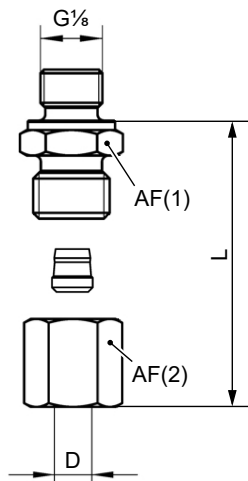


Fig. 8: Mounting rail

Process connections



Basic connection
G $\frac{1}{8}$ internal thread



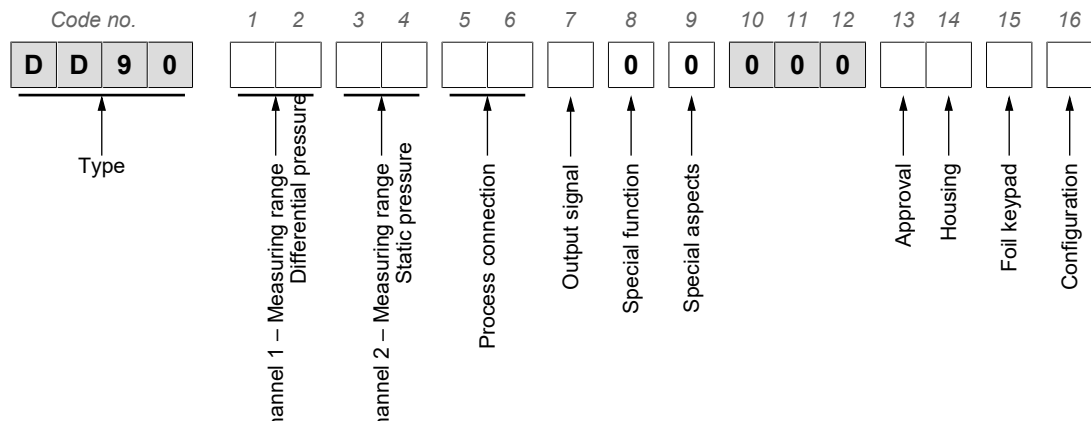
Cutting ring screw connection

Fig. 9: Process connections

Process connection		D	L	AF(1)	AF(2)
G $\frac{1}{8}$ internal thread (basic connection)					
Cutting ring screw connection	Pipe	6	25	14	14
		8	27	17	14
Pneumatic push-in fitting	Hose	6	18	11	---
		8	20.5	13	---
Connection spigot UNF		7/16	23.5	19	---

NOTICE! Pneumatic push-in fittings may only be used up to a maximum of 10 bar.

3 Order codes



[1.2] Channel 1: Differential pressure measuring range		
58	0 ... 60	mbar
59	0 ... 100	mbar
60	0 ... 160	mbar
82	0 ... 250	mbar
83	0 ... 400	mbar
B3	-60 ... 60	mbar
B4	-100 ... 100	mbar
R5	-160 ... 160	mbar
B6	-250 ... 250	mbar
B7	-400 ... 400	mbar
01	0 ... 0.6	bar
02	0 ... 1	bar
03	0 ... 1.6	bar
04	0 ... 2.5	bar
05	0 ... 4	bar
06	0 ... 6	bar
07	0 ... 10	bar
08	0 ... 16	bar
09	0 ... 25	bar
E9	-0.6 ... 0.6	bar
G9	-1.6 ... 1.6	bar
K9	-2.5 ... 2.5	bar
M9	-4 ... 4	bar
N9	-6 ... 6	bar
31	-1 ... 0	bar
32	-1 ... 0.6	bar
27	-1 ... 1	bar
33	-1 ... 1.5	bar
34	-1 ... 3	bar
35	-1 ... 5	bar

[3.4] Channel 2: Static pressure measuring range		
00	None	
10	0 ... 40	bar

[5.6] Process connection

00	G1/8 internal, stainless steel 1.4404
24	6 mm cutting ring screw connection, stainless steel
25	8 mm cutting ring screw connection, stainless steel
P6	Pneumatic push-in fitting for 6/4 mm hose, nickel-plated brass
P8	Pneumatic push-in fitting for 8/6 mm hose, nickel-plated brass
33	Connection spigot 7/16-20 UNF, brass

NOTICE! Pneumatic push-in fittings may only be used up to a maximum of 10 bar.

[7] Analogue output

0 None

Switchable, preset at the factory:

C	0 ... 10 V	3-wire
A	0 ... 20 mA	3-wire
P	4 ... 20 mA	3-wire

Digital interface

M	MODBUS RTU	(without switch output)
N	MODBUS RTU	(with 4 switch outputs)
I	IO-Link	(with 4 switch outputs)

[8] Special function

0 None

[9] Special aspects

0 None

[13.14] Approval	Housing	Cover
00 None	Anthracite	Green
R1 ATEX (Zones 2 and 22)	Black (conductive)	Black (conductive)

[15] Foil keypad

0	FISCHER
1	neutral

[16] Configuration

0	Default
1	Linear characteristic curve
2	Flow rate
3	Table
5	Formula
S	Customer-specific

4 Accessories

4.1 M12 connection cables

Designation	No. of pins	Length	Order No.
PUR connection cable (unshielded)			
M12 socket (straight) on cable end (stripped and tinned)	4 pins	2 m	06401993
		5 m	06401994
		10 m	06401572
	5-pin	2 m	06401995
		5 m	06401996
		10 m	06401573
	8-pin	2 m	09001844
		5 m	09011146
		10 m	09011016

4.2 USB interface

Designation		Order No.
Connection cable, USB-A on USB micro-B connector	2 m	09007340
Stick USB 2.0, USB-A/micro-B connector	16 GB	09007316

4.3 Modbus

Designation		Order No.
Modbus terminating resistor	120 ohm socket	06411280
	120 ohm connector	06411279
Y-distributor (shielded)		04451217

Designation	No. of pins	Length	Order No.
PUR connection cable (shielded)			
M12 plug to M12 socket straight plug	5-pin	1 m	09011277
		2 m	09011278
		5 m	09011299
		10 m	09011315
		20 m	09011295
M12 socket (straight) on cable end (stripped and tinned)	5-pin	2 m	09011316
		5 m	09011317
		10 m	09011318
M12 plug (straight) to cable end (stripped and tinned)	5-pin	2 m	09011495
		5 m	09011496
		10 m	09011497

4.4 IO-Link

Designation	No. of pins	Length	Order No.
PUR connection cable (unshielded)			
M12 plug to M12 socket straight plug	4 pins	2 m	09011363
		5 m	09011364
		10 m	09011365
		15 m	09011366

4.5 Measuring device accessories

MZ1###	Siphons
MZ400#	Capillary throttle coil
MZ410#	Settable damping reactor

The MZ data sheet is available for download on our website (fischermesstechnik.de).

4.6 Shut-off valves

DZ2300H###	Three-spindle equalising and shut-off valve
DZ2400H###	Four-spindle equalising and shut-off valve with vent valve

The DZ23-24 data sheet is available for download on our website (fischermesstechnik.de).

4.7 Accessories for outdoor use

Designation	Material	Order No.
Canopy	Stainless steel	02006130

4.8 Software

The inTouch configuration software is available for download on our website (fischermesstechnik.de).

Notes

Notes

Notes



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