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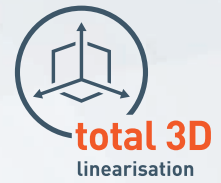
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ДАТЧИКИ ДАВЛЕНИЯ

ОПТИВАР DP 3050





OPTIBAR DP 3050 **Technical Datasheet**

Compact differential pressure transmitter for measuring flow, level and differential pressure

- High accuracy and measurement stability under all process conditions
- Intuitive setup via internal push buttons or LCD display
- Robust stainless steel construction

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

Measuring system

Measuring principle	Piezoresistive differential pressure measuring cell
Application range	<ul style="list-style-type: none"> • Flow measurement with square root output in gases, vapours and liquids • Differential pressure measurement • Level measurement of liquids
Measuring range	100 mbar, 500 mbar, 3 bar, 16 bar / 1.45 psi, 7.25 psi, 43.51 psi, 232.06 psi
Display and User interface	
Display on signal converter	<ul style="list-style-type: none"> • Dot-matrix display 32 x 20 mm / 1.26 x 0.79" • Display infinitely rotatable by 350° • Ambient temperatures below -20°C / -4°F may affect the readability of the display
Display function	<ul style="list-style-type: none"> • Display of measured value or derived measured value such as filling height • Warning and diagnostic information • All parameters are accessible via the operating menu
Operating and display languages	German, English, Spanish and French
Operating	Local operation via 4 softkeys on the display and adjustment module
Remote control	<ul style="list-style-type: none"> • PACTware™ via GenericHART® • HART® Hand Held Communicator

Measuring accuracy

Differential pressure			
Reference conditions acc. to IEC 60770-1	<ul style="list-style-type: none"> • Ambient temperature (constant): +18...+30°C / +64...+86°F • Relative humidity (constant): 45...75% • Ambient pressure (constant): 860...1060 mbar / 12.5...15.4 psi • Mounting position: vertical • Rising characteristics • Measurement start at 0.00 bar / psi • Process diaphragm: 316L / 1.4404 • Fill fluid: silicone oil • Material of process flanges: 316L / 1.4404 • Power supply: 24 VDC ±3 VDC • Load for HART®: 250 Ω 		
Reference accuracy acc. to DIN EN 61298	Includes the linearity, hysteresis and non-repeatability under reference conditions. Applies to the digital interfaces (HART®) as well as for the analogue 4...20 mA current output. [% of the set span]		
		TD < 10:1	TD > 10:1
	100 mbar / 1.5 psi	<± 0.1%	<± 0.01% x TD
	500 mbar / 7.3 psi		<± 0.05% + 0.005% x TD
	3 bar / 43.51 psi		
16 bar / 232.1 psi	<± 0.01% x TD		

Effect of ambient temperature	Ambient temperature effect on zero and span in relation to the set measuring span. Applies to the digital interfaces (HART®) as well as for the analogue 4...20 mA current output. [% of the set span]			
		-10...+60°C / +14...+140°F	-40...+85°C / -40...+185°F	
	100 mbar / 1.5 psi	<± 0.15% + 0.15% x TD	<± 0.15% + 0.20% x TD	
	500 mbar / 7.3 psi	<± 0.15% + 0.05% x TD	<± 0.2% + 0.06% x TD	
	3 bar / 43.51 psi			
16 bar / 232.1 psi	<± 0.15% + 0.15% x TD	<± 0.15% + 0.20% x TD		
Effect of system pressure	Ambient temperature effect on zero and span in relation to the set measuring span. Zero-point offsets can be calibrated out under operating pressure. Applies to the digital interfaces (HART®) as well as for the analogue 4...20 mA current output. [% of the set span]			
		up to nominal pressure	on zero	on span
	100 mbar / 1.5 psi	160 bar / 2320 psi	160 bar / 2320 psi: <± 0.20% x TD	160 bar / 2320 psi: <± 0.20%
	500 mbar / 7.3 psi		160 bar / 2320 psi: <± 0.10% x TD	160 bar / 2320 psi: <± 0.10%
	3 bar / 43.51 psi			
16 bar / 232.1 psi				
Effect of mounting position	A position-dependent zero offset can be corrected			
	≤0.35 mbar per 10° inclination around the transverse axis			
Long-term stability acc. to DIN 16086 and IEC 60770-1	Applies to the digital interfaces (HART®) as well as for the analogue 4...20 mA current output. [% of the set span]			
	<0.1% x TD (Turn Down) over a period of 5 years			
Total performance in accordance with DIN 16086	At a temperature change of -10...+60°C / +14...+140°F, up to the indicated nominal pressure. [% of the set span]			
		Nominal pressure	-10...+60°C / +14...+140°F	
	100 mbar / 1.5 psi	160 bar / 2320 psi	<± 0.37%	
	500 mbar / 7.3 psi		<± 0.24%	
	3 bar / 43.51 psi			
16 bar / 232.1 psi	<± 0.33%			
The details of total performance comprise the reference accuracy, the effect of the ambient temperature on the zero signal and the measuring span as well as the effect of the static pressure on the measuring span.				
$E_{\text{perf}} = \sqrt{((E_{\Delta TZ} + E_{\Delta TS})^2 + E_{\Delta PS}^2 + E_{\text{lin}}^2)}$ <p> $E_{\Delta TZ}$ = Effect of ambient temperature on the zero signal $E_{\Delta TS}$ = Effect of ambient temperature on the measuring span $E_{\Delta PS}$ = Effect of the static pressure on the measuring span E_{lin} = Reference accuracy </p>				
Dynamic output behaviour	These parameters depend on the fill fluid, temperature and, if applicable, the diaphragm seal. For further information refer to <i>Dynamic behaviour of the current output</i> on page 14			
Damping	63% of the input variable 0...999 seconds, adjustable in 0.1 second steps.			
Temperature				
The evaluation is made using the HART® output signal.				
Resolution	1°C / 1.8°F			
Accuracy	± 1°K			

System pressure				
Reference conditions acc. to IEC 60770-1	<ul style="list-style-type: none"> Ambient temperature (constant): +18...+30°C / +64...+86°F Relative humidity (constant): 45...75% Ambient pressure (constant): 860...1060 mbar / 12.5...15.4 psi Mounting position: vertical 			
Reference accuracy acc. to DIN EN 61298	Includes the non-linearity, hysteresis and repeatability under reference conditions. Applies to the digital interfaces (HART®) as well as for the analogue 4...20 mA current output. [% of URL]			
		up to nominal pressure acc. to URL absolute pressure	TD 1:1	
	100 mbar / 1.5 psi	160 bar / 2320 psi	<± 0.10%	
	500 mbar / 7.3 psi			
	3 bar / 43.51 psi			
16 bar / 232.1 psi				
Effect of ambient temperature	Ambient temperature effect on zero and span. [% of URL]			
		up to nominal pressure acc. to URL absolute pressure	-10...+60°C / +14...140°F	-40...+80°C / -40...+176°F
	100 mbar / 1.5 psi	160 bar / 2320 psi	<± 0.5%	<± 0.5%
	500 mbar / 7.3 psi			
	3 bar / 43.51 psi			
16 bar / 232.1 psi				
Long-term stability acc. to DIN EN 61298-1	<± 0.1% of URL over a period of 5 years			

Operating conditions

Temperature	
Process temperature	-40...+105°C / -40...+221°F
Ambient temperature	-40...+80°C / -40...+176°F
Storage temperature	-40...+80°C / -40...+176°F
Climate category	4K 4H (air temperature: -20...+55°C, humidity: 4...100% according to DIN EN 60721-3-4)

Further operating conditions

Protection category according to IEC 529 / EN 60529	Single chamber Housing, IP66/67, NEMA 4X or IP66/68 (0.2 bar) NEMA 6P (depends on electrical connection)
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Vibration	
Reference conditions	<ul style="list-style-type: none"> Without mounting bracket Process flanges 316L / 1.4404 PN 160 Single chamber housing
Vibration resistance acc. to IEC 60770-1	10...58 Hz, 0.35 mm 58...1000 Hz, 20 m/s ² 1 octave per minute, 10 cycles per axis
Shock resistant according to IEC 60770-1	500 m/s ² , 6 ms 100 shocks per axis
Noise according to IEC 60770-1	10...200 Hz, 1 (m/s ²) ² /Hz 200...500 Hz, 0.3 (m/s ²) ² /Hz 4 hours per axis

Materials

Gaskets	
EPDM	-40...+105°C / -40...+221°F
Copper	
FKM	-20...+105°C / -4...+221°F
Filling oil	
Silicone oil	-40...+105°C / -40...+221°F
Halocarbon oil	
Wetted parts	
Process connection, screwed flange	316L / 1.4404, NACE MR0175 / MR0103
Separating diaphragm	316L / 1.4435, NACE MR0175 / MR0103
Vent and lock screws	316L / 1.4404, NACE MR0175 / MR0103
Non-wetted parts	
Housing	316L / 1.4404
Lid cover sealing ring	EPDM
Housing lid	316L / 1.4404
Sight glass	Makrolon
Grounding screw	316L / 1.4404
Cable gland	Plastic (polyamide) black; nickel-plated brass; 316 / 1.4305

Process connection

Process	1/4-18 NPT (Female), IEC 61518 A
Mounting	7/16 UNF, M10 (up to PN160)

Electrical connections

Mechanical			
Cable gland	Type	Ingress Protection	Cable diameter
	A - M16 x 1.5 plastic	IP66/67 NEMA 4X	4.5...10 mm / 0.18...0.39"
	E - M16 x 1.5 nickel plated brass	IP66/67 NEMA 4X	4.5...10 mm / 0.18...0.39"
	X - M16 x 1.5 316L	IP66/68 NEMA 6P (0.2 bar)	4...11 mm / 0.16...0.43"
	C - M12 4-pin quick disconnect	IP66/67 NEMA 4X	n/a
Wire cross-section	Solid wire with cords: 0.34...2.5 mm ² / AWG 22...14		
	Cord with wire end sleeve: 0.34...1.5 mm ² / AWG 24...16		
Electrical			
Operating voltage	Non-Ex device: 12...45 VDC		
Reverse polarity protection	Integrated		
Permissible residual ripple	for U_n 12 VDC ($12 < U_B < 14$ VDC) $\leq 0.7 V_{eff}$ (16...400 Hz)		
Load	$R_{L,max} = (U_B - 12) / 22$ mA		
Potential connection in device	Electronics: Not electrically isolated		
	Ground terminal: Galvanically connected with process connection		
Overvoltage category	III		
Protection class	II		

Inputs and outputs

Output signal	
Output signal	4...20 mA / HART [®] version 7.5 3.8...20.5 mA (factory setting acc. to NAMUR recommendation)
Signal resolution	0.3 μ A
Error signal of current output (adjustable)	High alarm ≥ 21 mA Low alarm ≤ 3.6 mA
Max. output current	24 mA
Boot-up current	≤ 5 mA for 15 ms after switching on, then ≤ 3.6 mA
Damping	0.0 seconds: no damping
	0.5 seconds: with digital filter + PT1 element
	from 1.0 second: 63% of the input measurement from 1...30 seconds can be set in 1 second increments
Boot-up time first measurement value	3.5 seconds

Approvals and certificates

CE	The device complies with the legal requirements of the EU directive. The manufacturer confirms compliance with these regulations by affixing the CE marking.
Electromagnetic compatibility (EMC)	EMC conformity for EN 61326-1:2013 and EN 61326-2-3:2013
NAMUR	NE 21 - Electromagnetic compatibility of equipment NE 43 - Signal level for the failure information of digital transmitters NE 53 - Compatibility of field devices and display/adjustment components NE 107 - Self-monitoring and diagnosis of field devices
Classification according to Pressure Equipment Directive (PED 2014/68/EU)	For gases of fluid group 1 and liquids of fluid group 1, the requirements are fulfilled according to article 4, paragraph 3 (sound engineering practice).
RoHS	The device complies with the Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
AD2000	The pressure retaining material 316L (1.4404/1.4435) complies with the AD2000 W2 and W10 guidelines.

2.2 Pressure ranges

Min. / Max. adjustment:

Percent value: -10...110%

Pressure value: -20...120%

Zero/Span adjustment

Zero: -95...+95%

Span: -120...+120%

Difference between zero and span: max. = 120% of the nominal range.

Maximum allowed turn down = 50:1 (recommended 20:1)

Nominal range	100 mbar	500 mbar	3 bar	16 bar
Limit URL (upper)	100 mbar	500 mbar	3 bar	16 bar
Limit LRL (lower)	-100 mbar	-500 mbar	-3 bar	-16 bar
Smallest adjustable measuring span	1 mbar	5 mbar	30 mbar	160 mbar
Turn down	100:1	100:1	100:1	100:1
MWP (maximum system pressure) ①	160 bar	160 bar	160 bar	160 bar
Minimum system pressure	1 mbar abs (under reference conditions)			

① MWP corresponds to the PS designation in the PED (maximum system pressure)

Nominal range	1.45 psi	7.25 psi	43.51 psi	232.06 psi
Limit URL (upper)	1.45 psi	7.25 psi	43.51 psi	232.06 psi
Limit LRL (lower)	-1.45 psi	-7.25 psi	-43.51 psi	-232.06 psi
Smallest adjustable measuring span	0.015 psi	0.073 psi	0.435 psi	2.321 psi
Turn down	100:1	100:1	100:1	100:1
MWP (maximum system pressure) ①	2320 psi	2320 psi	2320 psi	2320 psi
Minimum system pressure	0.015 psi abs (under reference conditions)			

① MWP corresponds to the PS designation in the PED (maximum system pressure)

2.3 Ambient temperature effect on current output

< 0.05% / 10 K, max. < 0.15%, each case at -40...+80°C / -40...+176°F

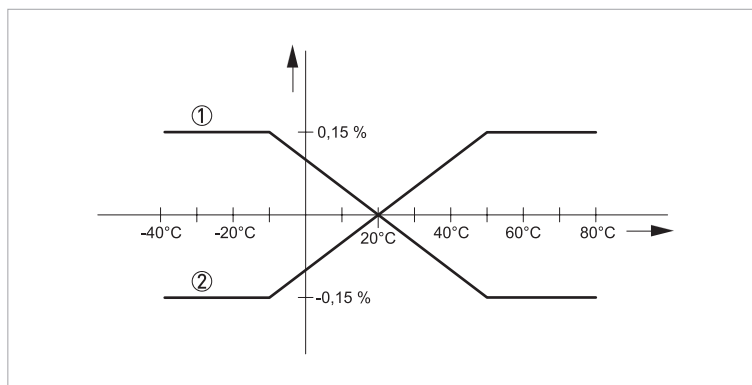


Figure 2-1: Ambient temperature effect on current output

- ① Falling characteristics
- ② Rising characteristics

2.4 Dynamic behaviour of the current output

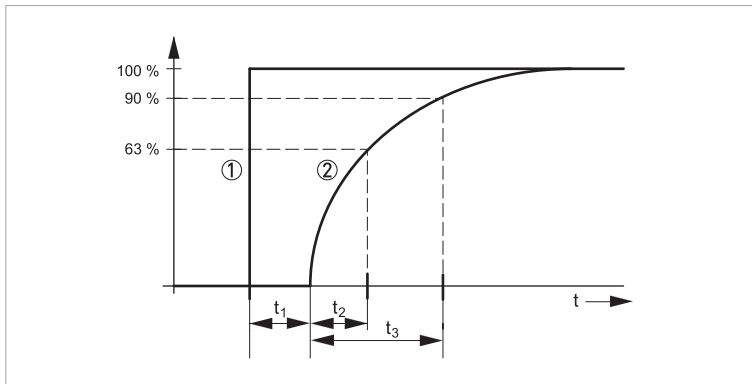


Figure 2-2: Behaviour at an abrupt change in the process variable.
 t_1 - dead time; t_2 - rise time; t_3 - step response time

- ① Process variable
- ② Output signal

These parameters depend on the fill fluid, temperature and, if applicable, the diaphragm seal

	Dead time (t_1) [ms]	T63% (t_2) [ms]	T90% (t_3) [ms] ①
100 mbar / 1.50 psi	50	95	220
500 mbar / 7.3 psi		75	200
3 bar / 43.51 psi		60	175
16 bar / 232.1 psi			

- ① Step response time is the sum of dead time and T90%

2.5 Dimensions and weight

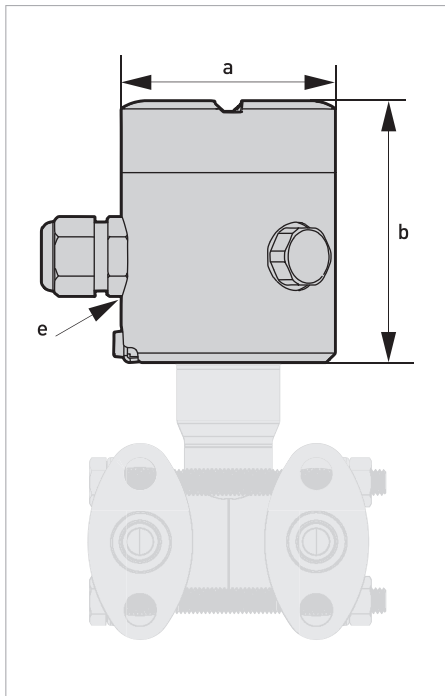


Figure 2-3: Dimension of the enclosure

Dimension	Blind Version		Version with display	
	mm	inch	mm	inch
a	64	2.52	64	2.52
b	65	2.8	73	3.1
e	M16 x 1.5			

Table 2-1: Dimension in mm / inch

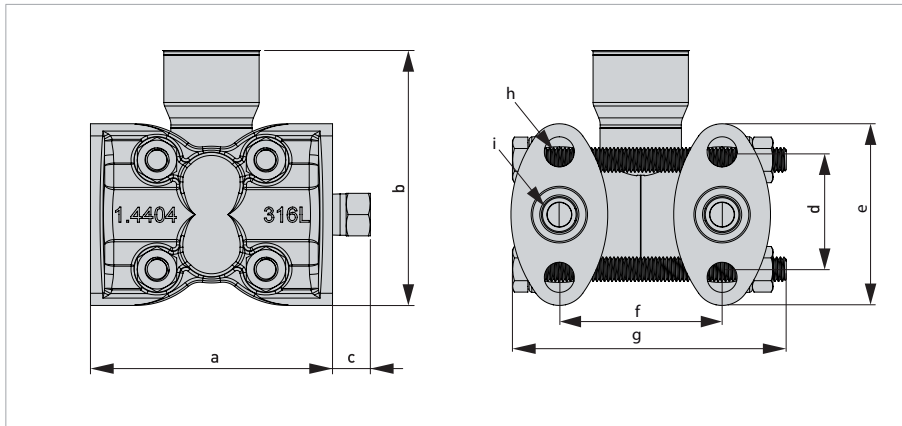


Figure 2-4: 1/4-18 NPT Process connection without venting (S0)

	Dimension [mm]	Dimension [inch]
a	80	3.15
b	83.9	3.3
c	12.5	0.49
d	41.3	1.63
e	60	2.36
f	54	2.13
g	91	3.58
h	7/16 UNF or M10	
i	1/4-18 NPT	

	Weight [kg]	Weight [lb]
Process connection	1.48	3.26

Overall height of the differential pressure transmitter = b (process connection) + overall height of the respective housing

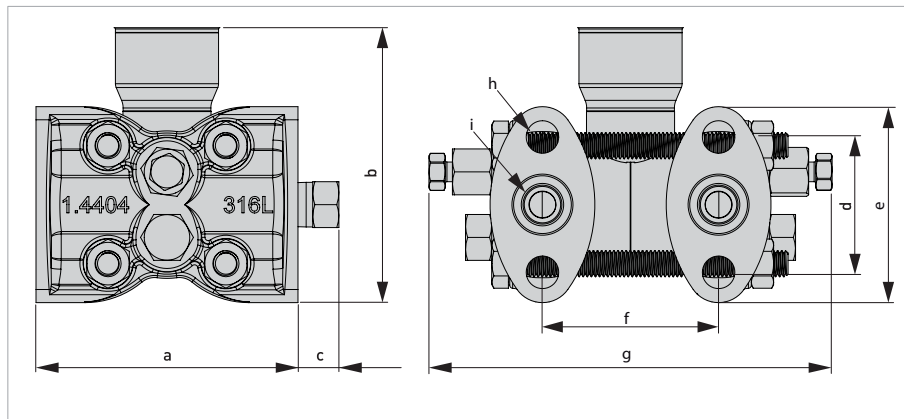


Figure 2-5: 1/2 NPT with side vent (SD)

	Dimension [mm]	Dimension [inch]
a	80	3.15
b	83.9	3.3
c	12.5	0.49
d	41.3	1.63
e	60	2.36
f	54	2.13
g	125	4.92
h		7/16 UNF
i		1/4-18 NPT according to IEC 61518 A

	Weight [kg]	Weight [lb]
Process connection, side vent	0.734	1.62

Overall height of the differential pressure transmitter = b (process connection) + overall height of the respective housing

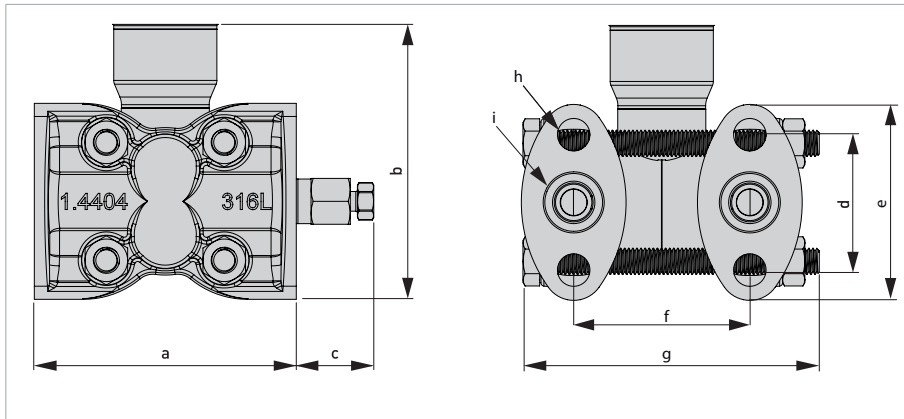


Figure 2-6: 1/4 NPT venting on the process axis (SR)

	Dimension [mm]	Dimension [inch]
a	80	3.15
b	83.9	3.3
c	12.5	0.49
d	41.3	1.63
e	60	2.36
f	54	2.13
g	125	4.92
h		7/16 UNF
i		1/4-18 NPT according to IEC 61518 A

	Weight [kg]	Weight [lb]
Process connection, side vent	1.5	3.31

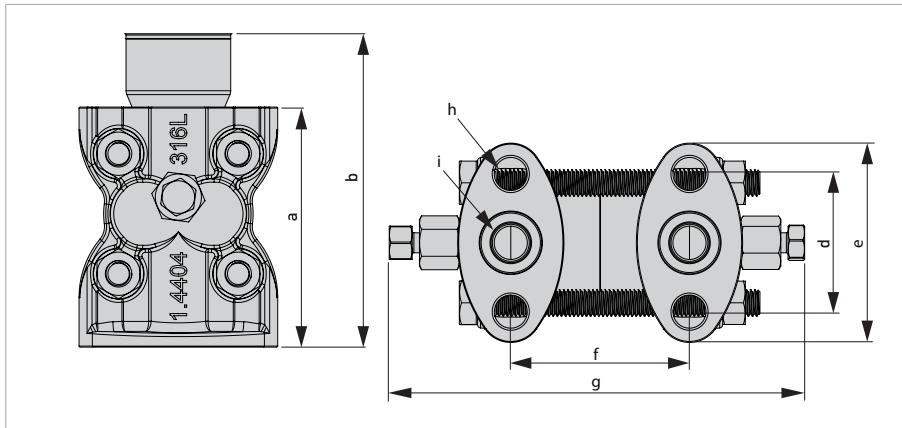


Figure 2-7: 90° vertical 1/4-18 Process connection, side vent (VD)

	Dimension [mm]	Dimension [inch]
a	72	2.83
b	94	3.7
d	41.3	1.63
e	60	2.36
f	54	2.13
g	125	4.92
h	7/16 UNF	
i	1/4-18 NPT according to IEC 61518 A	

	Weight [kg]	Weight [lb]
Process connection, side vent	0.629	1.39

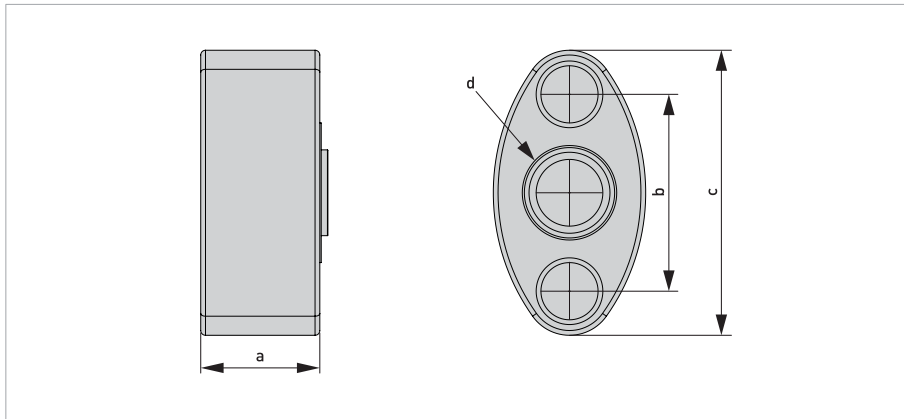


Figure 2-8: Oval flange adapter (Ax)

	Dimension [mm]	Dimension [inch]
a	25.3	0.996
b	41.3	1.63
c	60	2.36
d	1/2 NPT	

	Weight [kg]	Weight [lb]
Mounting bracket	0.196	0.43

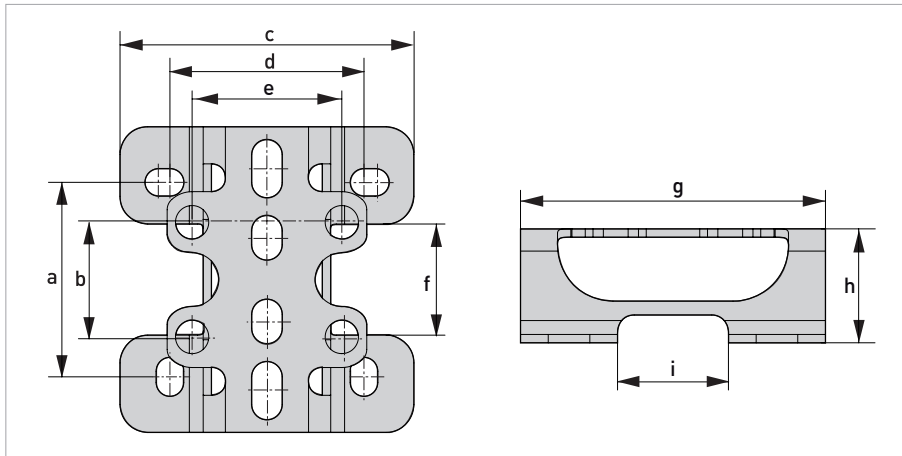


Figure 2-9: Mounting bracket for pipe and wall mounting 2" / 50.8 mm

	Dimension [mm]	Dimension [inch]
a	70	2.76
b	41.3	1.63
c	106	4.17
d	70	2.76
e	54	2.13
f	40	1.57
g	110	4.33
h	41	1.61
i	40	1.57

	Weight [kg]	Weight [lb]
Mounting bracket	0.33	0.73

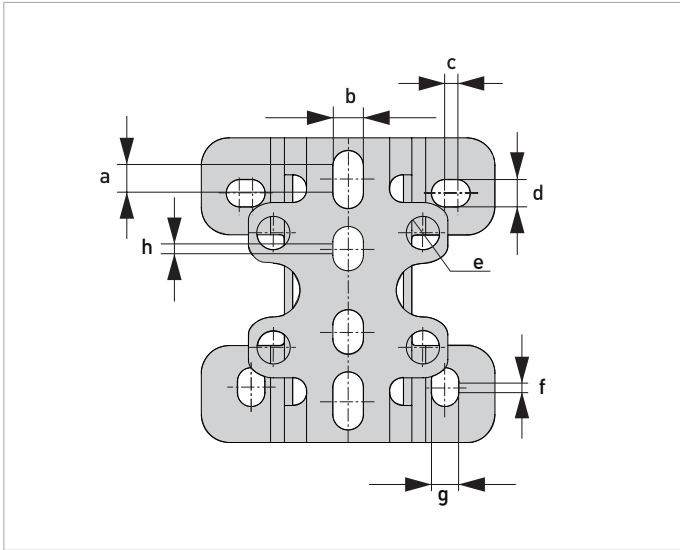


Figure 2-10: Drilling diameter for mounting bracket

	Dimension [mm]	Dimension [inch]
a	10	0.39
b	11	0.43
c	4	0.16
d	10	0.39
e	4x Ø12	4x Ø0.47
f	4	0.16
g	10	0.39
h	5	0.2

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