

Ultrasonic measurement of water flow

Permanently installed ultrasonic clamp-on system for flow measurement of water

Features

- Watertight IP68 transducers housed inside the rugged stainless steel (316Ti) Variofix C mounting fixtures, providing a highly reliable and long term durable solution for measuring at subsurface buried pipelines or at applications where the measurement point can be flooded
- Precise bidirectional, highly dynamic flow measurement, excellent zero-point stability and high reproducibility of measuring results
- Accurate and reliable flow measurement even at pipes with up to 6 % of solids or gaseous contents by volume (e.g. wastewater applications)
- Simple retrofitting solution for existing water networks without interrupting the supply or the need for costly shaft and pipe works
- Power supply selectable: 230 V AC or 24 V DC or 12 V DC (for remote power supply via e.g. solar panels)
- Transmission of measurement data from the data logger via RS232 serial interface
- Analog output 4...20 mA and 2 binary outputs (optorelay) available
- Modbus, BACnet, M-Bus and RS485 as communication protocols available

Applications

- Flow measurement at water and wastewater pipelines



FLUXUS F501




Variofix C



Variofix L

Transmitter

Technical data

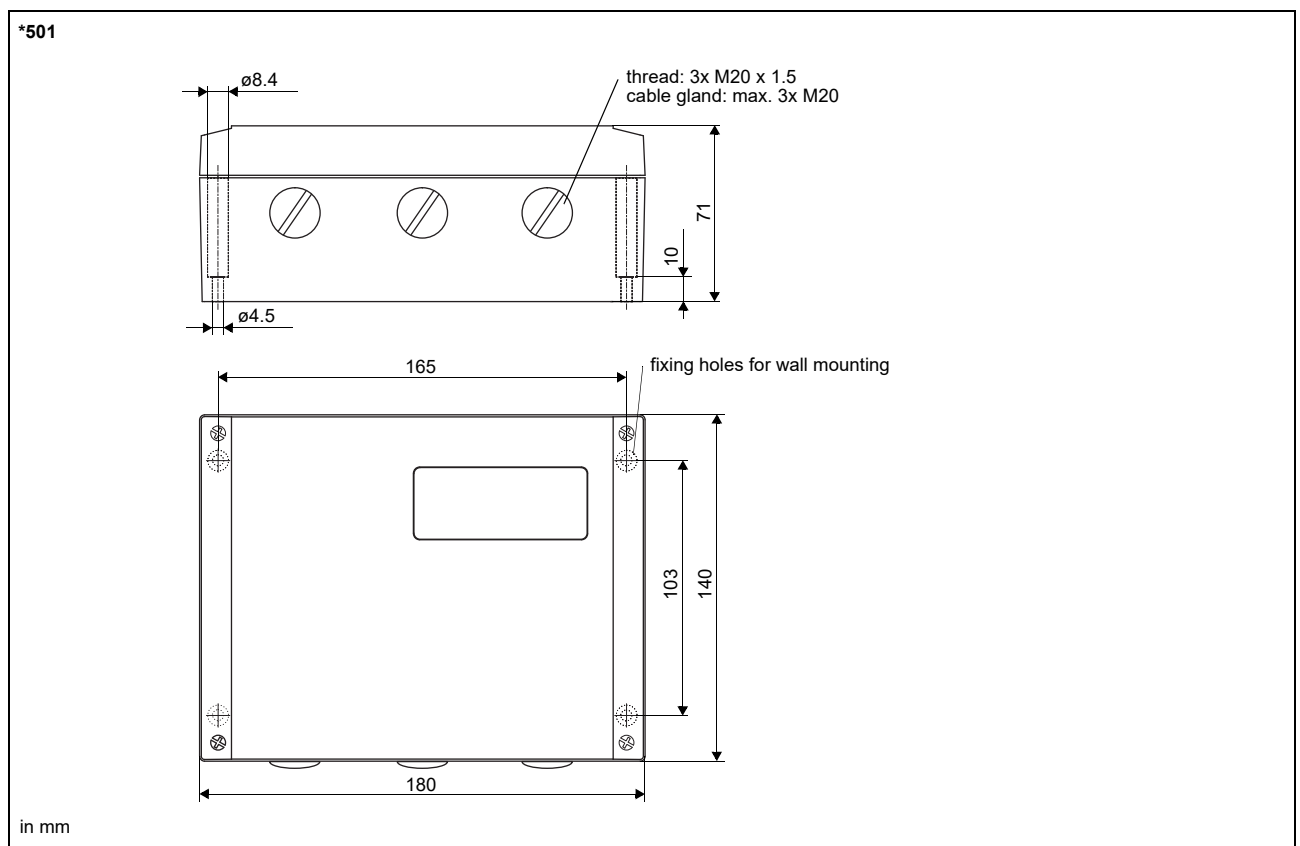
	FLUXUS F501 /D501MQ	FLUXUS F501 /D501PK
		
design	field device with 1 measuring channel	
transducers	CDM2L**, CDP2L**, CDQ2L**	CDK1L**, CDM2L**, CDP2L**
measurement		
measurement principle	transit time difference correlation principle	
flow velocity	m/s	0.01...25
repeatability	0.25 % of reading \pm 0.01 m/s	
fluid	<ul style="list-style-type: none"> • water • glycol/H₂O: 20 %, 30 %, 40 %, 50 % 	
measurement uncertainty (volumetric flow rate) ¹	\pm 1.5 % of reading \pm 0.01 m/s	
transmitter		
power supply	<ul style="list-style-type: none"> • 100...230 V/50...60 Hz or • 20...32 V DC or • 11...16 V DC (without backlight) 	
power consumption	W	< 10
number of measuring channels	1	
damping	s	0...100 (adjustable)
measuring cycle	Hz	10
response time	s	1
housing material	aluminum, powder coated	
degree of protection	IP66	
dimensions	mm	see dimensional drawing
weight	kg	1.5
fixation	wall mounting, optional: 2" pipe mounting	
ambient temperature	°C	-10...+60
display	2 x 16 characters, dot matrix, backlight	
menu language	English, German, French, Dutch, Spanish	
measuring functions		
physical quantities	volumetric flow rate, mass flow rate, flow velocity	
totalizer	volume, mass	
communication interfaces		
service interfaces	<ul style="list-style-type: none"> • RS232 • USB (with adapter) 	
process interfaces	max. 1 option: <ul style="list-style-type: none"> • RS485 (sender) • Modbus RTU, sender (switchable) • BACnet MS/TP, sender (switchable) • M-Bus 	
accessories		
serial data kit	<ul style="list-style-type: none"> • cable • adapter 	
software	<ul style="list-style-type: none"> • FluxDiagReader: download of measured values and parameters, graphical presentation • FluxDiag (optional): download of measurement data, graphical presentation, report generation 	
data logger		
loggable values	all physical quantities and totalized values	
capacity	> 100 000 measured values	

¹ for reference conditions and $v > 0.25$ m/s, with transducer module

		FLUXUS F501 /D501MQ	FLUXUS F501 /D501PK
outputs			
The outputs are galvanically isolated from the transmitter.			
• current output			
number		1	
range	mA	0/4...20	
accuracy		0.1 % of reading ±15 µA	
active output		R _{ext} < 500 Ω	
• binary output			
number		2	
optorelay		28 V/100 mA	
binary output as alarm output			
• functions		limit, change of flow direction or error	
binary output as pulse output			
• functions		mainly for totalizing	
• pulse value	units	0.01...1000	
• pulse width	ms	80...1000	

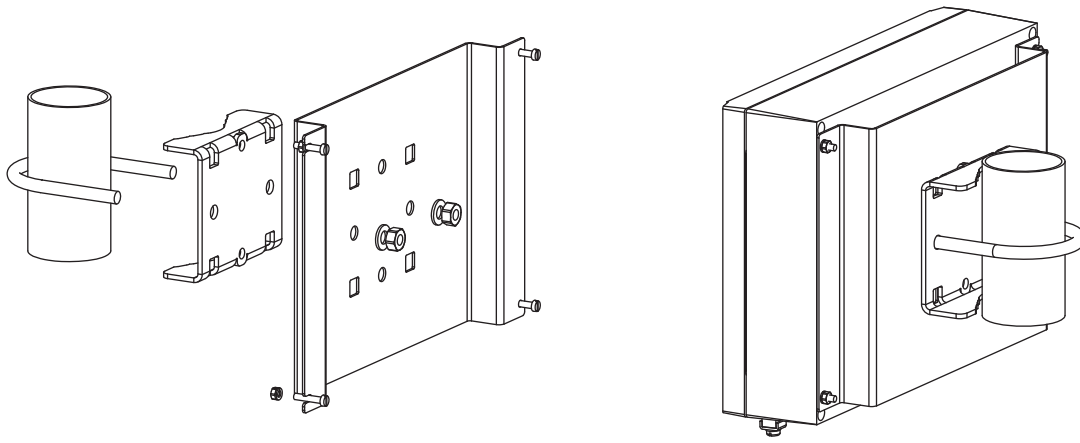
¹ for reference conditions and v > 0.25 m/s, with transducer module

Dimensions

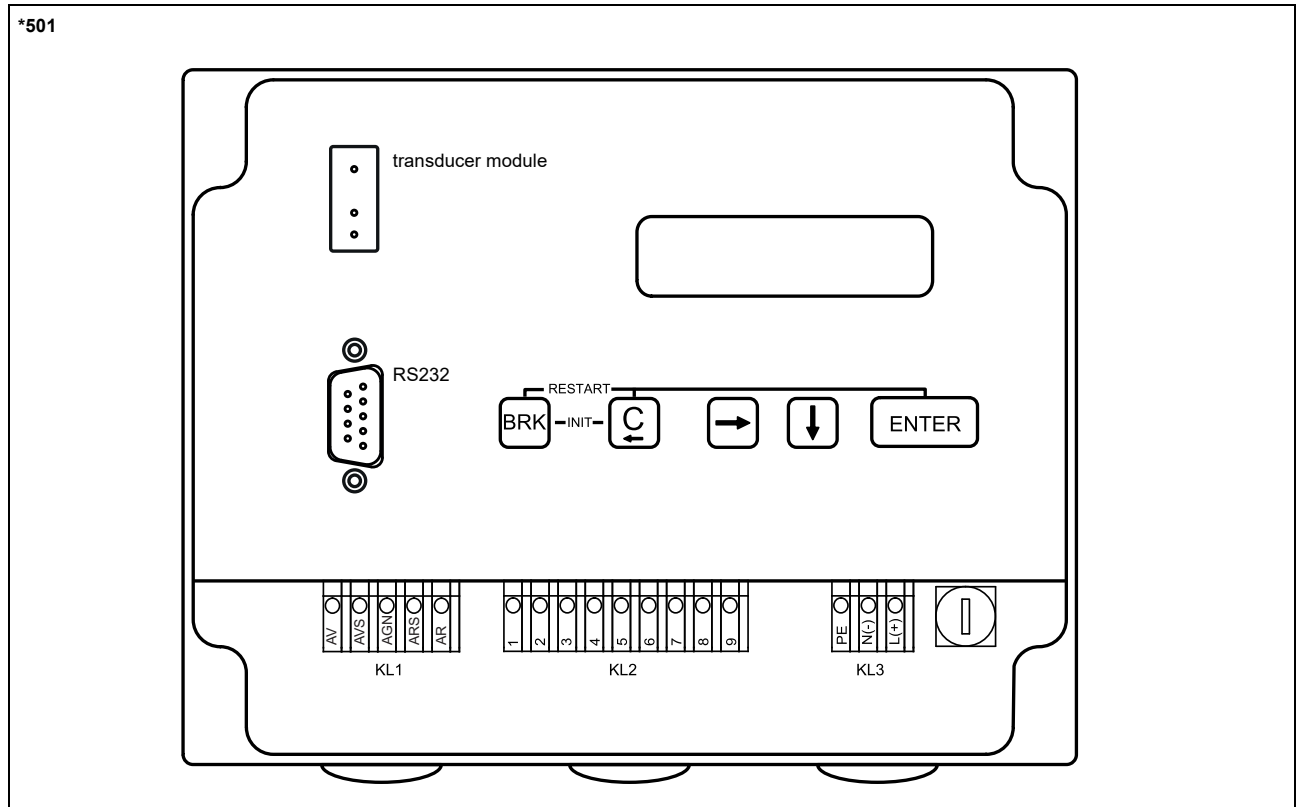


2" pipe mounting kit

50



Terminal assignment

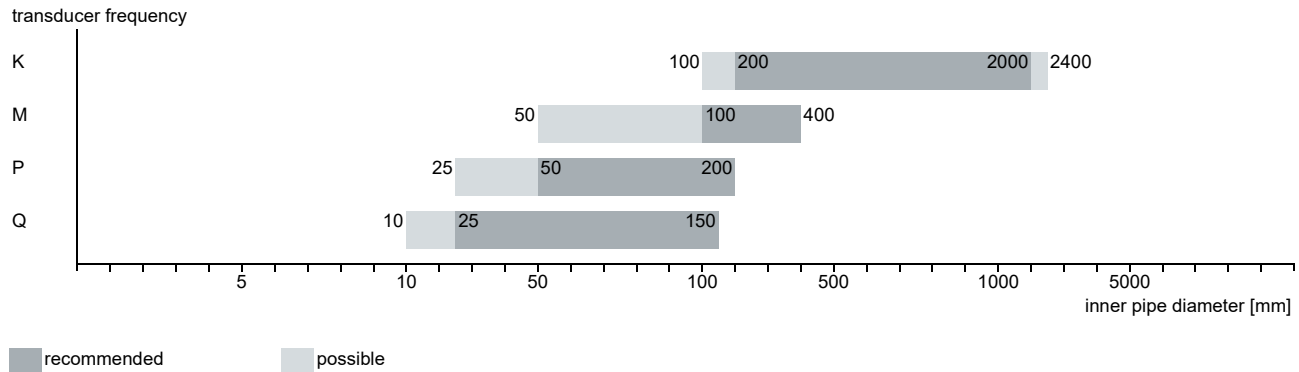


power supply ¹					
terminal	connection (AC)		connection (DC)		
PE	earth		earth		
N(-)	neutral		-		
L(+)	phase		+		
transducers, extension cable					
terminal	connection		transducer		
AV	signal		↑ ↗ ↘ ↑ ↗		
AVS	internal shield				
ARS	internal shield				
AR	signal				
cable gland	external shield		↑ ↗		
outputs ¹					
terminal	connection		terminal	connection	communication interface
1(-), 2(+)	binary output B1		8(+)	signal +	
3(-), 4(+)	binary output B2		7(-)	signal -	
5(-), 6(+)	current output I1		9	shield	• RS485 • Modbus RTU • BACnet MS/TP • M-Bus

¹ cable (by customer): e.g. flexible leads, with insulated wire end ferrules, lead cross sectional area: 0.25...2.5 mm²

Transducers

Transducer selection



Technical data

Shear wave transducers

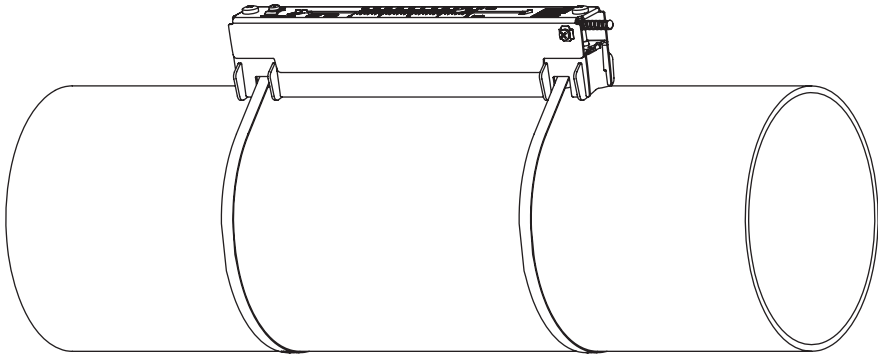
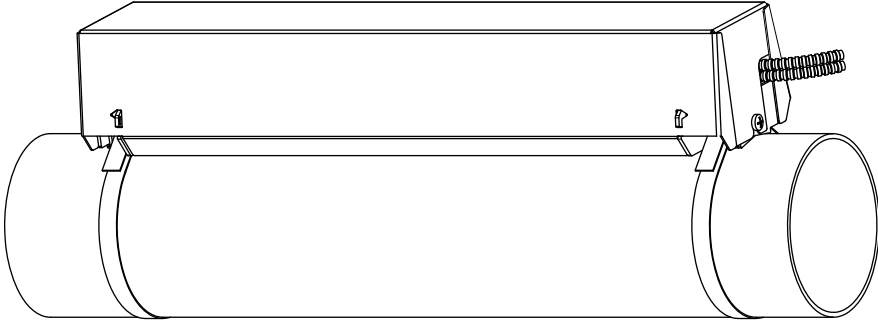
technical type		CDK1LZ7	CDM2LZ1	CDP2LZ1	CDQ2LZ1
transducer frequency	MHz	0.5	1	2	4
inner pipe diameter d					
min. extended	mm	100	50	25	10
min. recommended	mm	200	100	50	25
max. recommended	mm	2000	400	200	150
max. extended	mm	2400	-	-	-
pipe wall thickness					
min.	mm	5	2.5	1.2	0.6
material					
housing		PEEK with stainless steel cap 316Ti (1.4571)	PEEK with stainless steel cap 316L (1.4404)		
contact surface		PEEK			
degree of protection		IP67			
transducer cable					
type		2606			
length	m	10			
length (**-*****/LC)	m	20			
dimensions					
length l	mm	126.5	64	40	
width b	mm	51	32	22	
height h	mm	67.5	40.5	25.5	
dimensional drawing					
weight (without cable)	kg	0.36	0.066	0.016	
pipe surface temperature					
min.	°C	-40			
max.	°C	+100			
ambient temperature					
min.	°C	-40			
max.	°C	+100			

Shear wave transducers (IP68)

technical type		CDK1LI8	CDM2LI8	CDP2LI8
transducer frequency	MHz	0.5	1	2
inner pipe diameter d				
min. extended	mm	100	80	25
min. recommended	mm	200	100	50
max. recommended	mm	2000	400	200
max. extended	mm	2400	-	-
pipe wall thickness				
min.	mm	5	2.5	1.2
material				
housing		PEEK with stainless steel cap 316Ti (1.4571)	PEEK with stainless steel cap 316Ti (1.4571)	
contact surface		PEEK	PEEK	
degree of protection		IP68 ¹	IP68 ¹	
transducer cable				
type		2550	2550	
length	m	12	12	
dimensions				
length l	mm	130	72	
width b	mm	54	32	
height h	mm	83.5	46	
dimensional drawing				
weight (without cable)	kg	0.43	0.085	
pipe surface temperature				
min.	°C	-40	-40	
max.	°C	+100	+100	
ambient temperature				
min.	°C	-40	-40	
max.	°C	+100	+100	

¹ test conditions: 3 months/2 bar (20 m)/20 °C

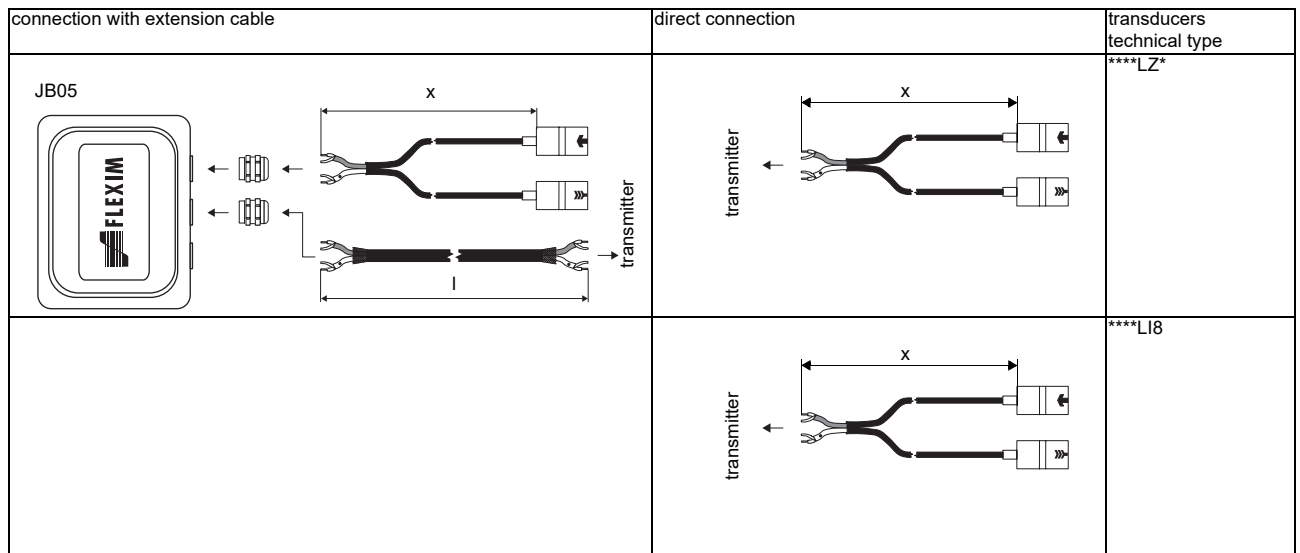
Transducer mounting fixture

<p>Variofix L (VLK, VLM, VLQ)</p> 	<p>material: stainless steel 316Ti (1.4571), 316L (1.4404), 17-7PH (1.4568) inner length: VLK: 348 mm VLM: 234 mm VLQ: 176 mm dimensions: VLK: 423 x 90 x 93 mm VLM: 309 x 57 x 63 mm VLQ: 247 x 43 x 47 mm transducers: CD**LZ1</p>
<p>Variofix C (VCK, VCM)</p> 	<p>material: stainless steel 316Ti (1.4571) inner length: VCK-*L: 500 mm VCM: 400 mm dimensions: VCK-*L: 560 x 126 x 120 mm VCM: 460 x 96 x 80 mm transducers: CD**L*</p>

Coupling materials for transducers

type	ambient temperature °C
coupling compound type N	-30...+130
coupling foil type VT	-10...+200

Connection systems



Cable

transducer cable			
type		2606	2550
weight	kg/m	0.033	0.035
ambient temperature	°C	-40...+100	-40...+100
properties			longitudinal watertight
cable jacket			
material		PUR	PUR
outer diameter	mm	5	5.2 ±0.2
thickness	mm		0.9
colour		grey	grey
shield		x	x

extension cable			
type		2551	2615
weight	kg/m	0.083	0.18
ambient temperature	°C	-25...+80	-30...+70
properties			halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2
cable jacket			
material		TPE-O	PUR
outer diameter	mm	8	max. 12
thickness	mm		2
colour		black	black
shield		x	x

Cable length

transducer frequency		K		M, P		Q	
transducers technical type		x	l	x	l	x	l
CDK1LZ7	m	10	≤ 90	-	-	-	-
CD*2LZ1	m	-	-	10	≤ 90	10	≤ 90
****LI*	m	12 ¹	-	12 ¹	-	-	-

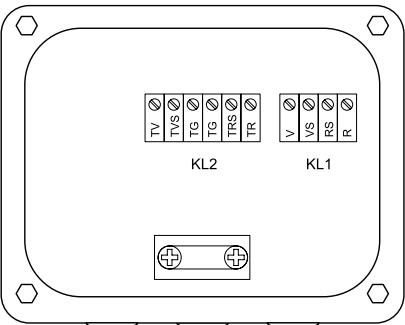
¹ others on request

x - transducer cable length

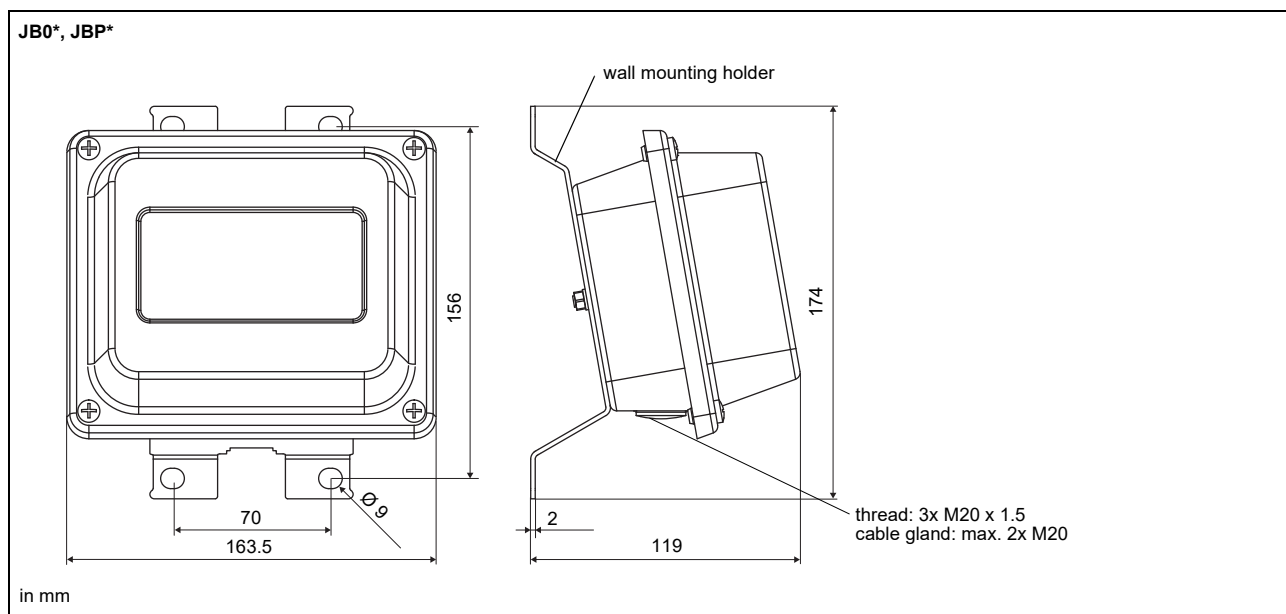
l - max. length of extension cable (depending on application)

Junction box

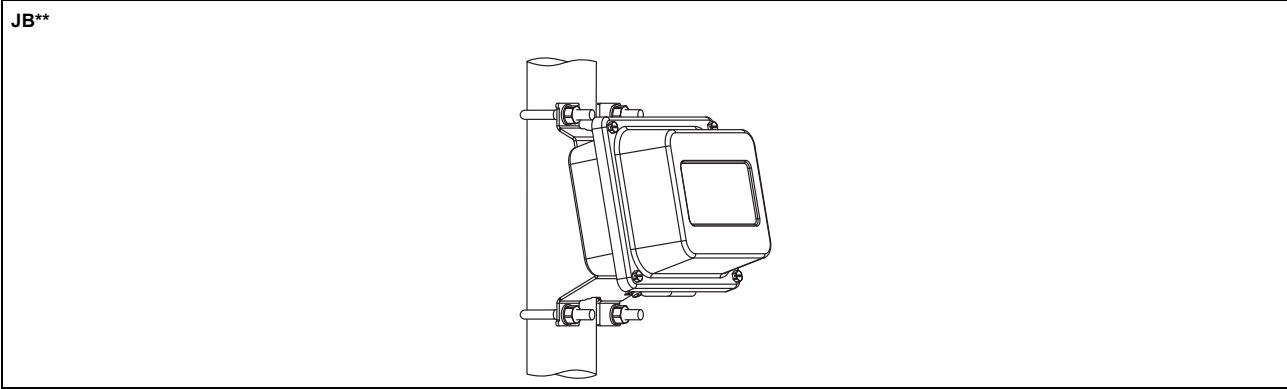
Technical data

JB05																															
weight	kg	1.2 kg																													
fixation		wall mounting optional: 2" pipe mounting																													
material																															
housing		stainless steel 316L (1.4404)																													
gasket		silicone																													
degree of protection		IP67																													
ambient temperature																															
min.	°C	-40																													
max.	°C	+80																													
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"></div> <div style="width: 65%;"> <p>Connection</p>  <p>Transducers</p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> <th>transducer</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL1</td> <td>V</td> <td>signal</td> <td>↑</td> </tr> <tr> <td>VS</td> <td>internal shield</td> <td></td> </tr> <tr> <td>RS</td> <td>internal shield</td> <td>↕</td> </tr> <tr> <td>R</td> <td>signal</td> <td></td> </tr> </tbody> </table> <p>Extension cable</p> <table border="1"> <thead> <tr> <th>terminal strip</th> <th>terminal</th> <th>connection</th> </tr> </thead> <tbody> <tr> <td rowspan="4">KL2</td> <td>TV</td> <td>signal</td> </tr> <tr> <td>TVS</td> <td>internal shield</td> </tr> <tr> <td>TRS</td> <td>internal shield</td> </tr> <tr> <td>TR</td> <td>signal</td> </tr> </tbody> </table> </div> </div>			terminal strip	terminal	connection	transducer	KL1	V	signal	↑	VS	internal shield		RS	internal shield	↕	R	signal		terminal strip	terminal	connection	KL2	TV	signal	TVS	internal shield	TRS	internal shield	TR	signal
terminal strip	terminal	connection	transducer																												
KL1	V	signal	↑																												
	VS	internal shield																													
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terminal strip	terminal	connection																													
KL2	TV	signal																													
	TVS	internal shield																													
	TRS	internal shield																													
	TR	signal																													

Dimensions



2" pipe mounting kit



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