

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 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 to 20 mA and 2 binary outputs (optorelay) available
- Modbus, BACnet and RS485 as communication protocols available

Applications

- Flow measurement at water and wastewater pipelines



FLUXUS F501




PermaLok



PermaRail

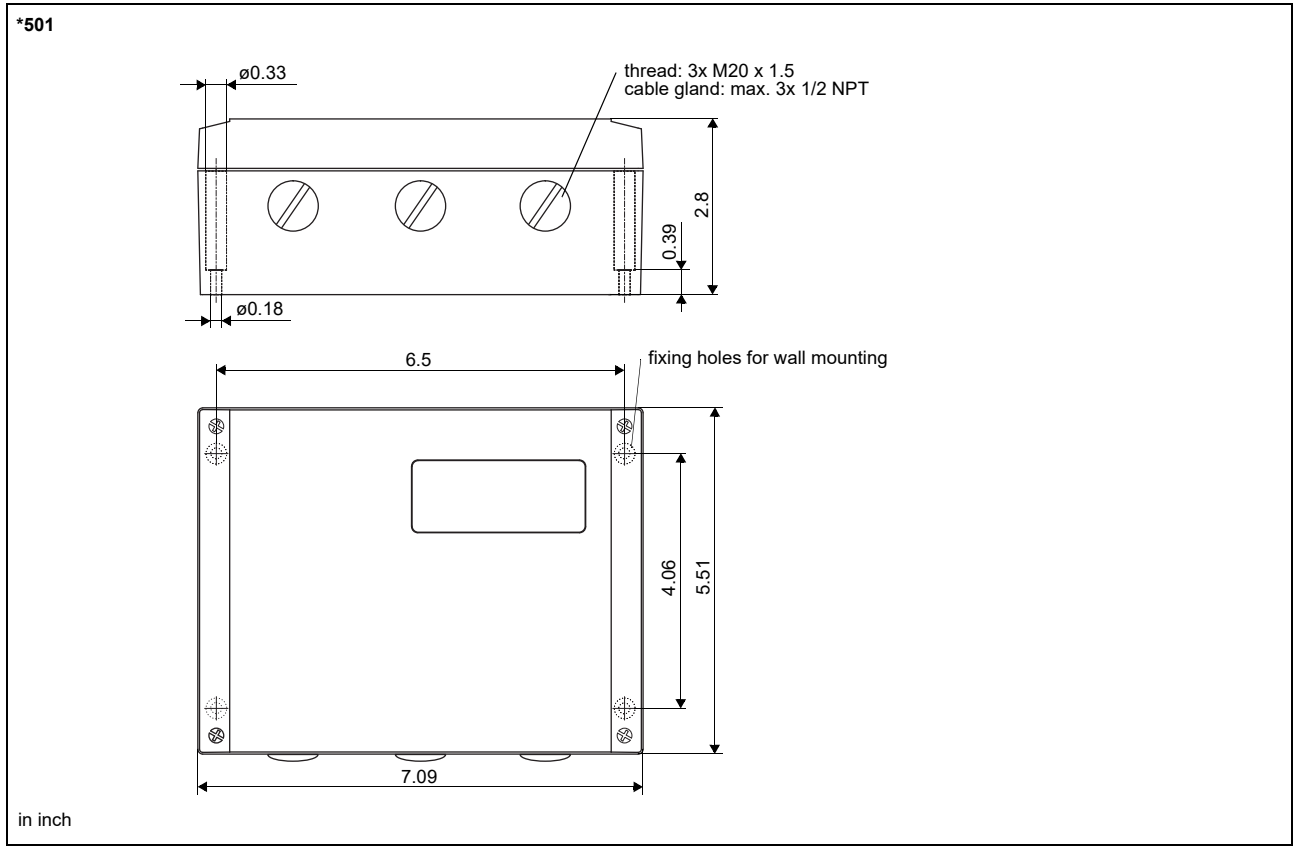
Transmitter

Technical data

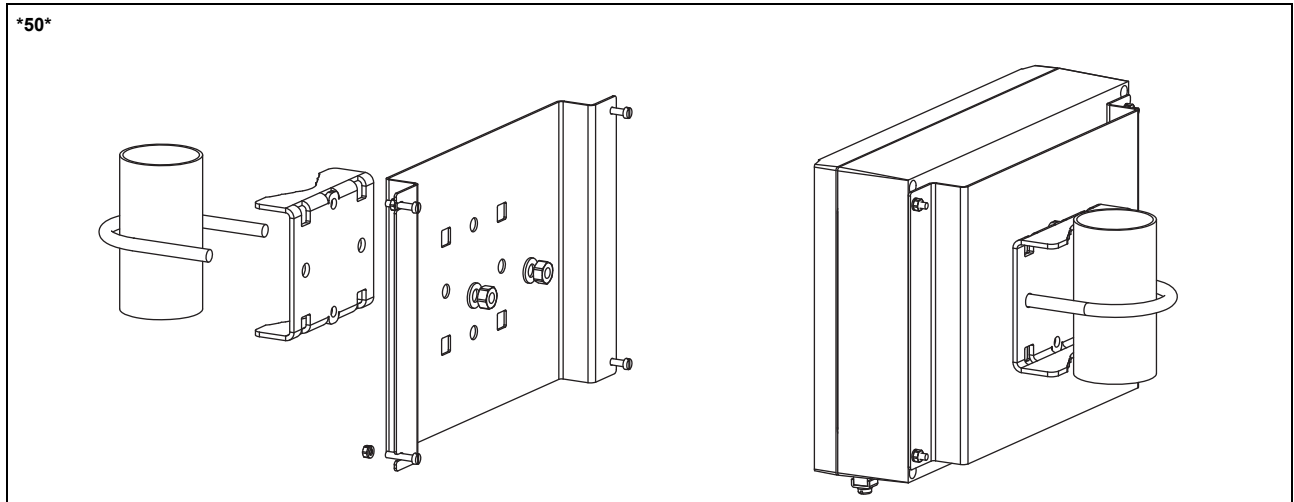
	FLUXUS F501 /D501MQ	FLUXUS F501 /D501PK
		
design	field device with 1 measuring channel	
transducers	CDM2L**, CDP2L**, CDQ2L**	CDK1L**, CDM2L**, CDP2L**
measurement		
measurement principle	transit time difference correlation principle	
flow velocity	ft/s	0.03 to 82
repeatability	0.25 % of reading \pm 0.03 ft/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 0.03 ft/s	
transmitter		
power supply	<ul style="list-style-type: none"> • 100 to 230 V/50 to 60 Hz or • 20 to 32 V DC or • 11 to 16 V DC (without backlight) 	
power consumption	W	< 10
number of measuring channels		1
damping	s	0 to 100 (adjustable)
measuring cycle	Hz	10
response time	s	1
housing material	aluminum, powder coated	
degree of protection	NEMA 4	
dimensions	in	see dimensional drawing
weight	lb	3.3
fixation	wall mounting, optional: 2" pipe mounting	
ambient temperature	°F	14 to +140
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) 	
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	
outputs		
	The outputs are galvanically isolated from the transmitter.	
• current output		
number		1
range	mA	0/4 to 20
accuracy	0.1 % of reading \pm 15 μ A	
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 to 1000
• pulse width	ms	80 to 1000

¹ for reference conditions and $v > 0.82$ ft/s, with transducer module

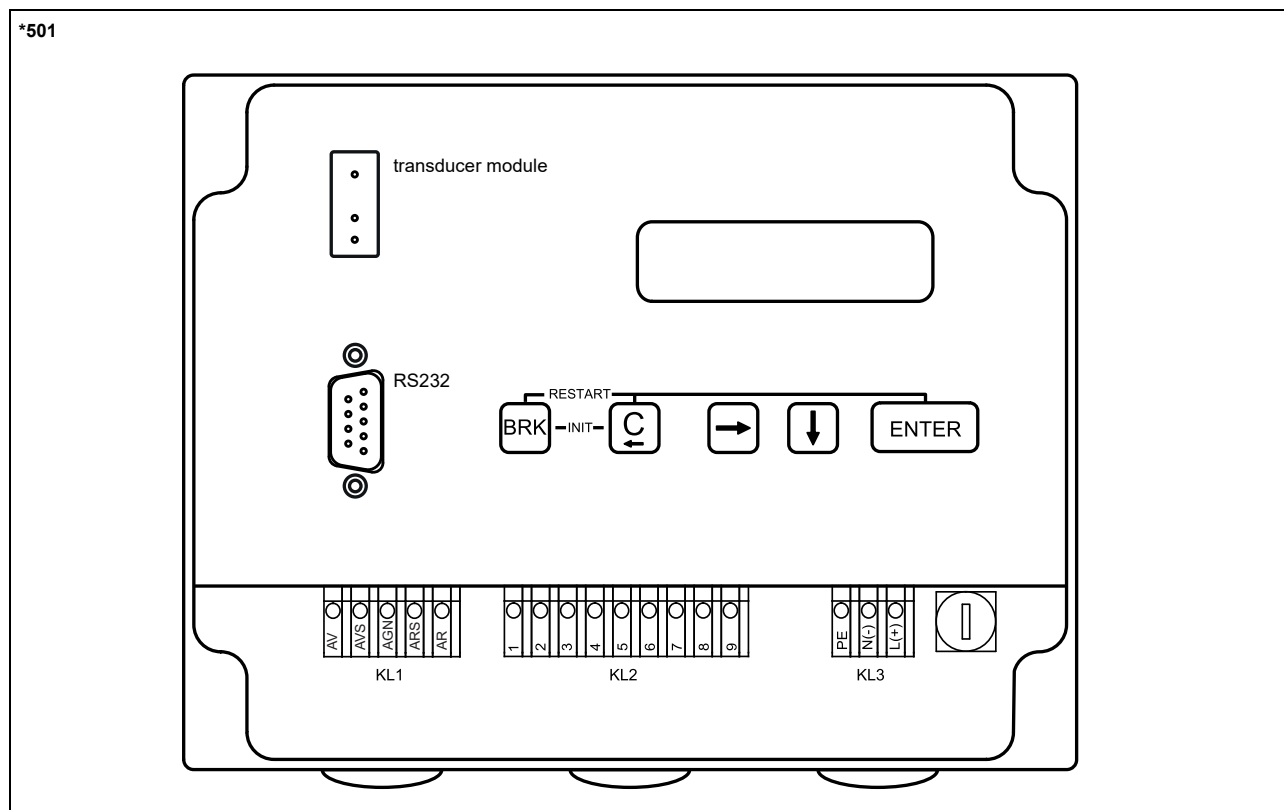
Dimensions



2" pipe mounting kit



Terminal assignment

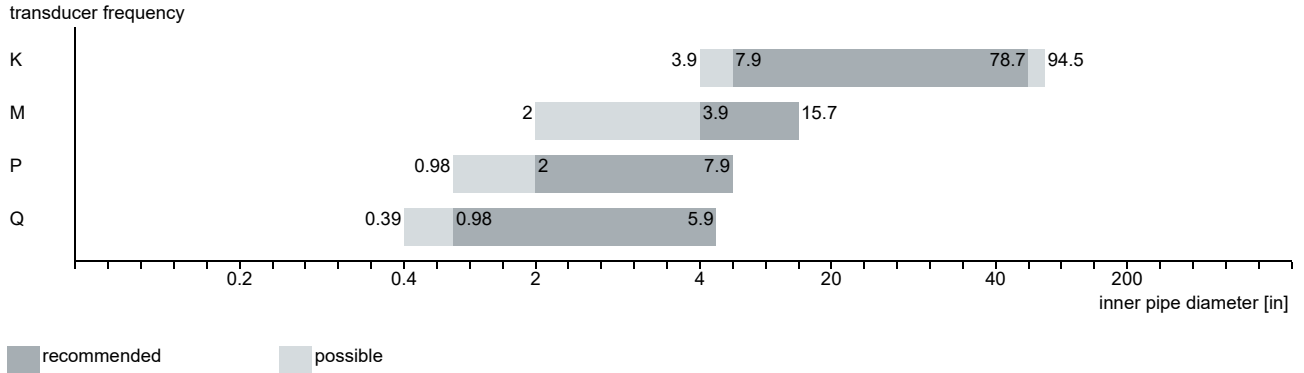


power supply ¹				
terminal	connection (AC)		connection (DC)	
PE	earth		earth	
N(-)	neutral		-	
L(+)	phase		+	
transducers, extension cable				
terminal	connection		transducer	
AV	signal		↑	
AVS	internal shield			
ARS	internal shield		↕	
AR	signal			
cable gland	external shield		↑ ↕	
outputs ¹				
terminal	connection	terminal	connection	communication interface
1(-), 2(+)	binary output B1	8(+)	signal +	<ul style="list-style-type: none"> • RS485 • Modbus RTU • BACnet MS/TP
3(-), 4(+)	binary output B2	7(-)	signal -	
5(-), 6(+)	current output I1	9	shield	

¹ cable (by customer): e.g., flexible leads, with insulated wire end ferrules, lead cross sectional area: AWG14 to 24

Transducers

Transducer selection

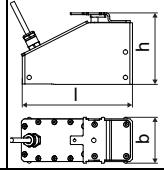
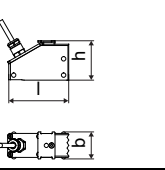


Technical data

Shear wave transducers

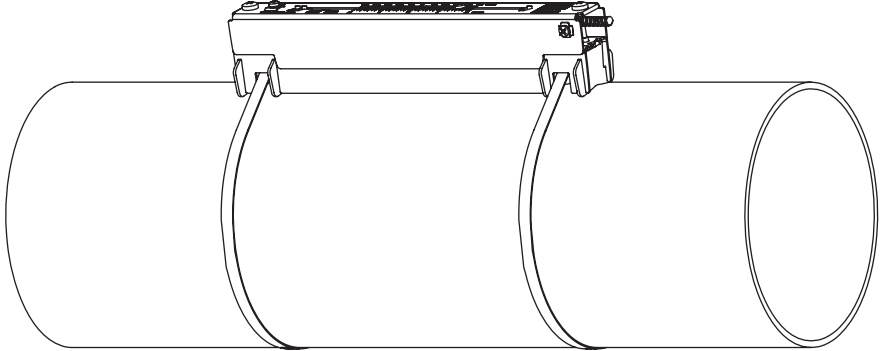
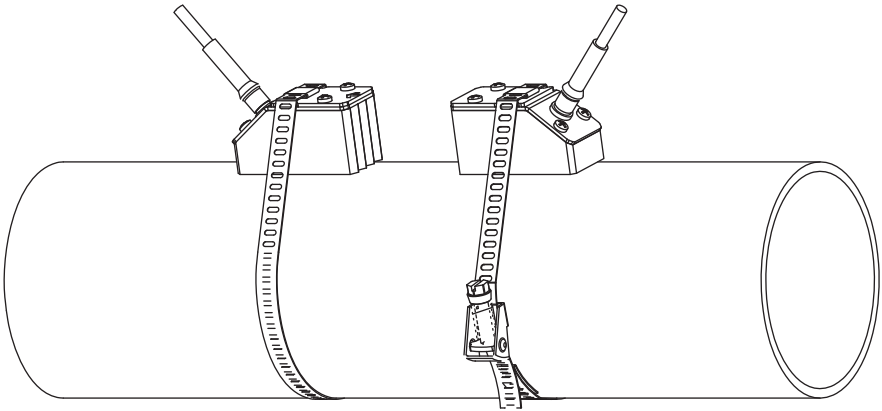
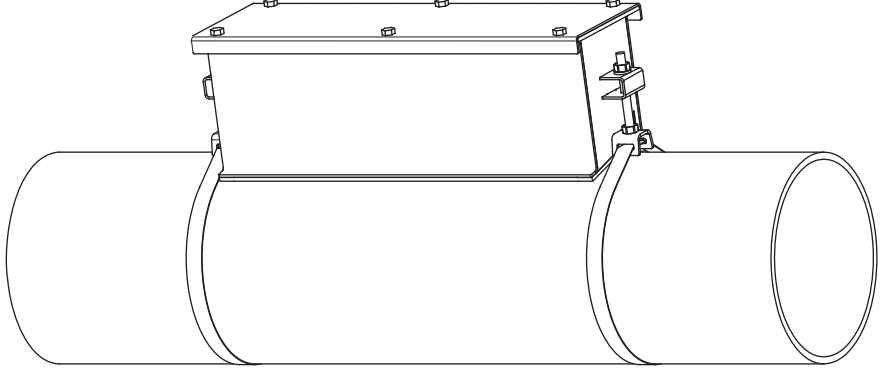
technical type		CDK1LZ7	CDM2LZ1	CDP2LZ1	CDQ2LZ1
transducer frequency	MHz	0.5	1	2	4
inner pipe diameter d					
min. extended	in	3.9	2	0.98	0.39
min. recommended	in	7.9	3.9	2	0.98
max. recommended	in	78.7	15.7	7.9	5.9
max. extended	in	94.5	-	-	-
pipe wall thickness					
min.	in	0.2	0.1	0.05	0.02
material					
housing		PEEK with stainless steel cap 316Ti	PEEK with stainless steel cap 316L		
contact surface		PEEK			
degree of protection		NEMA 6			
transducer cable					
type		2606			
length	ft	32			
length (**-*****/LC)	ft	65			
dimensions					
length l	in	4.98	2.52	1.57	
width b	in	2.01	1.26	0.87	
height h	in	2.66	1.59	1	
dimensional drawing					
weight (without cable)	lb	0.79	0.15	0.04	
pipe surface temperature					
min.	°F	-40			
max.	°F	+212			
ambient temperature					
min.	°F	-40			
max.	°F	+212			

Shear wave transducers (IP68)

technical type		CDK1L18	CDM2L18	CDP2L18
transducer frequency	MHz	0.5	1	2
inner pipe diameter d				
min. extended	in	3.9	3.1	0.98
min. recommended	in	7.9	3.9	2
max. recommended	in	78.7	15.7	7.9
max. extended	in	94.5	-	-
pipe wall thickness				
min.	in	0.2	0.1	0.05
material				
housing		PEEK with stainless steel cap 316Ti	PEEK with stainless steel cap 316Ti	
contact surface		PEEK	PEEK	
degree of protection		IP68 ¹	IP68 ¹	
transducer cable				
type		2550	2550	
length	ft	39	39	
dimensions				
length l	in	5.12	2.76	
width b	in	2.13	1.26	
height h	in	3.29	1.81	
dimensional drawing				
weight (without cable)	lb	0.95	0.19	
pipe surface temperature				
min.	°F	-40	-40	
max.	°F	+212	+212	
ambient temperature				
min.	°F	-40	-40	
max.	°F	+212	+212	

¹ test conditions: 3 months/29 psi (65 ft)/36 °F

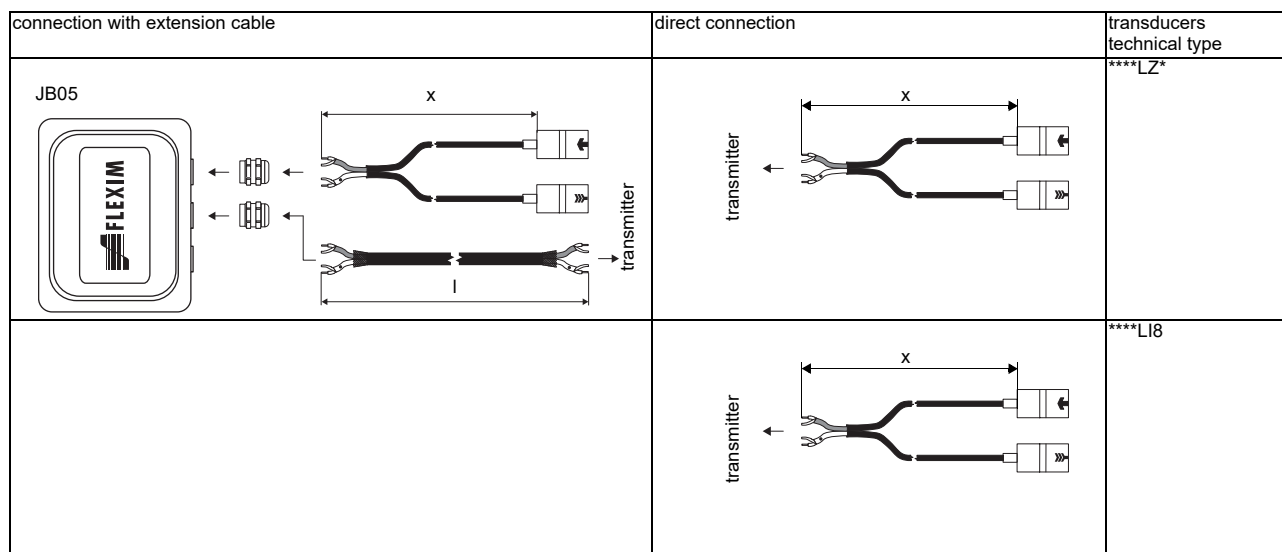
Transducer mounting fixture

<p>PermaRail (VLK, VLM, VLQ)</p> 	<p>material: stainless steel 316Ti, 316L, 17-7PH inner length: VLK: 13.7 in VLM: 9.2 in VLQ: 6.9 in dimensions: VLK: 16.65 x 3.54 x 3.66 in VLM: 12.17 x 2.24 x 2.48 in VLQ: 9.72 x 1.69 x 1.85 in transducers: CD**LZ1, CDK1LI8</p>
<p>quick release clasps and tension straps</p> 	<p>material: stainless steel 410, 200</p>
<p>PermaLok PL</p> 	<p>material: stainless steel 316 transducers: CDM2LI8, CDP2LI8</p>

Coupling materials for transducers

type	ambient temperature °F
coupling compound type N	-22 to +266
coupling pad type VT	14 to +392

Connection systems



Cable

transducer cable			
type		2606	2550
weight	lb/ft	0.07	0.02
ambient temperature	°F	-40 to +212	-40 to +212
properties			longitudinal watertight
cable jacket			
material		PUR	PUR
outer diameter	in	0.2	0.2 ±0.01
thickness	in		0.04
color		gray	gray
shield		x	x

extension cable			
type		2551	2615
weight	lb/ft	0.06	0.12
ambient temperature	°F	-13 to +176	-22 to +158
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	in	0.31	max. 0.47
thickness	in		0.08
color		black	black
shield		x	x

Cable length

transducer frequency		K		M, P		Q	
transducers technical type		x	l	x	l	x	l
CDK1LZ7	ft	32	≤ 295	-	-	-	-
CD*2LZ1	ft	-	-	32	≤ 295	32	≤ 295
****LJ*	ft	39 ¹	-	39 ¹	-	-	-

¹ others on request

x = transducer cable length

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

Junction box

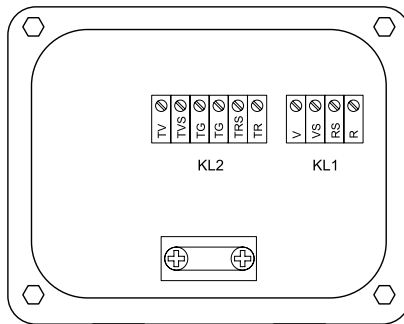
Technical data

JB05		
weight	lb	2.6 lb
fixation		wall mounting optional: 2" pipe mounting
material		
housing		stainless steel 316L
gasket		silicone
degree of protection		IP67
ambient temperature		
min.	°F	-40
max.	°F	+176

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

Connection



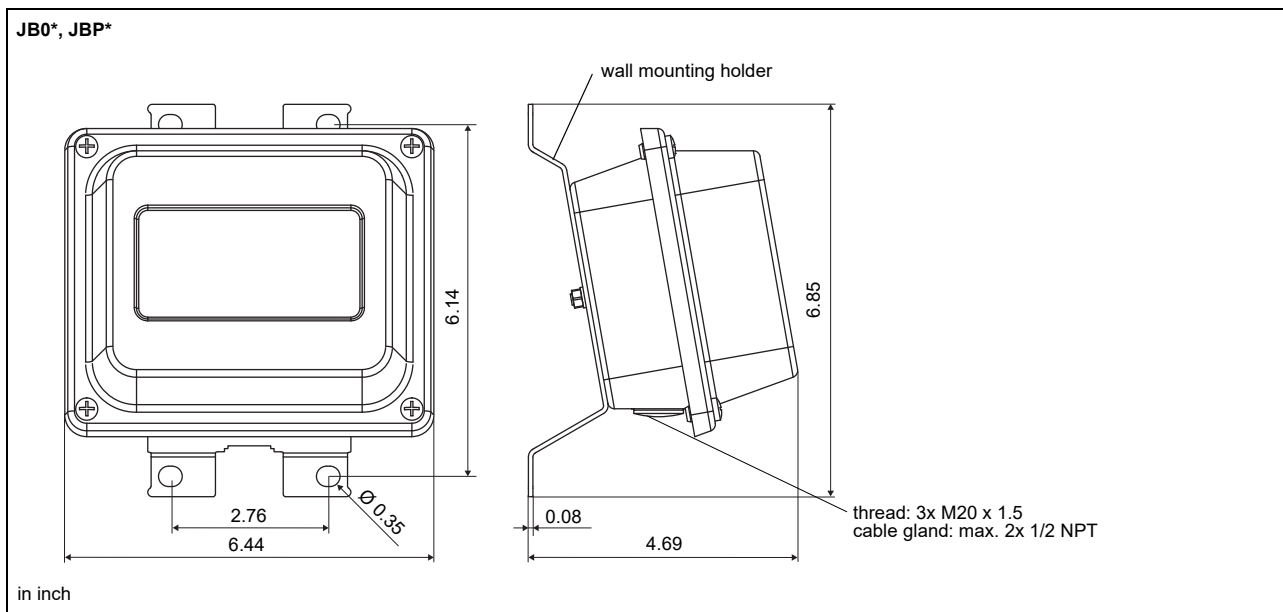
Transducers

terminal strip	terminal	connection	transducer
KL1	V	signal	↑
	VS	internal shield	
	RS	internal shield	⤴
	R	signal	

Extension cable

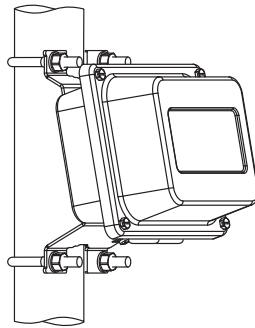
terminal strip	terminal	connection
KL2	TV	signal
	TVS	internal shield
	TRS	internal shield
	TR	signal

Dimensions



2" pipe mounting kit

JB**



FLEXIM AMERICAS Corporation
Edgewood, NY 11717
USA

Tel.:(631) 492-2300
Fax:(631) 492-2117

internet: www.flexim.com
e-mail: usinfo@flexim.com

1-888-852-7473

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