COMAC CAL

CZECH PRODUCER
AND DEVELOPER
OF MEASUREMENT
AND SENSOR TECHNOLOGY

Paddle wheel flow meter
FPW

Ver. 1.2

Installation and technical conditions

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Description of device

The FPW paddle wheel flow meter is designed for clean liquid fluids with flow velocity within the range of 0,3 ÷ 6 m/s (ideally 2÷3 m/s) and it is based on mechanical measurement principle according to which the flow velocity of a fluid is proportional to the speed of the paddle wheel populated with stainless steel needles picked up by the proximity sensor. Thanks to this solution instead of using the magnetic needles and Hall probe there is no deposition of minute ferrous particles and thus long service life and stability of the meter is ensured. Prompt and simple installation ranks among basic advantages as wall as the price thanks to its simple construction.

The accuracy of paddle wheel flow meters may deteriorate for liquids with high viscosity. The liquids with high viscosity tend to create a laminar flow profile with impaired centre of the flowing liquid and thus the changed profile of the running liquid whereas it is desirable for accuracy that the liquid velocity is ideally equal across the entire pipe diameter. Therefore, Reynolds number of liquid should be higher than 4500. Reynolds number is a dimensionless value connecting the effects of viscosity, density and flow velocity.

The meter is manufactured in three versions:

- FPW 05 – Pulse signal only
- FPW 10 – Pulse / switching contact
- FPW 20 – Pulse / switching contact + 4÷20mA

Scope of delivery

The device is delivered with an adapter for connection as per purchase order.

Process connection

The installation in the piping can be carried out by direct welding/bonding into the piping (according to material) or any of the fitting adapter delivered for simple installation (thread or mount) into diameter piping can be used. Drilling devices for simple installation without necessary welding and T-pieces in materials according to the customer requirements. The flow meter output can be connected to a display unit CC 100 (this is not standard order, to be ordered separately) or to various control systems.

Accessories to the flow meter can also be cable connections in various lengths with M12 (4-pin) connectors for electric connection. However, these are not part of delivery owing to standard solution of individual elements and thus the possibility of deliveries also from other manufacturers of these parts

The FPW 05 design is not equipped with the M12 connector but only with a cable entry bushing and three-core PVC cable (cable length is 2 m as standard). Optionally can be also equipped with a M12 connector.

Storage conditions

The temperature during transportation and storage of the meter must be within the range of -20 °C up to 60 °C.

Warranty

Unprofessional installation or improper use of the device may result in a loss of warranty rights as well as failure to comply with installation or operating conditions according to this manual.
Repairs are not possible. The warranty becomes null and void by repairs or intervention in the device by a person other than the manufacturer.

Installation in pipeline

Important information for selection of location

Prior to dismantling or splitting the piping or service carried on the meter always be particular about safety instructions for pressure and temperature in case of the fluid given. As there is a risk of pressurized liquid jet or high temperature, we recommend you to use essential personal protective equipment.

Outdoor conditions
It is necessary to ensure that the sensor is not exposed to weather effects and that the measured medium cannot freeze around the flow sensor as it would damage the sensor itself.
In case of outdoor location, the manufacturer recommends using a protective roof to avoid direct solar exposure so that the evaluation electronics cannot get overheated.

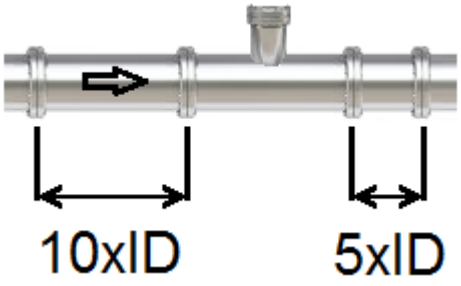
Vibration
Levels and range of vibrations must be under 2.2 in the frequency range of 20 ÷ 50 Hz according to IEC 068-2-34.

Actual location
The paddle wheel flow meters operate with clean liquids best. Particles and impurities may prevent the propeller from proper rotation and can contribute to faster component wear.

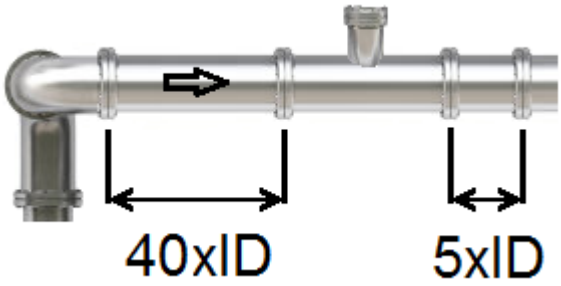
For installation of the meter, it is necessary to select such a location so that the correct length of straight pipe before and after the meter is available. Thanks to the fact that the paddle wheel interferes with the flow to a small extent only, the flow must have a consistent velocity all over the pipe's inside diameter and due to this accurate reading is made possible. Calming lengths of straight pipe segments make it possible to disperse possible whirling occurred in the flow prior to the respective measurement of the paddle wheel. The turbulent flow may be caused by obstacles such as an elbow, T-piece, pump, etc. Minimum lengths of the calming length of the pipe's straight segment will depend on the type of obstacle before the paddle wheel. The absolute minimum is typically ten times the amount of inside diameter of the straight pipe before the meter and five times the amount after the meter.

Recommended calming segments before the meter according to the obstacle on the piping, where ID means internal diameter of pipe (it is always 5x ID after the meter)

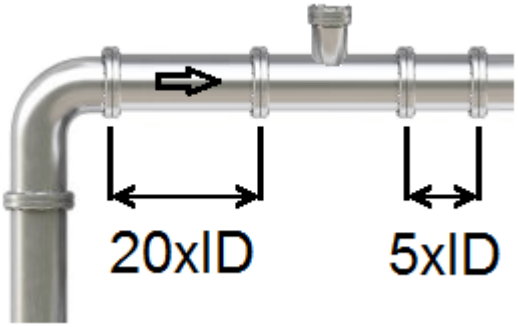
Standard calming segments – 10xID



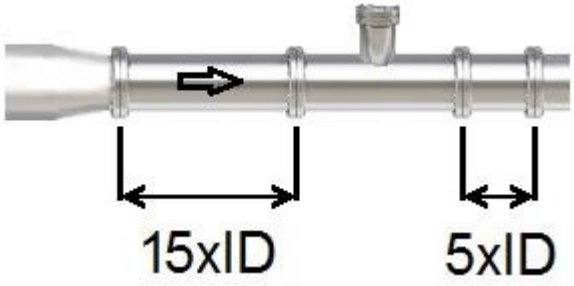
2x 90° elbow in two planes – 40xID



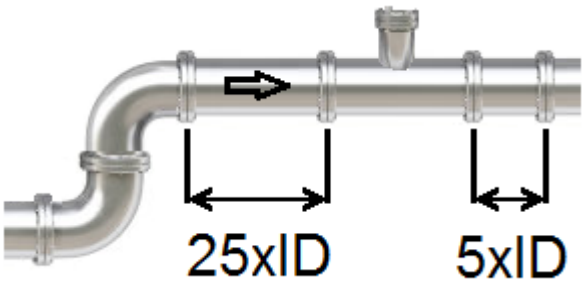
1x 90° elbow – 20xID



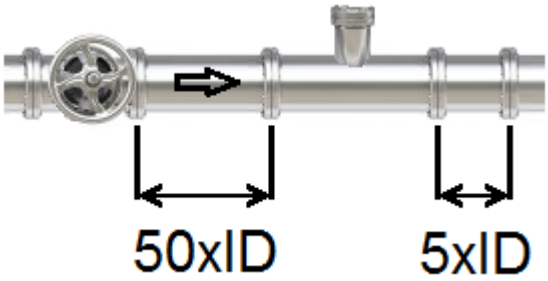
Reducer to pipe's inside diameter – 15xID



2x 90° elbow in one plane – 25xID



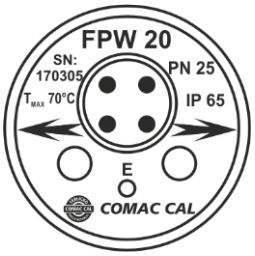
Valve – 50xID



When installing the meter, be particular placing the meter in such a manner that the paddle wheel rotation axis is in horizontal position so that damage to the rotor by impurities in liquids can be avoided). In case of a vertical pipe, the positioning does not matter; however, we recommend you to place the meter in the ascending part to reduce the risk of aeration.

The measurement point must always be full of water free of bubbles; in case of air space, an erroneous measurement may take place. If necessary, it is possible to use the installation of measuring track in the form of U, by which means permanent submersion of the lower part with the meter is ensured. For the same reason, we recommend you to place the meter on the upstream side of the ascending piping.

For installation in piping, it is necessary to ensure the parallel run of the flow with the arrow indicated on the flow meter body.



WARNING : The actual installation of the weld-on adapter or fittings or gluing of plastic adapter onto the piping always carry out with the removed electronic unit so that mechanical and temperature damage can be avoided.

When blending a mixture, it is necessary to incorporate the flow meter either before the blending point or at a sufficient distance after it (min. 50x d), otherwise the indication may be inaccurate.

Paddle wheel flow meter arrangement

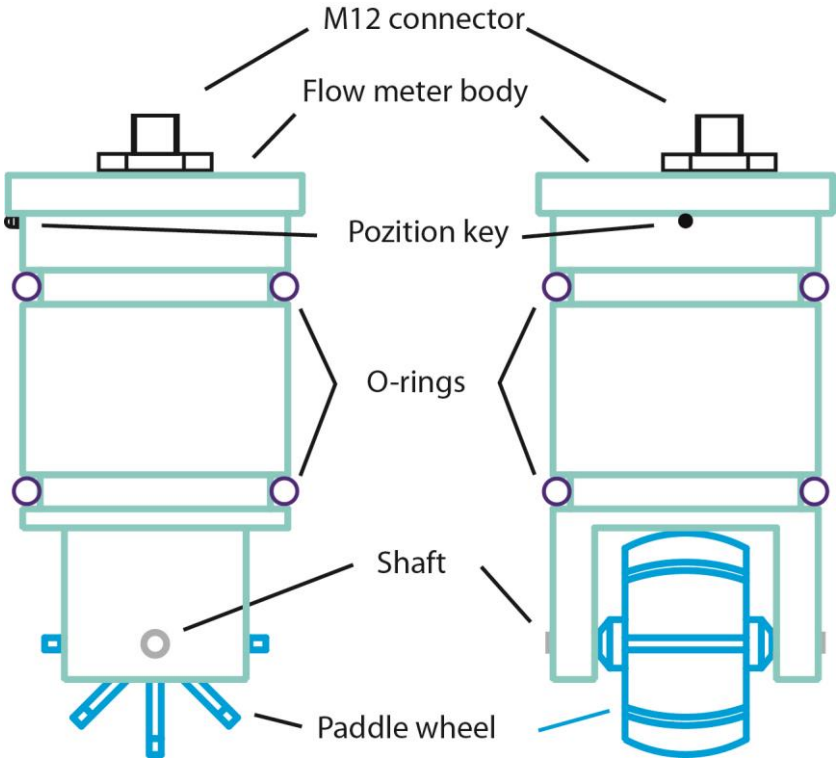
Paddle wheel flow meters consist of three basic components:

- Paddle wheel
- Wheel motion sensor (possibly display unit)
- Fitting adapters

These components can be purchased separately or as a package in order to meet particular requirements of your application. The paddle sensor is designed for insertion in the pipe fitting. Approximately a half of the paddle protrudes into the flow. The liquid flowing through the pipe causes the rotational motion of the rotor with paddles. The proximity sensor scans the movement of stainless steel rods located in the paddles and transforms them into electric pulses that are proportional to the flow velocity (possibly also 4÷20mA current output for FPW 20 version). Since the rotational motion of the paddle wheel depends on flow velocity, the number of output pulses (4÷20mA current output) depends on velocity flow in the place of the paddle wheel and the volume flow depends on pipe cross-section and velocity flow. This relation is indicated by a figure called K-factor. The K-factor indicates then the number of output pulses per volume unit for every particular pipe size, eventually when using a particular pipe fitting as mounting accessories.

Paddle wheel and motion sensor

Individual parts of the meter



Spare parts

Replaceable part	Ordering number
O-rings (EPDM)	*FPW-RK1*
Paddle wheel (PEEK)	*FPW-RK2*
Paddle wheel shaft (stainless steel DIN 1.4401)	*FPW-RK3.1*
Paddle wheel shaft (zirconium ceramics)	*FPW-RK3.2*
Sleeve nut (DIN 1.4401)	*FPW-RK4*

Fitting adapters

Particular fittings for installation:
Various pipe fixtures (fittings) are available. These are designed so as to facilitate the installation right into the piping by means of various connection methods, for example, with female or male threads, by welding, bonding, etc. These "in-line" fixtures are available in various materials, e.g. polyproplylene, PVC, and stainless steels. Further, it is possible to use the drilling device where after simple drilling a hole in piping, the attachment yoke can be placed right onto the pipe. Thanks to this, it is not necessary to cut the piping or install it using special adapters. The offer is in "Optional accessories" section.

Pipe saddle, PP (+AISI 304), PN10

Order code	Connect	K-factor	
DPPP-10-D50	OD 50	According to the inside diameter of pipe *viz "Table of K-factor for the most common size of pipes"*	
DPPP-10-D63	OD 63		
DPPP-10-D75	OD 75		
DPPP-10-D90	OD 90		
DPPP-10-D110	OD 110		
DPPP-10-D125	OD 125		
DPPP-10-D140	OD 140		
DPPP-10-D160	OD 160		
DPPP-10-D200	OD 200		
DPPP-10-D225	OD 225		
DPPP-10-D315	OD 315		

Plastic T-piece for glue connection in PVC, PN16

Order code	Connect	Flow range	K-factor [imp/l]	
TPVC-16-DN40	OD 40	2,3 ÷ 27 m3/h	30	
TPVC-16-DN50	OD 50	3,5 ÷ 42 m3/h	19	
TPVC-16-DN63	OD 63	5,6 ÷ 67 m3/h	11,5	
TPVC-16-DN75	OD 75	7,9 ÷ 95 m3/h	7,5	
TPVC-16-DN90	OD 90	11,5 ÷ 137 m3/h	5	

Stainless steel T-part with thread connection G, AISI304, PN25

Order code	Thread	Flow range	K-factor [imp/l]	
TSS304-25-G1/8	G 1/8	0,03 ÷ 0,6 m3/h	1100	
TSS304-25-G1/4	G 1/4	0,05 ÷ 1,1 m3/h	662	
TSS304-25-G3/8	G 3/8	0,09 ÷ 1,7 m3/h	408	
TSS304-25-G1/2	G 1/2	0,19 ÷ 3,8 m3/h	216	
TSS304-25-G3/4	G 3/4	0,56 ÷ 6,8 m3/h	100	
TSS304-25-G1	G 1	0,88 ÷ 10,6 m3/h	61	
TSS304-25-G1 1/4	G1 1/4	1,4 ÷ 17,4 m3/h	42	
TSS304-25-G1 1/2	G1 1/2	1.8 ÷ 22 m3/h	37	

Stainless steel T-part for welding connection, AISI304, PN25

Order code	Connect	Flow range	K-factor [imp/l]	
WTSS304-25-42,4x2	42,4x2	2 ÷ 25 m3/h	29	
WTSS304-25-48,3x2	48,3x2	2,7 ÷ 33 m3/h	19	
WTSS304-25-60,3x2	60,3x2	4,6 ÷ 55 m3/h	11	
WTSS304-25-76,1x2	76,1x2	7,3 ÷ 88 m3/h	8	
WTSS304-25-88,9x2	88,9x2	10,2 ÷ 120 m3/h	5,5	
WTSS304-25-114,3x2	114,3x2	17 ÷ 205 m3/h	3,5	
WTSS304-25-139,7x2	139,7x2	26 ÷ 313 m3/h	2,2	

Stainless steel welding adapter, AISI304, PN25

Order code	Connect	K-factor [imp/l]	
WSS304-25-D44	pipe ID≥48,3	According to the inside diameter of pipe	

In case of welding fitting is K-factor depending on the inner diameter of the installed pipe.

Table of K-factor for the most common size of pipes

Dimension of pipe	Inner diameter ID	Flow range	K-factor [imp/l]
48,3x2	44,3	2,7 ÷ 33 m3/h	24,8
53x1,5	50	3,5 ÷ 42 m3/h	19,5
60,3x2	56,3	4,5 ÷ 53 m3/h	15,5
76,1x2	72,1	7,5 ÷ 88 m3/h	8,7
84x2	80	9 ÷ 108 m3/h	6,6
88,9x2	84,9	10 ÷ 122 m3/h	5,8
108x4	100	14 ÷ 170 m3/h	3,9
114,3x2	110,3	17 ÷ 206 m3/h	3,3
139,7x2	135,7	26 ÷ 312 m3/h	2,5
168,3x2	164,3	38 ÷ 458 m3/h	1,5
219,1x2	215,1	65 ÷ 784 m3/h	0.9

ID = inner diameter of pipe OD = outside diameter of pipe

If the inside dimension of the piping is beyond the given table, K-factor is then given by the conversion formula:

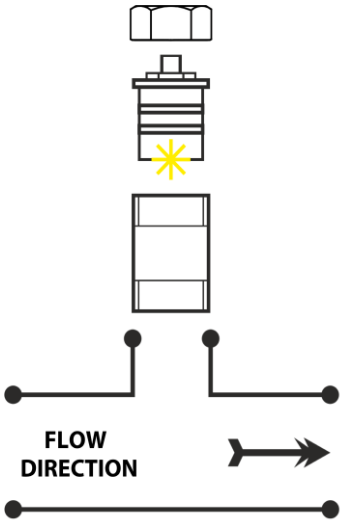
$K\text{-factor_new} = (K_{TABLE} \times ID_{TABLE}^2) / ID_{NEW}^2$

ID_{TABLE} is the closest inside diameter selected from the table to the tube used
K_{TABLE} is K-factor from the table to the corresponding ID_{TABLE} used
ID_{NEW} is the inside diameter of the tube used for installation

For version FPW FPW-10 and FPW-20 may K-factors vary depending on the setting of pulse constant meter (dividing ratio). All values of K-factor are valid for water at 25 ° C.
All dimensions are in millimetre.

Assembly procedure using the fitting adapter

Before starting the actual assembly, make sure that the system is pressureless or discharged. Install then a suitable adapter, drilling device or T-piece by screwing or bonding, or possibly install the welding adapter if appropriate. Install then the paddle wheel flow meter by inserting it into the adapter. When installing the meter in the piping and for ensuring the most accurate flow rate evaluation, you need to observe the direction of angular displacement of the meter in such a way that the axis of the paddle wheel is perpendicular to the direction of the flow to which corresponds the positional key when inserting the meter (in the event of the weld-on version and the drilling device, the notch for the positional key must be created by the installation technician. That is why you should check the correct location of the slot for the positional key on the adapter against the piping.

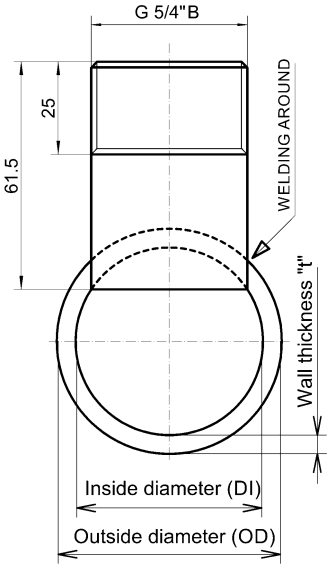


Always place the meter in horizontal position, preferably from above onto the piping so that excess wear or possible damage to the paddle wheel shaft by deposits or impurities in the piping can be avoided.

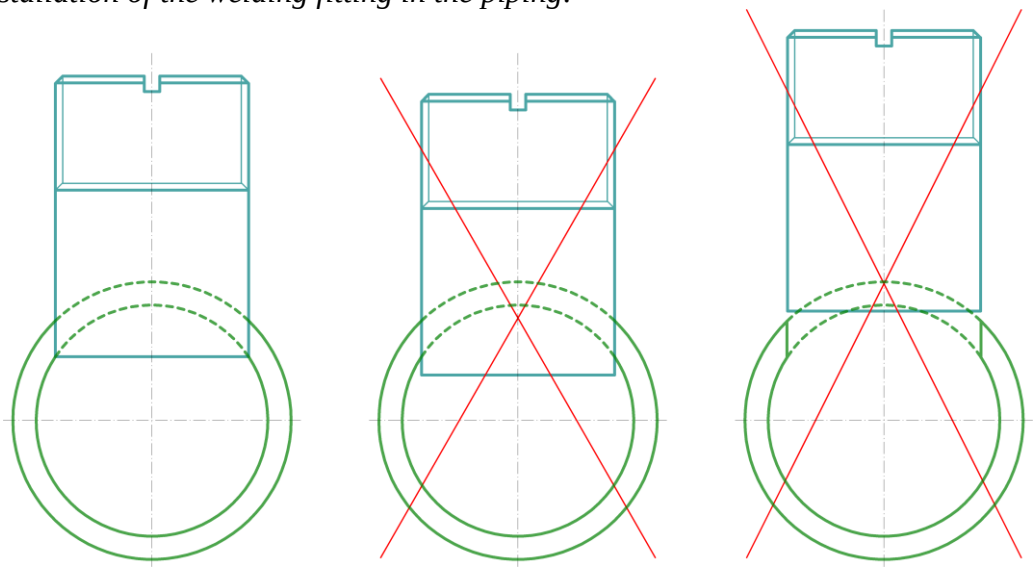
Before inserting the meter in the adapter, you should apply grease (silicone vaseline) to O-rings and to the interior of the adapter so as to avoid damage to the sealing EPDM O-rings. You need to proceed to insertion with due care and insert evenly and perpendicularly to the adapter. After insertion of the meter (the positional key must fit in the slot), screw in the sleeve nut and tighten it by hand until it does not come loose.
Warning: Do not cause pollution of paddle or axis by vaseline!

Installation by means of the welding fitting

In the location selected for installation of the meter, drill a 42 mm diameter hole in the piping with an annular bit. We recommend you to install the meter to the piping always from above so as to avoid excessive wear on the paddle wheel axle and potential damage to the paddle wheel by sediment deposits or debris in the piping. Now, you can weld the adapter on the selected place on the piping.
Screw the sleeve nut on the adapter to prevent it from falling into the piping by coincidence. Slide the adapter in the hole in the piping as shown in the Figure. It is suitable to make a mark on the adapter according to the thickness of the pipe wall so that the depth of insertion in the piping can be correct. Apply spot welding to two or three locations and check the perpendicularity to the piping axes. If everything is correct, make a weld all round, making sure that the adapter cannot be deformed by welding.

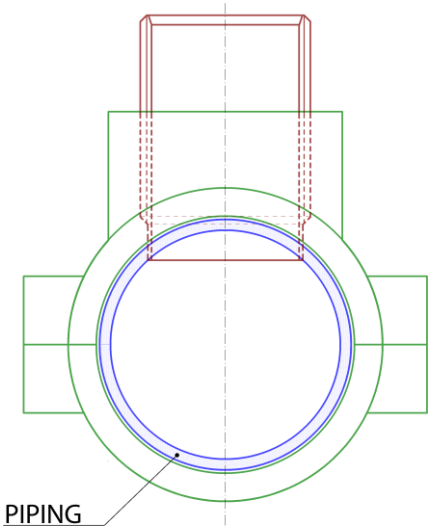


Correct installation of the welding fitting in the piping:



To complete the installation, you need to make a slot for the flow meter's positional key according to instruction page 12.

Installation by means of the drilling device



Find out the thickness of the pipe wall to which the drilling device will be mounted. Screw the sleeve nut on the adapter without the meter. Screw the adapter into the drilling device that after installation on the piping, the adapter is found as deep as illustrated in the figure. For checking, it is suitable to have a short pipe segment; apply the drilling device with the adapter to its edge and you will see right away if the adapter is dipped into the piping correctly. Seal the adapter in the drilling device preferably using Teflon tape or packing cord. Tighten with a wrench on the sleeve nut. For fine handling, you can catch the adapter at the thread just below the nut with the combination pliers.

In the location selected for installation of the meter, drill a 40 mm diameter hole in the piping with an annular bit. We recommend you to install the meter always from above to the piping so as to avoid excessive wear on the paddle wheel axle and potential damage to the paddle wheel by sediment deposits or debris in the piping.

Install the drilling device with the adapter on the bored hole in a standard way including sealing O-ring.

To finish the installation, it is necessary to make a slot for the insertion position key of the meter which guarantees the correct displacement of the meter in the adapter for the future. We recommend you to adhere to the maximum angle of deviation from straight direction of the piping (flow of the liquid) up to 3° whereas the slot forms the upstream side of the meter so that the medium can flow from the same side where this slot is found.

The respective slot can be made using a grinder, saw or file. The slot is about 3.4 mm wide and 3.4 mm deep. **Remove the eventual burrs or chips and clean it mainly from the internal side to avoid damage to O-rings during installation!**

Before inserting the meter in the adapter, you should apply grease (silicone vaseline) to O-rings and to the interior of the adapter so as to avoid damage to the sealing EPDM O-rings. You need to proceed to insertion with due care and insert evenly and perpendicularly to the adapter. After insertion of the meter (the key must fit in the slot), screw in the sleeve nut and tighten it by hand until it will not come loose.

Warning: Avoid fouling of the propeller and/or its shaft by vaseline!

Sources of disturbances

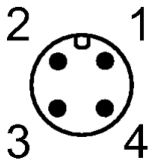
The following items rank among the most frequent sources of disturbances to the steady flow of liquid:

- The flow of liquid flow in the flow sensor should be **steady and free of whirling**. Recommended minimum length of straight segments is 10×d before the flow sensor and 5×d after the sensor (where d is the inside diameter in millimetres).
- Pumps and bends or elbows located close one after another in various planes.
- Abrupt changes in pipe cross-section (we recommend you to make reductions with the lowest possible cone angle α. (where α is the angle made by skewed walls of the pipe reduction).
- Anything interfering with the liquid flow.
- Branch pipes, T-pieces, bends, elbows, slide valves, cocks, flap valves. Closing, control, throttling and check valves. Pipe outlets from tanks, heat exchangers and filters.
- When blending a mixture of substances (or blending the same substances with different values), it is necessary to incorporate the flow meter either before the blending point or at a sufficient distance after it (min. 50×d), otherwise it may cause measurement inaccuracy.

Wiring

Any installation or manipulation with the device always carry out after disconnection of supply voltage!!!
When the operations described below are performed unprofessionally, the claim on warranty becomes extinct!!!

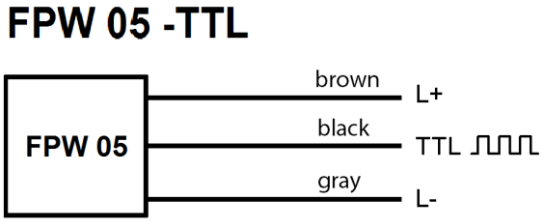
Meter wiring



Connector M12 wiring (for FPW 10 and FPW 20 versions only)
The meter is equipped with a standard 4-pin M12x1 connector.

VERSION FPW 05

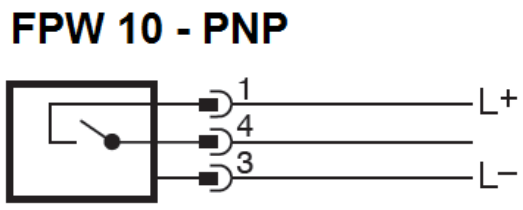
The meter is connected by means of a 3-core PVC cable with standard 2m cable length
The optional connection of the M12 connector is as on FPW-10, where the pin 4 TTL output.



Standard wiring:

Brown PIN1 – supply voltage +9÷30 V
Black PIN4 – TTL output (max. 3 V/ 5mA)
Gray PIN3 – supply voltage GND

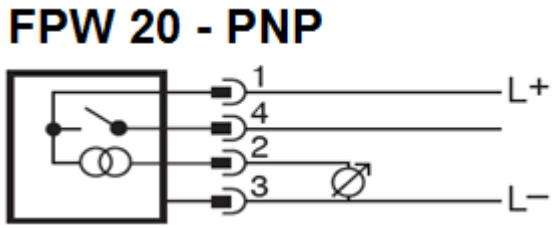
VERSION FPW 10



Standard wiring

PIN 1 – supply voltage +24V
PIN 3 – supply voltage GND
PIN 4 – switching point PNP contact

VERSION FPW 20



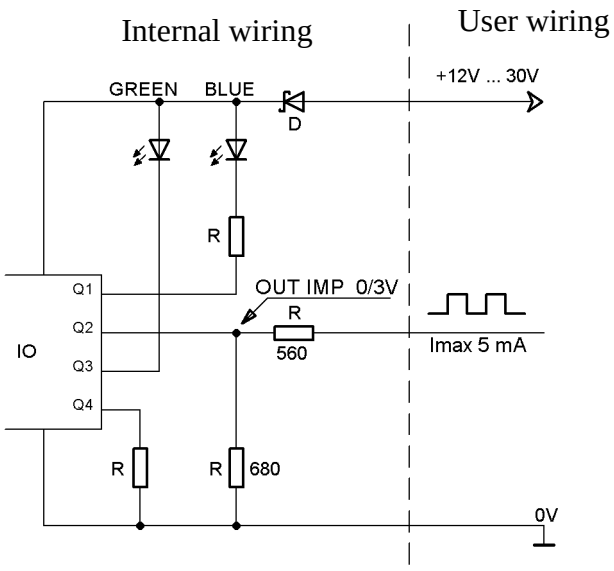
Standard wiring:

PIN 1 – supply voltage +24 V
PIN 2 – 4÷20 mA output
PIN 3 – supply voltage GND
PIN 4 – pulse point /switching point PNP contact

Pulse output (FPW 05 only)

In case of FPW 05 flow meters, it is only the pulse output dependent on the flow velocity within the range of 0.3-6m/sec.

Wiring example:



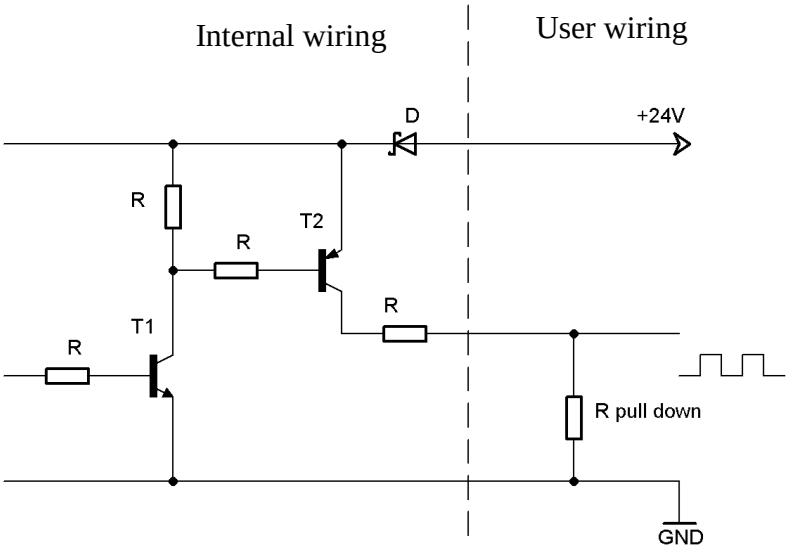
Pulse output or make/break contact (FPW 10 and FPW 20 only)

In case of FPW 10 and FPW 20 versions, output mode can be selected either as pulse mode with a pulse constant according to K-factor of the individual fitting used or as a flow monitor with PNP wiring on PIN 4.

In case of flow monitor function, the meter is delivered with a switching point set as a switch. If the flow is above the switching point, the PNP contact on PIN 4 is closed. If the flow is below the switching point, the contact is open.

Note: The switching point is dependent on the fact if the flow velocity increases or decreases in time, i.e. these are switching points with hysteresis which is set by the manufacturer.

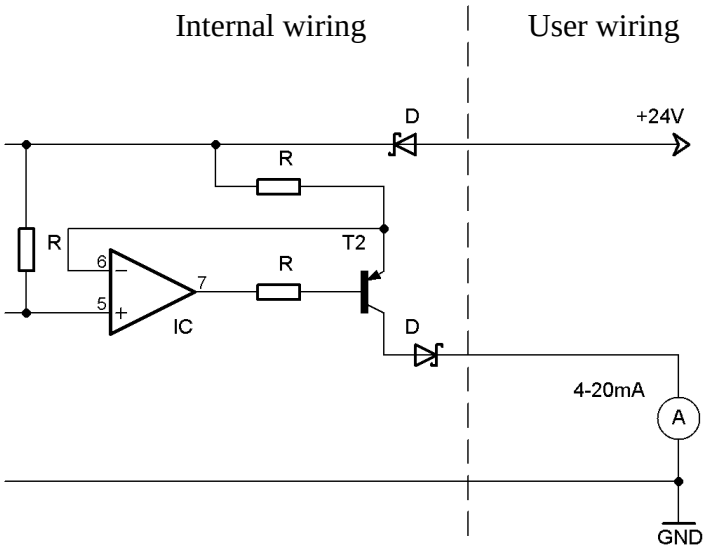
Wiring example:



4-20mA output (FPW 20 only)

The manufacturer delivers the meter with output set to 4-20mA in such a manner that at zero flow velocity of the medium, the output value is 4mA and at 6m/sec it is 20mA. The dependence of flow on velocity is linear.

Wiring example:



Putting into operation

After powering up, the meter runs the internal diagnostic and LED tests, followed by measurement mode.

Individual LED operation indications

Green	– POWER (indicates that the supply voltage is present)
Orange	– flow is zero or below minimum limit
Red	– flow is above maximum limit
Blue	– pulse output function (volume pulses on output are copied) / FlowSwitch function (indicates the state of FlowSwitch contact)

If no LED is lit or flashing, the meter is most likely disconnected from supply voltage!!!

Customization and control of FPW meter

In case of FPW 05 version, it is not possible to set or change its parameters that are set by the manufacturer. This version does not have a button. Setting by button is only available in FPW 10 and FPW 20 versions.

Switching the pulse output to FlowSwitch function
Press down the button on the switching flow and hold it until the blue LED is lit. Release the button – this state is indicated by flashing of this LED. To confirm, press down the button again.
Unless you confirm, the setting will not be accepted and it will return to its original state after a few seconds.
Note: The hysteresis set by the manufacturer is applied to setting the flow meter into flow monitor mode.

Switching the FlowSwitch function to pulse output
Press down the button on and hold it until the red LED is lit. Release the button – this state is indicated by flashing of this LED. To confirm, press down the button again.
Unless you confirm, the setting will not be accepted and it will return to its original state after a few seconds.

Pulse constant setting
Press down the button on and hold it until the green LED is lit. Release the button – this state is indicated by flashing of this LED. The blue LED starts blinking at the same time. The number of blinks of this blue LED multipled 2 indicates the factor of the meter's basic constant (K-factor). The maximum factor is 24 (12 blink of blue LED). Multipled ration could be 2,4,6,8,10,12,14,16,18,20,22,24 Unless confirmed by the button within this limit, the setting will not be accepted and returns to original state.
Pulse constant is set in factory to a basic K-factor according to the table on page 8 and 9, it means without multiple ration (stabil width of pulse is 1ms). When using divider ratio is pulse width / constant gap of 1:1. To return to the original settings without dividing ratio, it is necessary to make the "Factory settings".
Example setting for divider 4
Press the button and hold it until the green LED light. After that, release the button - the green LED start flashes. Wait until the blue LED flashes 2times and then immediately that press the button for confirmation. Setting is finished.

20mA limit setting (for FPW20 version only)
During the limit flow for 20mA, press down the button and hold it until the orange LED is lit. Release the button – this state is indicated by flashing of this LED. To confirm, press down the button again. Wait until the red LED is lit to indicate that upper limit of the range has been reached. Setting is completed by this.
Unless you confirm, the setting will not be accepted and it will return to its original state after a few seconds.

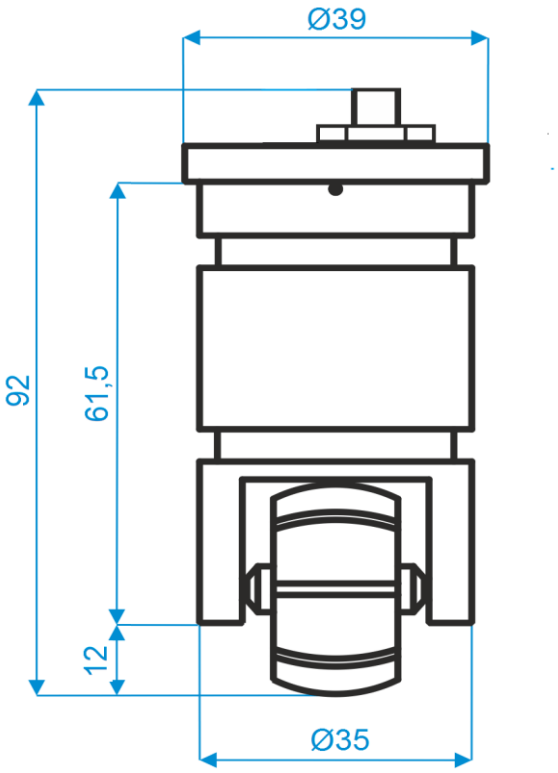
Factory reset
Press down the button on and hold it until all LEDs are lit. Release the button – this state is indicated by flashing of all the LEDs. To confirm, press down the button again.
Unless you confirm, the factory setting will not be executed and it will return to its original state after a few seconds.

Technical parameters

Power supply	- FPW 05	9 ÷ 30 V DC, polarity reversal protected
	- FPW 10 & FPW 20	24 V ± 10 % DC, polarity reversal protected
Input power		<1 VA
Electrical connection		connector M12 × 1, 4 pin (FPW 05 – 3-core cable 3x0.5mm^2)
Display		2× two-colour LED (FPW 05 – 1x two-colour LED)
Outputs	- FPW 05	TTL output pulses (max. 3V / max. Iout=5mA)
	- FPW 10	PNP
	- FPW 20	PNP
Pulse / Status contact		PNP (active)
Status contact rating		max. 50mA
Current output (FPW 20 only)		4 ÷ 20 mA, active (max. load 400Ω)
Flow velocity ranges		0.3 ÷ 6 m/sec (according to the specific adapter and installation)
Accuracy	1÷6m/s	± 3% measured value
	0,3÷1m/s	± 5% measured value
Repeatability		± 1% of full scale
Hysteresis		2 ÷ 8 cm/sec
Control		1× flush-mounted button
Temperature of medium		-10 ÷ +80 °C
Ambient temperature		0 ÷ +55 °C
Material in contact with medium:		
Propeller support		PVDF
Propeller:		PEEK
Propeller shaft:		SS A4 (DIN 1.4401)
Pin in propeller paddle:		stainless steel DIN 1.4115 / zirconium ceramics
O-rings:		EPDM
Maximum pressure		25 bar
Pressure loss		max. 0.5 bar
IP code		IP67
Ambient humidity		max. 90 %
Dimensions (h×diameter)		90×∅38.8 mm
Weight		135g

Note .: The output pulses are generated even when the maximum velocity is exceeded.

Basic dimensions



Ordering code

FPW 05/10/20 | **FPWxx/Ax/Bxx**

FPW (paddle wheel flow meter)
05… pulse output
10… pulse / switching contact
20… pulse / switching contact + 4÷20m

A (oposit connector)
A1… M12x1, 4-pin
A2… NO
A3… 2m long cable 3x0.2 mm2 (FPW05 only)

B (pipe adapter)*
B01… without adapter
B02… threaded spacer for adapter (SS304)
B03… threaded spacer for adapter (PVC)

Pipe saddle in PP (PN10)
B11… DPPP-10-D50
B12… DPPP-10-D63
B13… DPPP-10-D75
B14… DPPP-10-D90
B15… DPPP-10-D110
B16… DPPP-10-D125
B17… DPPP-10-D140
B18… DPPP-10-D160

Plastic T-piece in PVC (PN16)
B21… TPVC-16-D40 (2.3÷27m³/h)
B22… TPVC-16-D50 (3.5÷42m³/h)
B23… TPVC-16-D63 (5.6÷67m³/h)
B24… TPVC-16-D75 (7.9÷95m³/h)
B25… TPVC-16-D90 (11.5÷137m³/h)

Welding adapter SS304 (PN25)
B51… WSS304-25-DN44

Threaded T-piece SS304 (PN25)
B31…TSS304-25-G1/8 (0.03÷0.6m³/h)
B32…TSS304-25-G1/4 (0.05÷1.1m³/h)
B33…TSS304-25-G3/8 (0.09÷1.7m³/h)
B34…TSS304-25-G1/2 (0.19÷3.8m³/h)
B35…TSS304-25-G3/4 (0.56÷6.8m³/h)
B36…TSS304-25-G1 (0.88÷10.6m³/h)
B37…TSS304-25-G1/4 (1.4÷17.4m³/h)
B38…TSS304-25-G1/2 (1.8÷22m³/h)

Welding T-piece SS304 (PN25)
B41…WTSS304-25-42.4x2 (2÷25m³/h)
B42…WTSS304-25-48.3x2 (2.7÷33m³/h)
B43…WTSS304-25-60.3x2 (4.6÷55m³/h)
B44…WTSS304-25-76.1x2 (7.3÷88m³/h)
B45…WTSS304-25-88.9x2 (10.2÷120m³/h)
B46…WTSS304-25-114.3x2 (17÷205m³/h)
B47…WTSS304-25-139.7x2 (26÷313m³/h)

* For the correct function of the meter we recommend to order also suitable adapter.