

AFLOWT



**ELECTROMAGNETIC
FLOW METER**

AFLOWT MF

Modification "Lite M"

INSTALLATION MANUAL



ISO 9001:2008

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**Manufacturer quality management system is certified to
ISO 9001:2008**



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TABLE OF CONTENTS

INTRODUCTION.....	4
1. SAFETY INSTRUCTIONS.....	5
2. PREPARATION FOR MOUNTING.....	5
3. MOUNTING.....	6
3.1. General Requirements	6
3.2. Mounting the flow meter in the pipeline	6
3.3. Wiring the flow meter.....	12
4. DISMOUNTING.....	14
5. PUTTING INTO OPERATION	15
APPENDIX A. Stainless steel structures for mounting flow meters in the pipeline.....	16
APPENDIX B. Connecting USB-MF adaptor.....	24

The present manual covers procedures for on-site mounting and dismounting of AFLOWT FM electromagnetic flow meter, "Lite M" modification. When performing mounting or dismounting, also refer to "Electromagnetic Flow Meter AFLOWT MF, Modification "Lite M", Operation Manual" (part I, II)" documents.

LIST OF ABBREVIATIONS

DN	- Nominal diameter
MF	- Magnetic flow meter
MU	- Measuring unit

CAUTION!

1. **The flow meter can be** mounted into the metal pipeline with hot fluid only if the pipeline structure is able to compensate for thermal expansion to prevent deformation of the flow tube.
2. **NEVER** touch the electrodes in the inner part of the flow tube.
3. When power is applied to the flow meter, **NEVER** perform electric welding on the pipeline section where the flow meter is installed and in the room where the flow meter is installed, if the pipeline is empty.
4. Passing of weld current through the body of the flow meter is **STRICTLY FORBIDDEN**.
5. When performing welding, **NEVER** install the flow meter as a mounting fixture. You must use the dimension simulator instead.
6. When mounting and using the flow meter, **NEVER** remove protection rings from the flow sensor. The protection rings are installed to protect projecting fluoroplastic lining.
7. The flow meter mounted in the pipeline **SHALL NOT** be rotated around the pipeline axis.
8. When moving the flow meter **DO NOT** take it by the Measuring Unit.
9. Storage and transportation of flowmeters, with flow sensor which has been executed from fluoroplastic, has to be carried out **ONLY** with protective rings.

1. SAFETY INSTRUCTIONS

- 1.1. The flow meter should be mounted (dismounted) by the technicians:
 - Certified for performing work of this type
 - Having the right to work with electrical installations up to 1000 V
 - Familiar with all the instructions outlined for the flow meter and auxiliary equipment used for mounting and dismounting.
- 1.2. When working with the flow meter, the dangerous factors are as follows:
 - AC voltage (RMS value up to 264 V, frequency 50/60Hz)
 - Pipeline pressure (up to 2.5 MPa)
 - Medium temperature (up to 150 °C).
- 1.3. When mounting (dismounting) the flow meter, **YOU MUST NOT:**
 - Make connections to the flow meter, switch over modes or replace electronic components when the flow meter is powered up
 - Remove the flow meter from the pipeline until pressure in the pipeline section worked on is fully released
 - Use defective electronic devices and electric tools or use them without proper grounding (neutral earthing).
- 1.4. Prior to work, make sure that no dangerous AC/DC voltage that may cause injury or death is applied to the pipeline section to be worked on. Use the appropriate measuring device for this purpose.

2. PREPARATION FOR MOUNTING

- 2.1. The MF should be transported packed in the manufacturer's box.
- 2.2. After the MF has been moved to the mounting location from a cold environment into a warm one (with ambient temperature above zero), it shall be left in the manufacturer's box for at least 3 hours to make sure that no moisture remains inside.
- 2.3. When unpacking, check that the delivery package contains all items specified in the Equipment Certificate.

3. MOUNTING

3.1. General Requirements

When mounting the flow meter on site, a free pipeline section shall be provided. It is used to mount the Flow Sensor, straight pipe runs of appropriate length upstream and downstream the Flow Sensor, and the display unit (if applicable).

Overall dimensions and weight of the flow meter are given in Appendix B, part I of the User manual.

CAUTION! You MUST choose a mounting location considering the conditions specified in the User Manual.

3.2. Mounting the flow meter in the pipeline

3.2.1. Mounting considerations:

- The flow meter may be mounted into the pipeline installed horizontally, vertically, or obliquely. Special filters or dirt traps are not needed
- To prevent air accumulation at the mounting location, the flow meter should not be placed at the upper point of the pipeline or in the open-ended pipeline; the best place to mount the flow meter (if applicable) is the lower or the uprising pipeline run (see Fig.1)
- Liquid pressure in the pipeline shall be chosen so that to prevent gas release
- The MF should be mounted in the pipeline where liquid pulsation and turbulence are minimal.

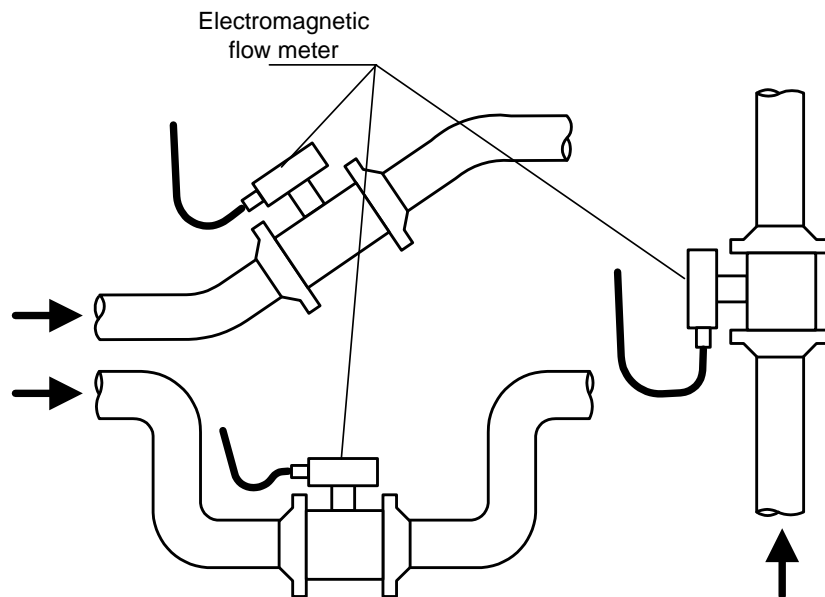


Fig.1. Recommended mounting locations

- Straight pipe runs with nominal diameter (DN) equal to nominal diameter of the flow meter shall be provided upstream and downstream the MF. Length of the runs shall not be less than specified in Table 1. The

runs must not include devices or components that may disturb flow structure

- When the MF is operated, the inner channel of the flow sensor shall be fully filled with liquid
- When mounting the flow meter into horizontal or oblique pipeline, position the axis of the stand of the Measuring Unit in vertical plane going through the pipeline axis. Maximum deflection is $\pm 30^\circ$ (Fig. 2)
- Intensity of external magnetic field (commercial frequency) should not exceed 40 A/m.

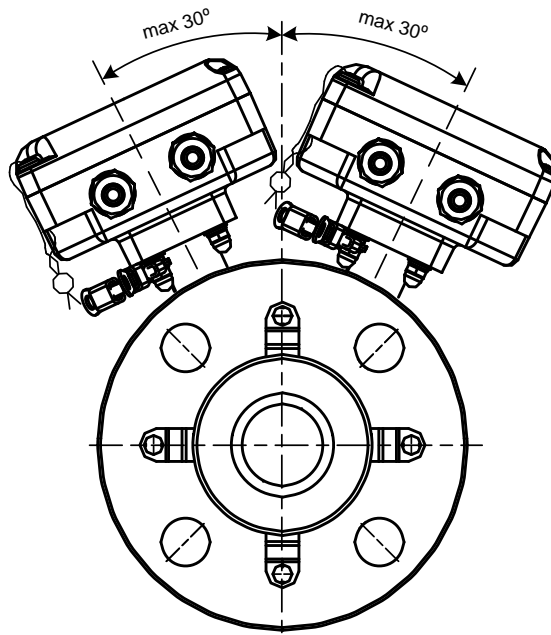


Fig.2. Maximum permissible deflection from vertical axis

NOTE. In case of impossibility of installation of a flow meter in recommended places device installation in the top point of the pipeline is allowed. Installation of the air valve in the point which is above is thus necessary is more true points of flowing part of a flow meter, for example in pipeline expansion.

ATTENTION! It is necessary to watch serviceability of the air valve. Correct work of a flow meter is possible only in the absence of air in the channel.

Table 1. Length of straight pipe runs

Version of flowmeter	Unidirectional		Bidirectional	
	upstream MF	downstream MF	upstream MF	downstream MF
MF-X40L/F	5·DN	2·DN	5·DN	3·DN
MF-X70L/F	5·DN	3·DN	5·DN	5·DN

3.2.2. The MF is mounted in the pipeline with use of an assembly-welded structure. The structure is assembled from fittings included in the delivery package (the structure can be assembled by the manufacturer on request).

The flow meter can be mounted in a plastic (metal-plastic) pipeline only with use of manufacturer-supplied fittings.

3.2.3. Set of fittings for metal pipelines

3.2.3.1. The set of fittings for assembling the assembly-welded structure includes:

- Flat weld flanges (modified)
- FS (Flow Sensor) dimension simulator of appropriate DN and design (flanged or wafer type)
- Gaskets
- Fasteners.

Overall mounting dimensions and DN of the simulator correspond to the dimensions of the MF to be mounted with this fitting assembly. The simulator is installed instead of the MF when performing mounting or welding or dispatching the MF for regular verification or repair.

In addition, the delivery package may contain straight pipe runs (DNs equal to DN of the MF) and concentric adaptors to provide connection from pipeline's greater DN to the lesser DN of the MF.

Assembly-welded structures made of carbon steel with reference linear dimensions specified are shown in Appendix A.

NOTE. Length of the supplied straight pipe runs can be reduced provided that the requirements for straight pipe runs given in Table 1 are met.

Types of mounting flanges and types of their modifications are also given in Appendix A.

Delivery package is agreed with the customer. The set of documentation for the fittings is available at customer's option.

3.2.3.2. Components of the assembly-welded structure are welded together and then welded to the pipeline where the flow meter will be installed in compliance with local rules and regulations in force. It is important to provide alignment of the whole unit and flatness/parallel alignment of the flanges between which the Flow Sensor is being installed.

3.2.3.3. The procedure for manufacturing the assembly-welded structure is as follows:

- a) Weld the flanges to the straight pipe runs considering that the axis of each straight pipe run is perpendicular to the flange plain adjacent to the MF (fig.3)
- b) If necessary, weld the adaptors to the opposite ends of the runs (Fig.4)

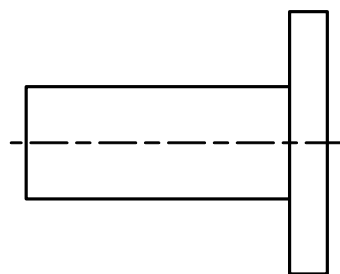


Fig.3

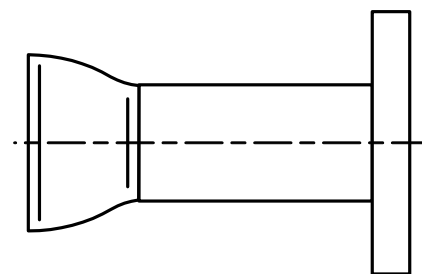


Fig.4

CAUTION! Overlaps and undercuts inside the channel are unacceptable. After completing the work, remove burrs and scales from the inside.

- c) Assemble the whole structure. Components are fixed by bolts (studs), see Appendix A. Make sure that the simulator is installed into the assembly-welded structure instead of the MF to provide alignment between two welded units, and to avoid damages to the MF when welding the structure to the pipeline. Before assembling, make sure that mounting gaskets included in the set of fittings are installed and all bolts (studs) from the delivery package are used. Nuts are tightened according to section 3.2.7.4 of this manual.

While assembling, please pay attention to the alignment of M5 threaded holes on cylindrical surface of the flanges adjacent to the Flow Sensor. The holes used to connect wires to the MF casing must be located in line that is parallel to the axis of the structure and allowing easy connection of the wires.

3.2.4. Set of fittings for plastic (metal-plastic) pipeline

- 3.2.4.1. The set of fittings for assembling the assembly-welded structure includes:

- Two straight adaptors of appropriate length and DN equal to DN of the flow meter. A flat flange (modified) is welded to one end. Another (free) end is threaded (external cylindrical pipe thread)
- FS dimension simulator of appropriate DN and design (wafer type)
- Gaskets
- Fasteners.

- 3.2.4.2. Overall mounting dimensions and DN of the simulator correspond to the dimensions of the Flow Sensor to be mounted with this fitting assembly.

View of the structure, reference linear dimensions and view of flanges (with modifications) are shown in Appendix A.

- 3.2.4.3. The procedure for manufacturing the assembly-welded structure is as follows:

- a) Put mounting gaskets supplied with the set of fittings onto flanges of the adaptors
- b) Place the simulator between the flanges and assemble the structure as a whole using studs. Use all of the studs. Nuts are tightened according to section 3.2.7.4 of this manual.

While assembling, please pay attention to the alignment of M5 threaded holes on cylindrical surface of the flanges adjacent to the Flow Sensor. The holes used to connect wires to the MF casing must be located in line that is parallel to the axis of the structure.

3.2.5. Mounting sets of fittings into the metal pipeline

- 3.2.5.1. Before mounting a set (assembly-welded structure), fix the pipes that may tip out of their axes after cutting the pipeline to stationary supports by clamps. Drain liquid from the pipeline, cut it and mount the set of fittings considering the following conditions:

- The longer straight pipe run should be the first relative to the source of liquid

- M5 threaded holes on cylindrical surface of the flanges used to connect wires to the MF casing should be in position allowing easy connection of the wires.
- 3.2.5.2. When welding the set of fittings to the pipeline, the inside of the set and pipeline should be protected from burrs and scales.
- After welding the weld joints must be stress relieved by means of heat treatment.
- 3.2.5.3. After completion of work, check weld joints and matting faces for leakages according to current norms and regulations specified for pipelines of this type. To do this, loose the clamps fastening pipes to supports and put the pipeline into operation. Re-weld bad joints and replace gaskets, if necessary.
- Wash the system before the simulator is replaced by the flow sensor.
- The set of fittings shall not be subjected to stresses and strains from the pipeline, namely bending, compression, tension, twisting caused by misbalance, misalignment or torque nonuniformity. To prevent this, do not remove the supports of the inlet and outlet ducts and tighten the fastening clamps.
- 3.2.6. Mounting fittings into the plastic (metal-plastic) pipeline
- 3.2.6.1. Before mounting, drain liquid from the pipeline and cut it at the mounting location. Fix the fitting assembly to stationary supports by clamps near the cut section considering the following condition: M5 threaded holes on cylindrical surface of the flanges used to connect wires to the MF casing should be in position allowing easy connection of the wires.
- 3.2.6.2. Connect the pipe ends to the fitting assembly using fittings of appropriate standard size assigned for use in plastic (metal-plastic) pipelines.
- To provide connection with a pipe of other diameter, it is possible to use an adaptor coupling as a confusor / diffusor.
- 3.2.6.3. After completion of work, check joints and matting faces for leakages according to current norms and regulations specified for pipelines of this type.
- Wash the system before the simulator is replaced by the Flow Sensor.
- 3.2.7. Mounting the flow meter in the metal pipeline
- 3.2.7.1. Position the flow meter instead of the simulator so that the axis of the Measuring Unit stand is arranged in vertical plane with maximum deflection of $\pm 30^\circ$ (see. Fig.2). An arrow on the Flow Sensor shall point in the flow direction.
- NOTE. The flow meter for measuring bidirectional flow may be installed without regard to flow direction.
- 3.2.7.2. Flow meters MF-4X0 (5X0)L (wafer type) are automatically centered relative to companion flanges of the pipeline because the outer diameter of the external rings matches the diameter of flange grooves.
- When mounting the MF, put new gaskets provided in the delivery package into the companion flanges.

Flow meters of wafer type with protection rings and flanged flow meters can be mounted with use of gaskets made of various materials.

CAUTION! Flow meters with polymeric flow tube are mounted with use of manufacturer-supplied rubber gaskets. The gaskets may be fixed with an adhesive.

To move pipeline flanges apart when installing or removing the MF (simulator), it is recommended to use special tool (provided on request).

3.2.7.3. When installing the flow meters of MF-4X0 (-5X0)F models (flanged flow meters), put bolts into mating flanges from the side of the pipeline flanges. Length of the bolts must provide the distance of minimum 3 mm from a bolt end to the flow meter assembly.

Alignment of the pipeline and Flow Sensor inner channel is provided when flanges of the flow meter are aligned with the companion pipeline flanges.

When the simulator is replaced by the flow meter, put additional gaskets included in the delivery package to provide leaktightness of mating flanges (if necessary).

CAUTION! Please make sure that the gaskets are aligned relative to the inner channel of the Flow Sensor, i.e. a gasket must not even partly cover the inner channel. To provide gasket alignment, it is recommended to fix the gaskets by adhesive.

The flow meter is mounted into the pipeline when all construction, welding and other works are finished.

3.2.7.4. When mounting the flow meter (simulator) into the pipeline, tighten nuts by a torque indicating wrench in order specified in Fig. 6. Maximum torque value is specified in Table 2. **Exceeding of torque value may cause damage to the flow tube followed by leaking liquid into the MF case.**

To prevent disbalance and misalignment, it is recommended to tighten nuts in several steps increasing torque step-by-step up to the value specified in Table 2 while controlling alignment of the mating flanges.

Table 2

DN, mm	20	25	32	40	50	65	80	100	150	200	300
Torque, N·m	15	20	25	35	35	40	50	60	80	100	120

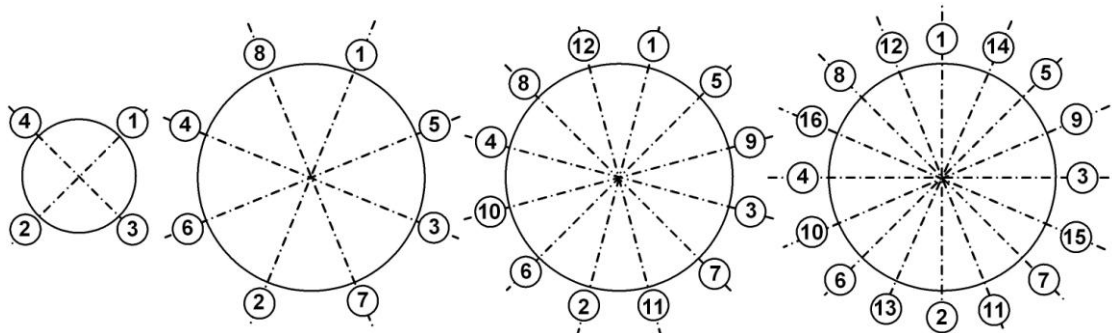


Fig.6. Order of tightening flange nuts

The MF mounted in the pipeline SHALL NOT be rotated around the pipeline axis.

CAUTION! If the instructions specified in sections 3.2.3 - 3.2.7 are not observed, manufacturer's warranty will be terminated.

- 3.2.8. Mounting procedures for the flow meter installed in a plastic (metal-plastic) pipeline and the flow meter of wafer type installed in a metal pipeline are the same.

CAUTION! The flow meter shall be mounted in a plastic (metal-plastic) pipeline only according to the requirements stated by the pipeline manufacturer.

3.3. Wiring the flow meter

- 3.3.1. Power and communication cables are connected to the MF after it is installed into the pipeline. Cables are passed via the corresponding glands of the Measuring Unit and connected to the board of the Processor module. Circuit diagram of output stages of the universal outputs is given in Appendix C, part I of the User manual.

The MF power supply cables should be connected considering the operating conditions of the flow meter. As a power cable, you may use any DC 24 V cable of at least 0.5 mm² cross section. Power cable length of one flow meter shall not exceed 300 m.

It is permissible to power several flow meters from one secondary power source only if there is no difference in potential between the pipelines where the flow meters are installed. In this case, permissible cable length is reduced proportionally.

As a signal cable for connecting the universal output of the flow meter to a signal receiving input, you can use a two/four-wire cable of at least 0.35 mm² cross section and length of up to 300 m. Use 4-wire cable for simultaneous connection of the both universal outputs.

It is allowed to use a four-vein cable for simultaneous connection of power-supply circuits and a universal output. At the section of veins of a cable not less than 0,5 mm² the maximum length of a cable remains to equal 300 meters, when using cable with section lived 0,35 mm² – the maximum length of a cable makes 200 meters.

Power supply and communication cables shall meet the requirements for operating conditions of the flow meter.

- 3.3.2. Prior to connection, strip cable ends of insulation by 5 mm and tin-plate the ends. Attach the socket (cable) connector provided in the delivery package to the power cable considering polarity, then attach the socket connector to the plug on the board of the Power Supply unit. Cables of the universal outputs are directly connected to the terminals on the board of the Processor module.

The power cable is passed through one cringle (adjacent to =24V sticker) and the signal cable - through the other.

CAUTION! To ensure the declared level of protection (IP65), the following requirements for electrical connections must be met:

- When mounting the flow meter into sloped or vertical piping, install the Measuring Unit so that cable glands are directed downwards (Fig.1)

- As power and connection cables, use round conductors with outer diameter from 3.0 to 6.5 mm
- Seals of the Measurement Unit case are installed into corresponding grooves provided that the seals are clean, undamaged and without waves or loops
- Install plugs into unused glands
- After completion of wiring, securely tighten screws on the cover of the Measuring Unit and nuts of cable glands.

To prevent water or condensate ingress into the Measuring Unit via the glands when using flat section cables, it is necessary to connect cables so that falling U-loop is formed in the vertical plane (see Fig.7).

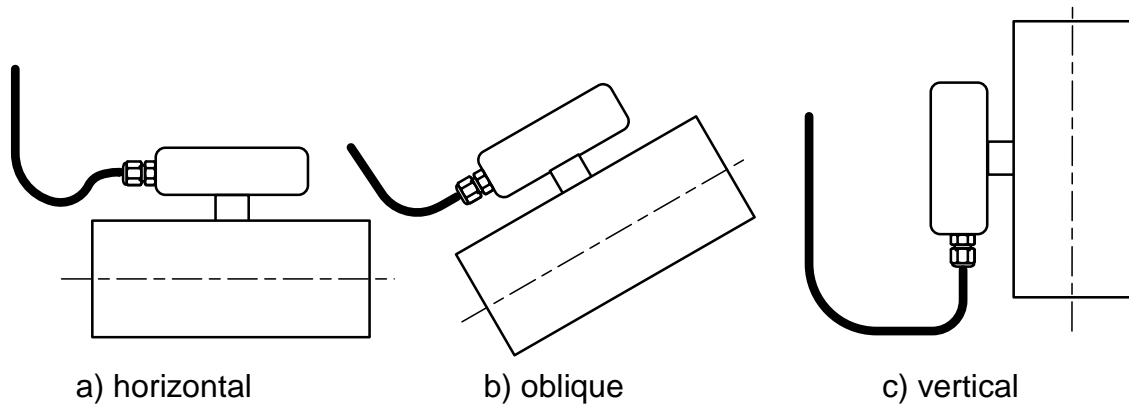


Fig.7. Shape of cables near cable glands

3.3.3. Communication and network cables are fixed on the wall wherever possible. To avoid mechanical damages, it is recommended to place all cables in metal or plastic tubes, corrugated sleeves, cable trays, trunks, or conduits. Signal and power cables can be placed together.

Plastic couplings MAG16 (optional) fastened on the cringles of the Measuring Unit can be used to fix metal sleeves of power cables. The sleeves are coiled into the coupling.

DO NOT fix the cables to the heated pipeline.

3.3.4. To provide electrical connection, it is necessary to connect the pipeline sections being cut in the mounting location by wires (jumpers) via a screw located on the MU. Wires should be of 4 mm² cross section as a minimum. If the pipeline has cathode protection, cross section of the jumpers shall correspond to the value of cathode protection current.

Use M5 threaded holes on cylindrical surface of the flanges to connect the jumpers.

3.3.5. The need for protective grounding is determined by power supply and environment conditions under which the flow meter is operated.

To prevent failures of the flow meter, the grounding terminal must not be connected to the lightning protection system.

As a grounding wire, you must use a mechanically protected copper wire of 2.5 mm² cross-section as a minimum or a copper wire without mechanical protection of 4 mm² cross section as a minimum.

The ground wire is connected to the MU fixing screw. Wires for connection to the pipeline flanges are also connected to this screw.

CAUTION! If the pipeline is equipped with cathode protection, you must not ground the flow meter.

3.3.6. In MF-5X0X flow meters, the cover of the MU with the indicator installed can be turned by 180°.

To do this, unscrew the cover, turn it by 180° with care and screw it again to the MU.

4. DISMOUNTING

4.1. The order of dismantling the flow meter before dispatching for regular calibration or repair is as follows:

- Turn off power, then disconnect network and signal cables from the flow meter
- Disconnect wires from flanges
- Cut off liquid at the flow meter location, make sure that pressure is fully released and drain the liquid
- Remove the flow meter and install the simulator instead.

4.2. On installing the simulator, check mating surfaces for leakage. Replace gaskets, if necessary. In case that no leakages are found, put the pipeline into operation.

4.3. Remove sediment and liquid residues from the inner channel of the Flow Sensor before packing.

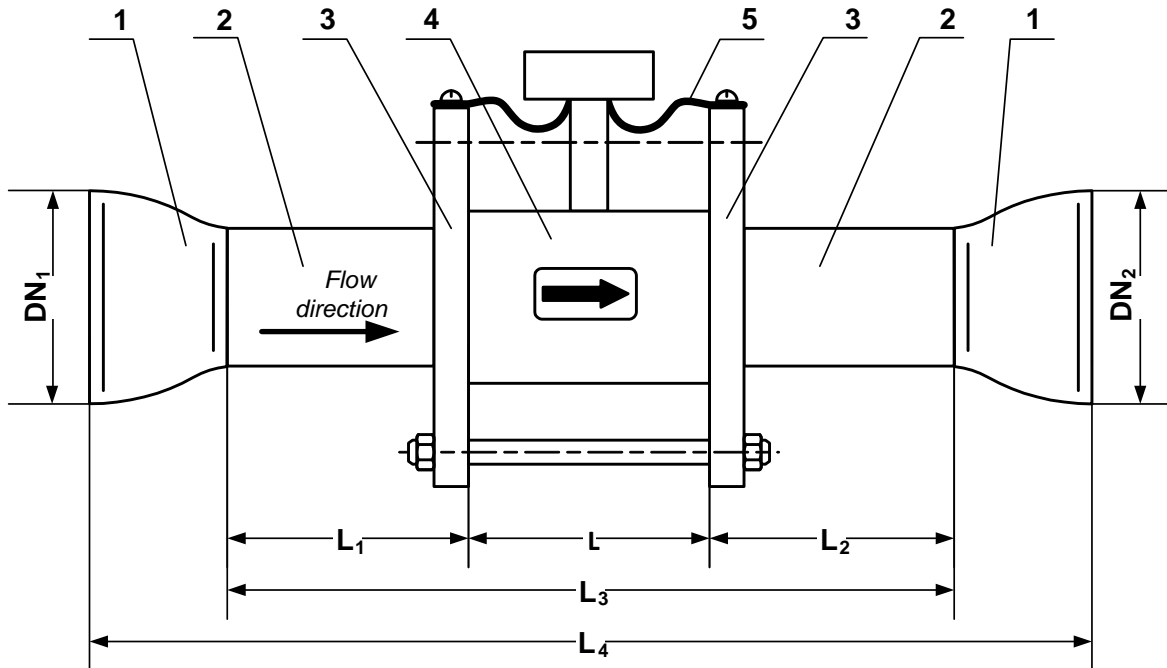
5. PUTTING INTO OPERATION

- 5.1. When putting the flow meter into operation check the following:
 - The flow is in the direction of the arrow on the flow meter's body (for unidirectional flow meter)
 - Length of the inlet and outlet straight pipe runs corresponds to unidirectional / bidirectional flow
 - The flow meter and related equipment are connected in accordance with the selected wiring diagram
 - The outputs operate in the preset modes
 - Power supply voltage corresponds to the specifications.
- 5.2. At first power-up or after a long break in operation, the flow meter becomes operational after:
 - It is washed by liquid for 30 minutes
 - It is kept powered for 30 minutes.
- 5.3. USB adaptor connection required to upload and/or modify service settings is made as specified in Appendix B.
- 5.4. To prevent unauthorized modification of service settings, the terminal used to enable modification of service settings may be sealed on putting the flow meter into operation.

To protect the flow meter from unauthorized access during operation, the cover of the MU may be sealed as well.

If a bypass is installed, it is necessary to seal its gates in closed position.

APPENDIX A. Stainless steel structures for mounting flow meters in the pipeline



1 – taper adaptor; 2 – straight pipe run; 3 – mating flange; 4 – MF (dimension simulator); 5 – wires for connection of MF casing to the pipeline.

Fig.A.1. Assembly-welded structure for mounting "Lite M" flow meters with protection rings (of wafer type)

Table A.1. Dimensions of assembly-welded structure for "Lite M" flow meters (wafer type connection)

DN	DN ₁ , DN ₂	L*	L ₁ *	L ₂ *	L ₃ *	L ₄ *	Notes
20	25	114	127	87	328	385	
	32					385	
	40					385	
	50					415	
	65					555	**
	80					565	**
25	32	114	152	102	368	425	
	40					425	
	50					455	
	65					595	**
	80					605	**
	100					615	**
32	40	124	187	122	433	490	
	50					520	
	65					540	
	80					670	**
	100					680	**
40	50	134	232	152	518	675	
	65					725	
	80					735	
	100					865	**
	125					905	**
	150					855	**

Table A.1 (cont'd)

DN	DN ₁ , DN ₂	L*	L ₁ *	L ₂ *	L ₃ *	L ₄ *	Notes
50	65	154	288	188	630	767	
	80					777	
	100					787	
	125					827	
	150					777	
65	80	175	363	233	771	918	
	100					928	
	125					968	
	150					918	
	200					958	
80	100	175	438	278	891	1048	
	125					1088	
	150					1148	
	200					1078	
	250					1328	**
	300					1328	**
	350					1588	**
100	125	216	538	338	1092	1288	
	150					1348	
	200					1278	
	250					1368	
	300					1368	
	350					1788	**
	400					1788	**
150	200	236	794	494	1524	1797	
	250					1877	
	300					1797	
	350					1957	
	400					1957	
	500					2557	**

* - reference dimensions without processing tolerances

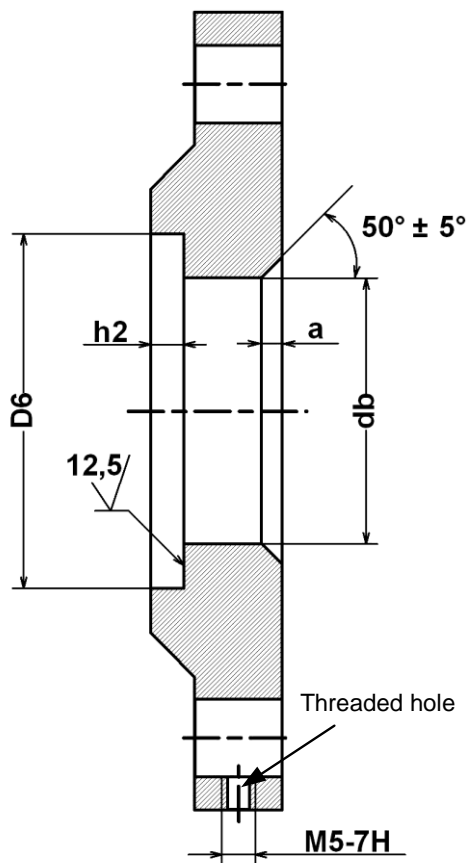
** - adaptor is made up of two concentric adaptors.

The flow meter is mounted in the pipeline with use of flat weld flanges (for 2.5 MPa pressure).

- For DN20 – flanges of design type 1 (with a fixing ridge)

- For DN25-DN150 – flanges of design type 3 (with a notch).

The flanges are processed before welding, namely, threaded holes (M5) for fixing wires are drilled on cylindrical surface of the flanges (Fig. A.2).

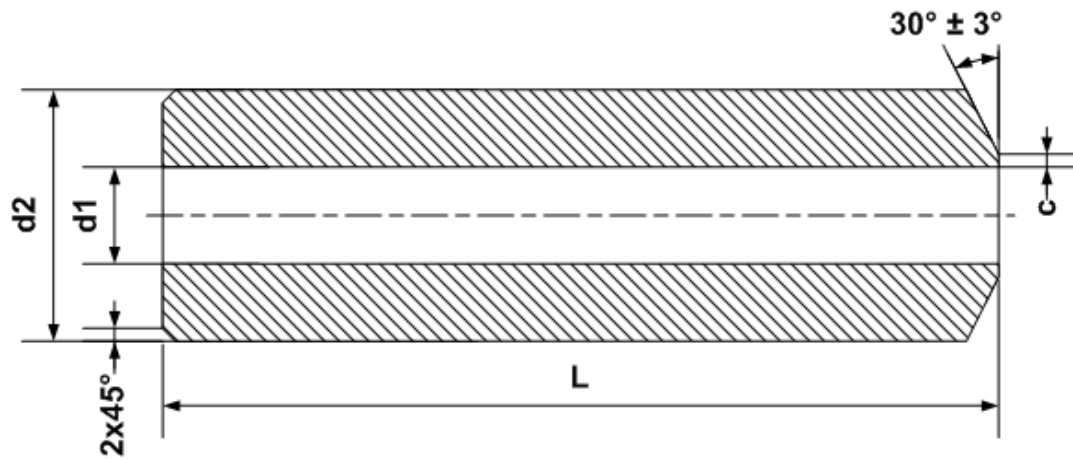


DN, mm	D6, mm	h2, mm	a, mm	db, mm	Initial flange
20	51 H12	3 ^{+0.5}	3	33	Flange 1-25-25 St25

Fig.A.2. Flanges processed for mounting MF DN20

To weld flanges to flow meters with DN20 (as shown in Fig.A.2) to the pipeline, it is necessary to use adaptor pipes (see Fig.A.3) with length greater than or equal to the length of the straight pipe run (see Table 1).

After welding, process the surface adjacent to the flange as specified in Fig.A.4. The adaptors and pipeline sections are welded butt-to-butt.



DN, mm	d1, mm	d2, mm	d3, mm	c, mm	L, mm
20	20	32	-	$1 \pm 0,5$	84
					124

Fig.A.3. View and dimensions of adaptor DN20

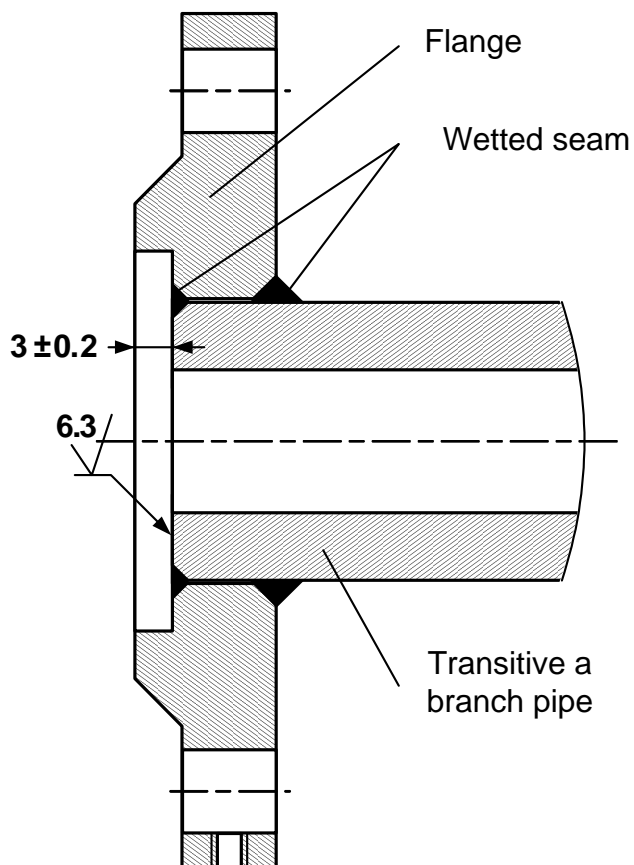
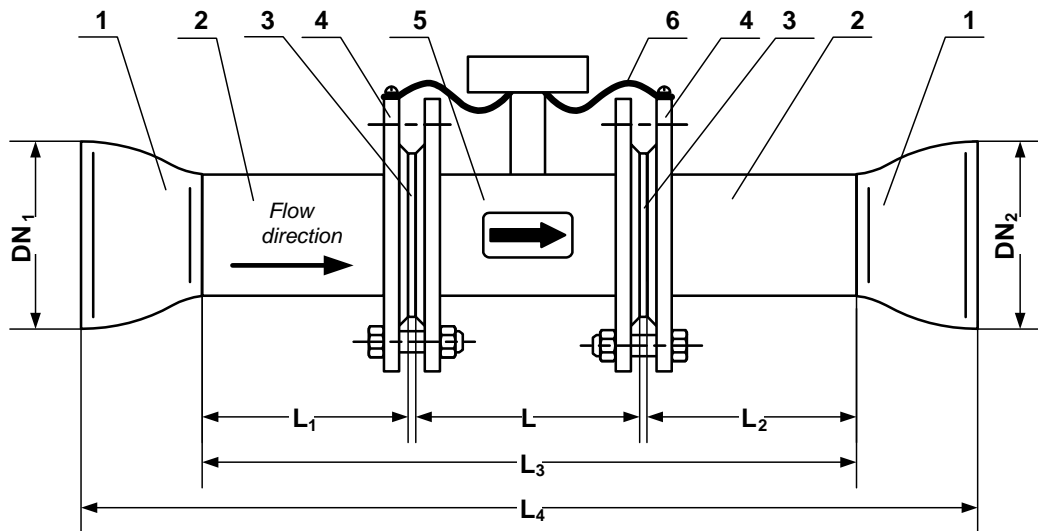


Fig.A.4. Flange DN20 and pipe adaptor welded together



1 – taper adaptor; 2 – straight pipe run; 3 – gaskets; 4 – flange; 5 – flanged MF (dimension simulator), 6- wires connecting MF case to the pipeline.

Fig.A.5. Assembly-welded structure for mounting "Lite M" flow meters (flanged type)

Table A.2. Dimensions of assembly-welded structure for "Lite M" flow meters (flange type connection), mm

DN	DN ₁ , DN ₂	L*	L ₁ *	L ₂ *	L ₃ *	L ₄ *	Notes
20	25	158	124	84	366	422	
	32					422	
	40					422	
	50					452	
	65					592	**
	80					602	**
25	32	158	149	99	406	462	
	40					462	
	50					492	
	65					632	**
	80					642	**
	100					652	**
32	40	202	184	119	505	561	
	50					591	
	65					611	
	80					741	**
	100					751	**
40	50	202	229	149	580	696	
	65					716	
	80					726	
	100					856	**
	125					896	**
	150					846	**

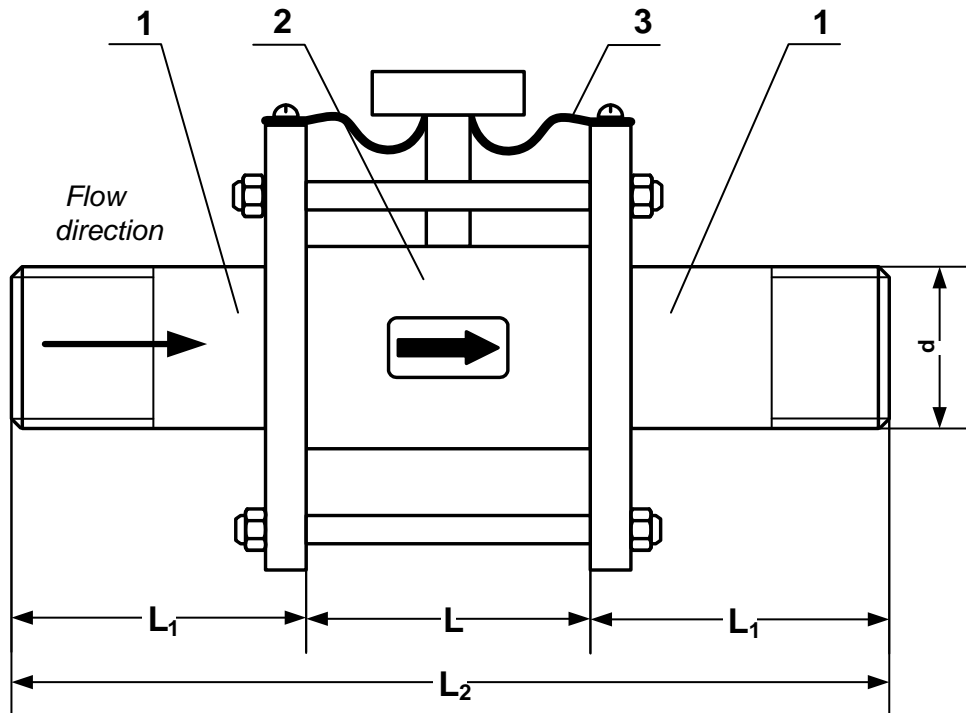
Table A.2. (cont'd)

DN	DN ₁ , DN ₂	L*	L ₁ *	L ₂ *	L ₃ *	L ₄ *	Notes
50	65	203	285	185	673	809	
	80					819	
	100					829	
	125					869	
	150					819	
65	80	220	360	230	810	956	
	100					966	
	125					1006	
	150					956	
	200					996	
80	100	230	435	275	940	1096	
	125					1136	
	150					1196	
	200					1126	
	250					1376	**
	300					1376	**
	350					1636	**
100	125	251	535	335	1121	1318	
	150					1378	
	200					1308	
	250					1398	
	300					1398	
	350					1818	**
	400					1818	**
150	200	324	795	495	1614	1890	
	250					1970	
	300					1890	
	350					2050	
	400					2050	
	500					2650	**
200	250	362	1050	650	2062	2426	
	300					2426	
	350					2506	
	400					2506	
	500					3106	**
300	350	514	1565	965	3044	3488	
	400					3488	
	500					4088	**

* - reference dimensions without processing tolerances

** - adaptor is made up of two concentric adaptors.

Flat welded flanges for 2.5 MPa pressure (with a fixing ridge), included in the set of fittings are processed as follows: threaded M5 holes for fixing wires are drilled on the cylindrical flange surface (see Fig.A.2).



1 – flange with pipe adaptor; 2 – MF (dimension simulator); 3 – wires for connection of MF with the pipeline.

Fig.A.6. Assembly-welded structure for mounting "Lite M" flow meters in the plastic (metal-plastic) pipeline (wafer type connection)

Table A.3. Dimensions of assembly-welded structure for "Lite M" flow meters, mm

DN	L*	L ₁ *	L ₂ *	d
20	113	86	285	G 3/4 - B
25	113	102	317	G 1 - B
32	123	122	367	G 1 1/4 - B
40	133	152	437	G 1 1/2 - B
50	153	187	527	G 2 - B
65	174	232	638	G 2 1/2 - B
80	174	277	728	G 3 - B
100	215	337	889	G 4 - B

The following flanges (for 2.5 MPa pressure) are used with pipe adaptors:

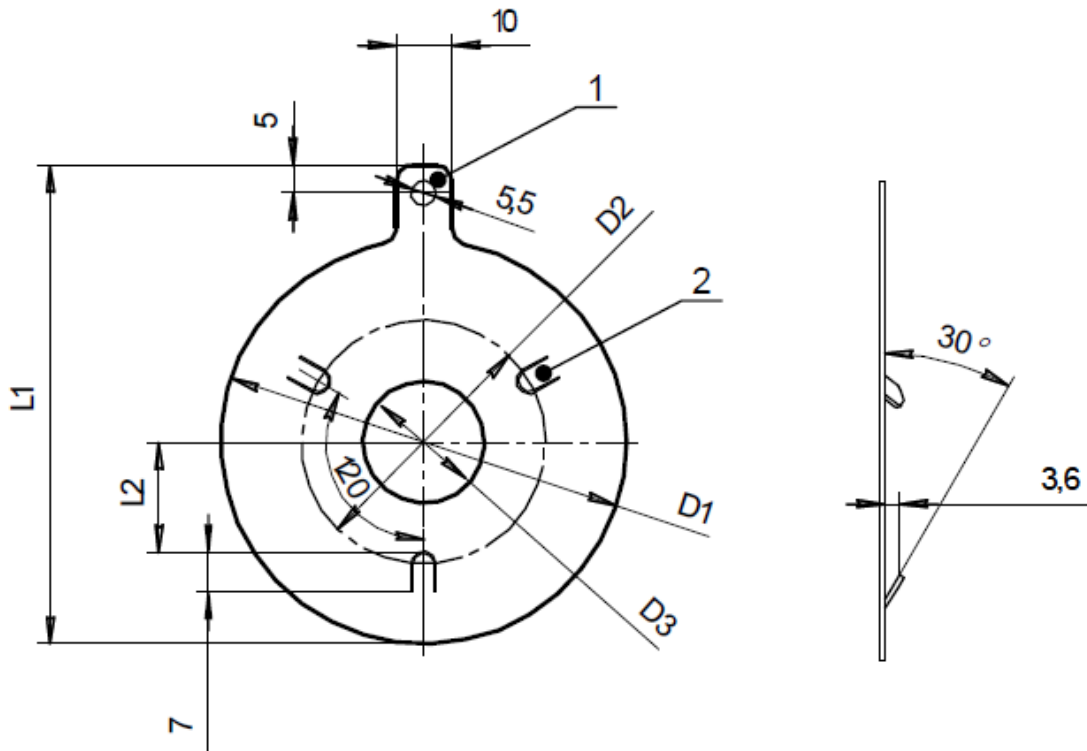
- For DN20 – flanges of design type 1 (with a fixing ridge)
- For DN25 – DN100 – flanges of design type 3 (with a notch).

The flanges are processed before welding: M5 threaded holes are drilled on the cylindrical surface of the flanges to fix wires (Fig.A.2).

CAUTION! Mounting of "Lite M" 4X0/5X0L flow meter in the plastic (metal-plastic) pipeline without the assembly-welded structure pictured on Fig.A.6, or mounting of 4X0/5X0F flow meter without protection rings will result in no electrical contact between the MF and liquid under control. In this case the manufacturer cannot assure stable operation of the flow meter.

NOTE. Electrical contact between 4X0/5X0F flow meter with protection rings mounted in the plastic (metal-plastic) pipeline and liquid under control is provided through the ground protection system. In this case there is no need to connect wires to the pipeline flanges.

For steady work of a flow meter with plastic Flow Sensor in plastic pipelines without use of a without the assembly-welded structure it is necessary to use the mounting ring shown in fig. A.7. The rings is established between a flow meter and a flanges, "pads" to a flow meter.



1 – hole for connection of electric conductors; 2 – "pads" for centering

Fig.A.7. Ring assembly for 4X0/5X0L flow meters with plastic Flow Sensor for installation in the plastic (metal-plastic) pipeline without the assembly-welded structure

Table A.4. Dimensions of assembly rings, mm

DN	L1	L2	D1	D2	D3
20	86	24	73	48	22
25	86	22.5	73	55.5	27
32	95	31.5	82	63	32
40	103	36.5	90	73	41
50	115	42.5	102	85	51

APPENDIX B. Connecting USB-MF adaptor

USB-MF adaptor is connected to XP2 terminal on the Processor module (see Fig.B.6, part I of User manual). In the presence of the module of interfaces, the adaptor is connected to XP2 connector instead of the flexible flat cable of the display module of interfaces.

Connection between the USB-MF adaptor and Processor module is made according to Fig.B1 (the front panel of the Measuring Unit is removed):

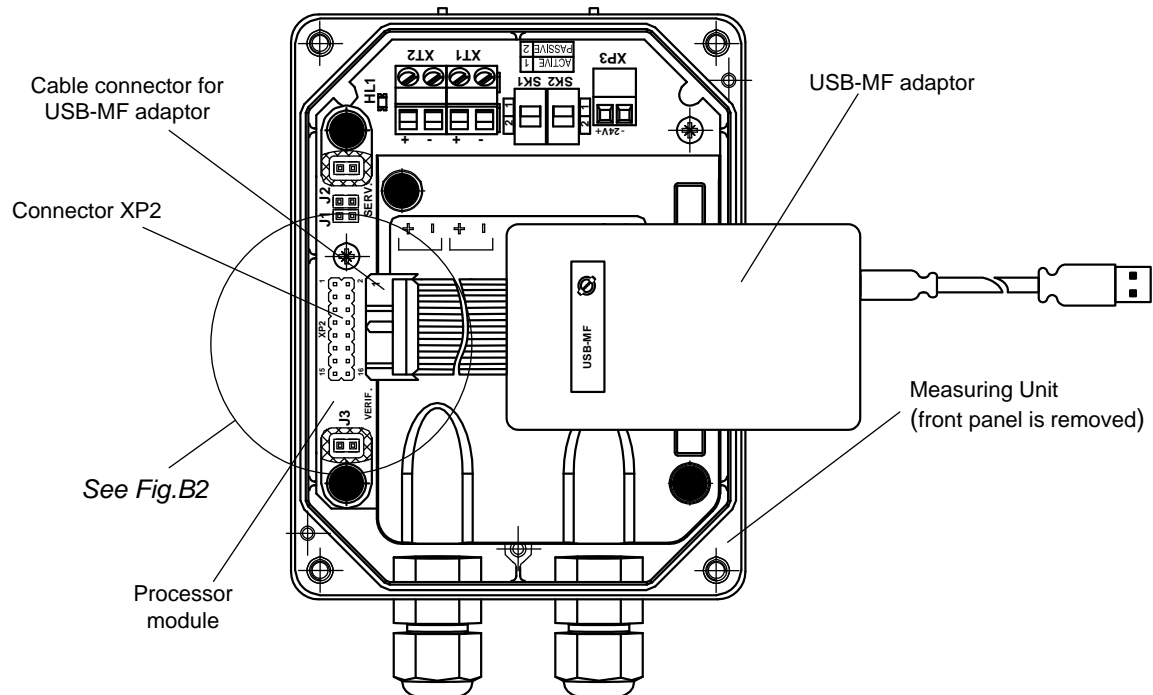


Fig.B.1. Connection of USB-MF adaptor to the Processor module board

When the connection cable connector USB-MF adaptor (UART connector) should be focused next follows: marker socket contact 1 on the connector adapter focused on pin 1 of connector XP2 processor module.

Connection from the cable of adapter and the connector XP2 is made without bias.

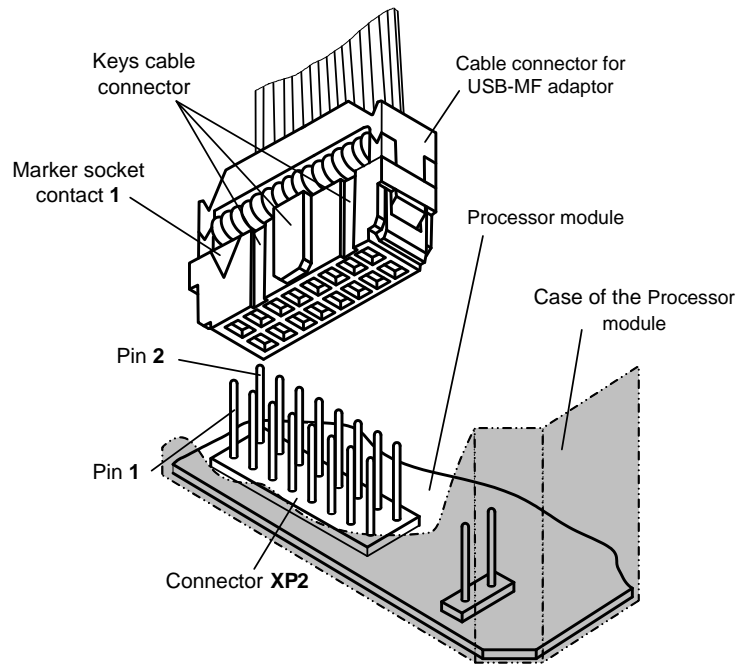


Fig.B.2. Connection the cable of USB-MF adaptor and Processor module

To modify flow meter settings, it is necessary to place a jumper on the "Service settings modification" terminal located on the board of the processor module.

Flow meters provide for modification of settings via RS-485 interface. Interface connections are made according to the notations on the Indicator board shown in Fig.B2.

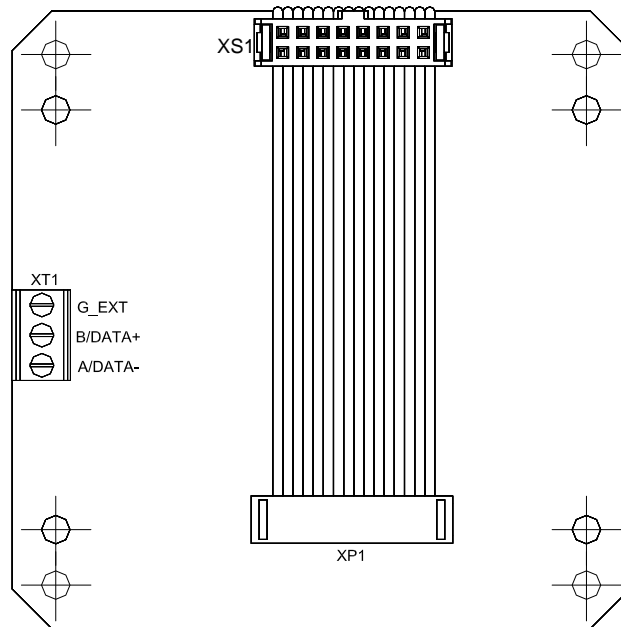


Fig.B.3. RS-485 connector