SGM-101F

transit time ultrasonic flowmeter

sgm lektra

CONTENTS

1-WARRANTY

Products supplied by SGM LEKTRA are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions document.
SGM LEKTRA can choose to repair or replace the Product.
If the Product is repaired it will maintain the original term of guarantee, whereas if the
Product is replaced it will have 12 (twelve) months of guarantee.
The warranty will be null if the Client modifies, repair or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract.
In no circumstances shall SGM LEKTRA be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods.

2-PRODUCT
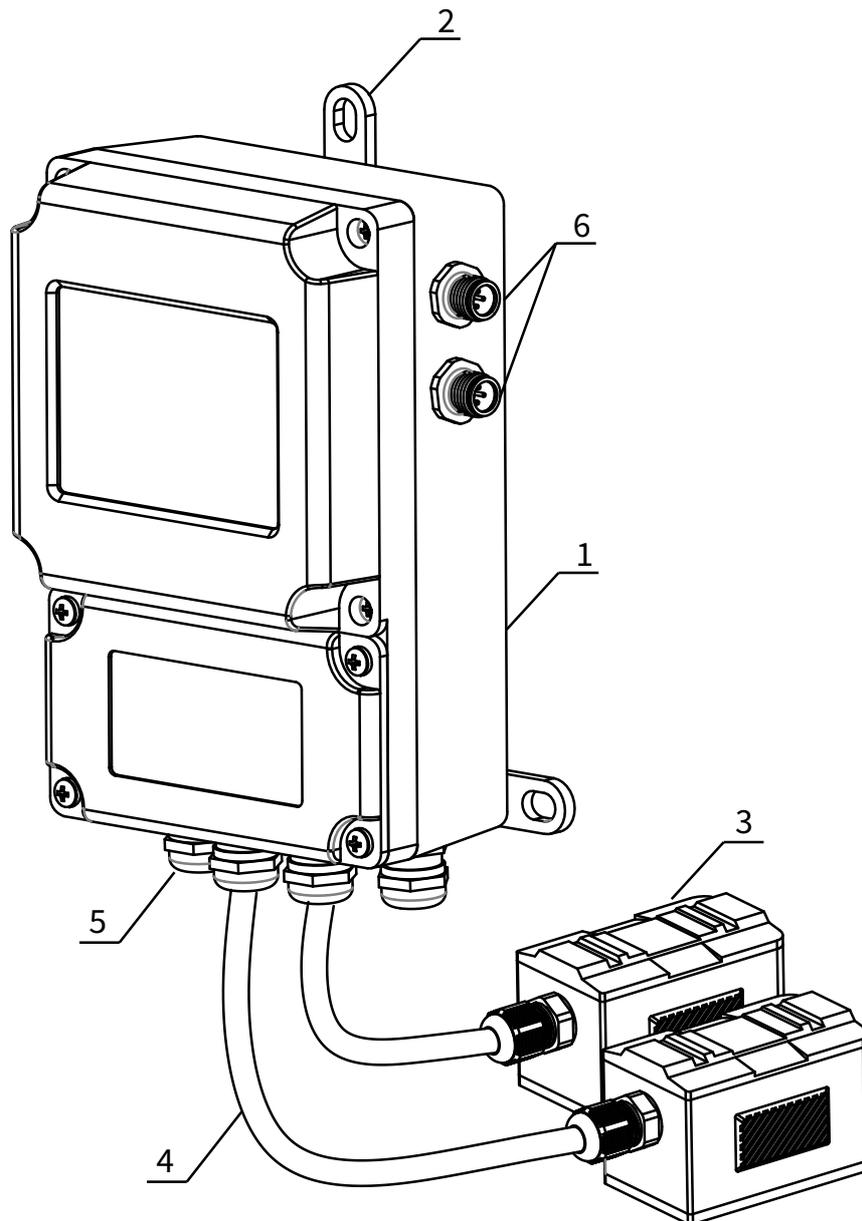
1. SGM-101F
2. Wall mounting Kit
3. Transducers
4. Transducers cables
5. Skintop
6. Heat counter connector (opz.)

2.1 - IDENTIFICATION

Each meter has an adhesive identification plate on which are the meter main data.
The following picture describes the information and data on the identification plate.

1	Mod. SGM-101FWATL-1NA	CE
2	P.S. 230Vdc 50-60Hz	SGM LEKTRA
3	S.N. FU0101600357	
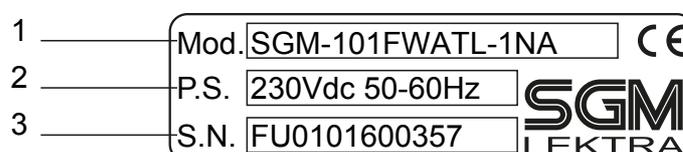
1. Product code   2. Power supply   3. Serial number

2.2 - WORKING PRINCIPLE

The SGM-101F is composed by a digital converter and two clamp-on or insertion type ultrasonic transducers.
The instrument calculates the instantaneous flow rate value by measuring the flight time difference of the ultrasonic pulses.
- Compact system for conductive and non-conductive fluids, even with the suspended material presence (<10g/l; <Ø1mm)
- Measuring ranges from <0,2m3/h to >30000m3/h
- Applicable to various pipes materials (eg. SS316, copper, plastic, etc.), with or without an inner lining.
- Power supply 10÷30Vdc; 24Vac; 115Vac; 230Vac.

The meter is designed to measure the fluid velocity inside a pipe.
The clamp-on transducers models allow an easy installation.
The transit time flow meter uses two ultrasonic transducers that work as transmitters and receivers.
They are installed externally to the pipe at a specific distance from each other.
They can be installed at V mode (2 sonic section), at W mode (4 sonic section) or at Z mode (1 sonic section).
The installation method choice depends on the pipe and the fluid characteristics.
The SGM-101F measures the transit time via the two transducers that alternatively transmit and receive a sound pulses sequence.
The difference in the measured transit time is directly related to the fluid velocity in the pipe.
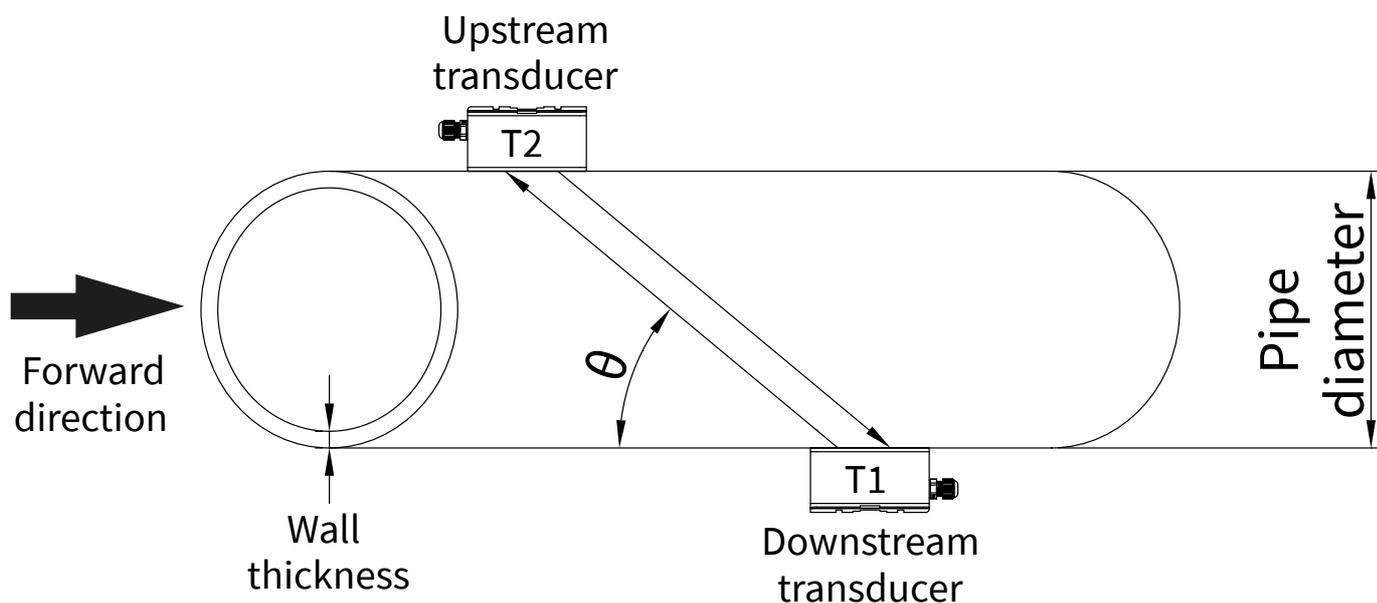
$$V = \frac{D}{\sin(2\theta)} \circ \frac{\Delta T}{T1 \cdot T2}$$

θ = sonic section angle
D = pipe internal diameter
T1 = sound transit time from the upstream transducer to the transducer downstream
T2 = sound transit time from the downstream transducer to the transducer upstream
ΔT = T2-T1

3-FEATURES

Pipe dimension range
DN20 ÷ DN4000
Transmitter protection class
IP66
Transducer protection class
IP68
Display
backlighted 2x20 alphanumeric digit
Keypad
4 keys
Housing material
painted aluminium
Displayed data
instantaneous flowrate; flow totalizer
Mounting
wall
Analog Output
Sel. 4÷20mA o 0÷20mA
Accuracy
±1%
Repeatability
±0,2%
Linearity
±0,5%
Basic measurement period
500ms
Serial port
RS485
Communication protocol
MODBUS RTU or ASCII+ (opz.)
Data logger
on SD card (opt.) or via MODBUS
Programmable frequency output
0÷5000Hz
Relay output
n.1 for pulse totalizer or alarm
Medium speed range
±12m/s
Unit working temperature
-20÷60°C
Ambient humidity
non condensing 85% RH (40°C)
Trasducer working temperature
TS-2 / TM-1 / TL-1 -30 ÷ +90°C; TS2H / TM1H -30 ÷ +160°C; TC-1/ TLC2 -40 ÷ +160°C
PT100 sensors working temperature
-40°C +160°C
Trasducer cable std. length
5mt
PT100 sensor cable std. length
15mt
Supply voltage
10÷30Vdc; 24Vac; 115Vac; 230Vac.
Power consumption
3W
Dimensions
200x120x77mm
Weight without sensors
1Kg

Vdc ABSORPTION		
Mode/Voltage	**12Vdc**	**24Vdc**
Relè + 20mA + R. Display	190mA	100mA
Relè + 20mA	150mA	85mA
20mA + R. Display	145mA	80mA
20mA	106mA	62mA
Measure only + R. Display	121mA	60mA
Measure only	86mA	41mA

4-DIMENSIONS

4.1 - SGM-101F MECHANICAL DIMENSIONS
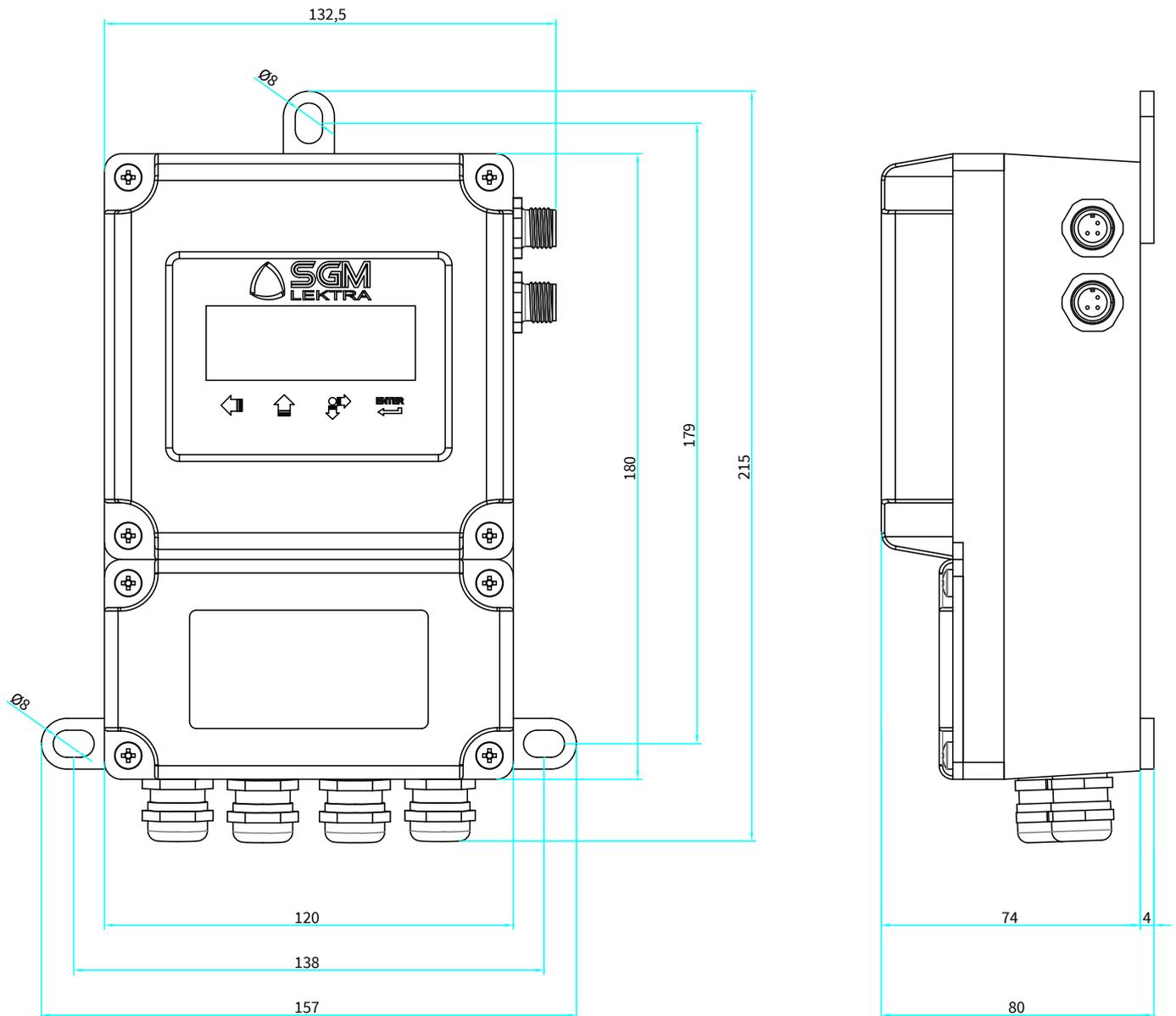
4.2 - TRANSDUCERS DIMENSIONS AND FEATURES

Transducer Type		Features
TS-2	*Dimensions*	
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +90°C
	Menu 23	>19. CLAMP-ON TS-2

Transducer Type		Features
TS2H	*Dimensions*	67mm / 28mm / 32mm
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +160°C
	Menu 23	>19. CLAMP-ON TS-2
TM-1	*Dimensions*	89mm / 42mm / 44mm
	Pipe Ø range	50÷700mm (2" ÷ 28")
	Temperature	-30 ÷ +90°C
	Menu 23	>16. CLAMP-ON TM-1
TM1H	*Dimensions*	89mm / 42mm / 44mm
	Pipe Ø range	50÷700mm (2" ÷ 28")
	Temperature	-30 ÷ +160°C
	Menu 23	>16. CLAMP-ON TM-1
TL-1	*Dimensions*	123mm / 57mm / 54mm
	Pipe Ø range	300÷4000mm (12" ÷ 160")
	Temperature	-30 ÷ +90°C
	Menu 23	>20. CLAMP-ON TL-1
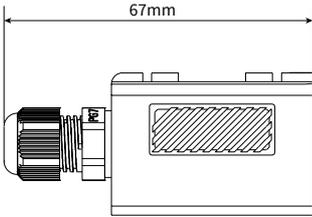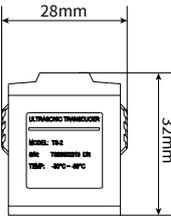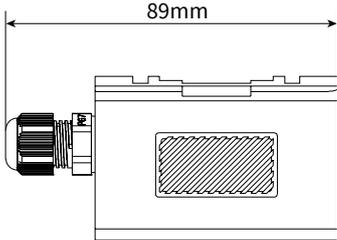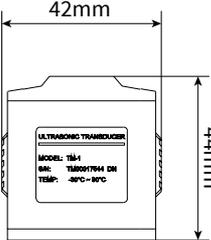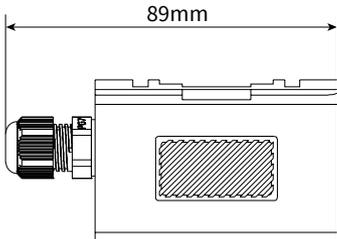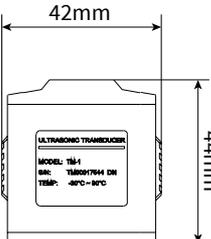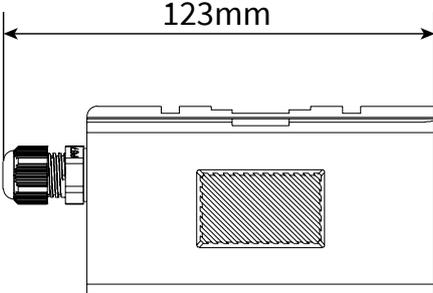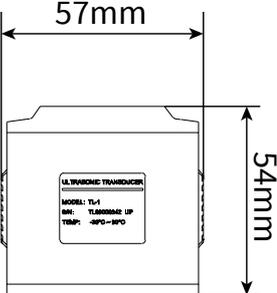
Transducer Type	Features	
TC-1 (standard)	*Dimensions*	
	Pipe Ø range	80÷4000mm (3" ÷ 160")
	Temperature	-40 ÷ +160°C
	Max pressure	1.6Mpa (16bar)
	Menu 23	>17. INSERZ. TC-1
TLC2 (for non-metallic pipes)	*Dimensions*	
	Pipe Ø range	80÷4000mm (3" ÷ 160")
	Temperature	-40 ÷ +160°C
	Max pressure	1.6Mpa (16bar)
	Menu 23	>21. INSERZ. TLC-2
PT100 (With brass plate)	*Dimensions*	CONNECTOR 4 WIRES CABLE M12
	Temperature	-40 ÷ +160°C

Transducer Type		Features
PT100	*Dimensions*	
	Temperature	-40 ÷ +160°C
PT100	*Dimensions*	
	Temperature	-40 ÷ +160°C
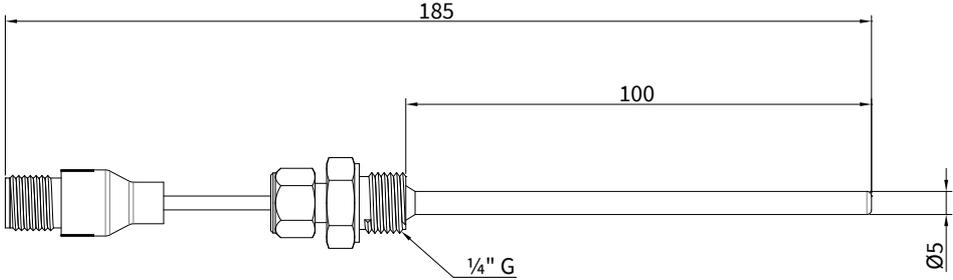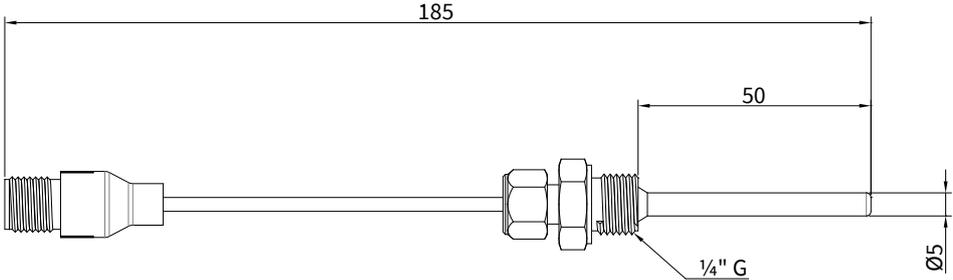
5-PIPE SPECIFICATIONS

5.1 - OUTSIDE PIPE DIAMETER

In the event that an appropriate instrument to measure the pipe outer diameter is not available (programming in M11), proceed as follows:
- use a rope or paper tape or sheet.
- wrap the pipe with rope or paper tape or sheet and mark the circumference point.
- measure the length corresponding to the pipe circumference.
- enter the measured value to "Pipe Outer Perimeter" menu (M10), SGM-101F will automatically calculate
  the correct pipe diameter value.

5.2 - PIPE THICKNESS

Value measured on site using an appropriate tool (caliper, ecc.), or from the technical data of the hydraulic circuit (programming in M12).
In the presence of tubes without inner lining, is possible to use the SGM-100T thickness gauge.

5.3 - PIPE MATERIAL

Value detectable on site, or from the technical data of the hydraulic circuit (programming in M14).

5.4 - INNER LINING MATERIAL

Value detectable on site, or from the technical data of the hydraulic circuit (programming in M15).

5.5 - INNER LINING THICKNESS

Value measured on site using an appropriate tool (caliper, ecc.), or from the technical data of the hydraulic circuit (programming in M16).

6-TRANSDUCERS POSITIONING

6.1 - INSTALLATION CHECK-UP

The signal power and quality (Q) can be checked through the installation check-up and it's possible to make the comparison of the measured flight time by the measuring range depending on the pipe diameter.

6.1.1 - Signal reception power - M90

The signal power, displayed to the menu M90 with UP and DN, is indicated by a three-digit number.

[00.0] means missing signal and [99.9] indicates the maximum measurable value.

Although the instrument is working properly with a signal power between 50.0 and 99.9, it is always recommended to

try to get a value as high as possible using the following methods:

1) Select the most favorable installation position.

2) Clean the pipe outer surface and apply more coupling grease.

3) Move the transducers both vertically and horizontally while doing the signal reception control.

   Mechanically lock the transducers when the detected power has reached its maximum value

   (always checking that the distance between the two transducers is equal to that indicated in the menu M25)

6.1.2 - Signal quality (Q) - M90

Better the signal quality (Q value higher), better will be the 'SNR and consequently the accuracy.

In normal operating conditions the Q value, displayed to the menu M90, is between 60 and 90.

In the case of a lower value, check:

1) Any interference with other instruments.

2) The transducers coupling with the pipe surface (clean the pipe or add more coupling grease).

3) The mounting position on the pipe.

6.1.3 - Total transit time and Delta Time - M93

The numbers shown in the M93 are called total transit time and delta time.

These values are fundamental to calculate the flow rate inside the pipe.

The total transit time should remain stable or in any case subject to minimal variations.

If the delta time fluctuates above 20% means that there are problems with the transducers installation.

6.1.4 - Time ratio between the Measured Total Transit Time and the Calculated Time - M91

The value should be in the range 100±3%. If the value exceeds this range check:

1) That the parameters have been entered correctly.

2) That the distance between the two transducers is the same as indicated in the menu M25.

3) That the transducers are installed in the right direction.

4) That the positioning point was chosen in an appropriate manner and that the pipe has not changed shape.

5) Inside the pipe there are no deposits.

6.2 - POSITIONING TYPE SELECTING

The transducers positioning type selection, Z-Mode, or V-Mode or W-Mode, is a function of measuring pipe DN:
DN20÷50   -   recommended installation: W (small pipe)
DN50÷250   -   recommended installation: V
DN250÷4000   -   recommended installation: Z

6.3 - MARKING POSITIONING

After the pipe parameters and transducers positioning type programming, the conversion unit automatically calculates the mounting axial distance between the two transducers: M25, Transducer Spacing.
The M25 value is used to mark out on the pipe the exact transducers positioning.

6.4 - MARKING TOOLS

To mark the transducers positioning points on the pipe surface are sufficient simple, but at the same time effective, tools:
- a paper tape with a minimum width of 50mm.
- a pencil or a thin tip pen.
- a meter.

6.5 - MARKING METHODS

6.5.1 - Z type positioning

For a correct transducers positioning, proceed as follows:

1) wrap the pipe with the paper tape making sure that the edges are perfectly overlapping.

With the pencil, draw the "C" circle on the pipe and, at the same time mark on the paper the

circumference measured point.
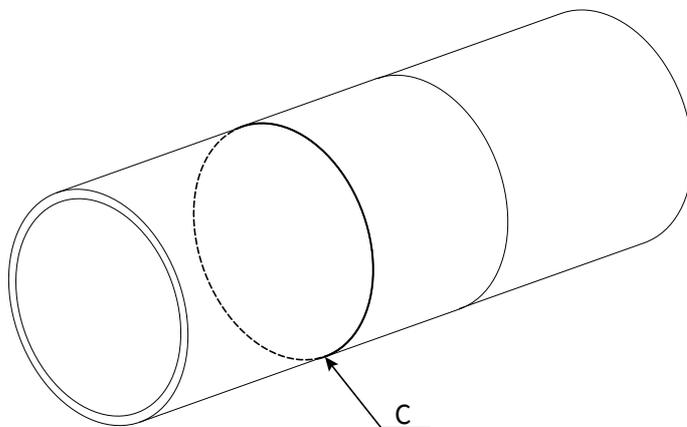
2) Remove the paper tape, cut it at the marked point and fold in half the portion corresponding to the circumference.

Then place the folded sheet on the top of the pipe.

The vertex of the sheet (point A) is the mounting position of the first transducer.
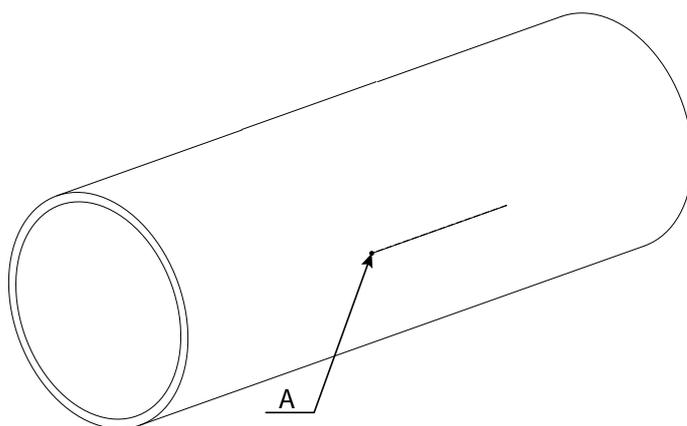
3) Identify the point "B" positioned at 180° degrees from point "A"
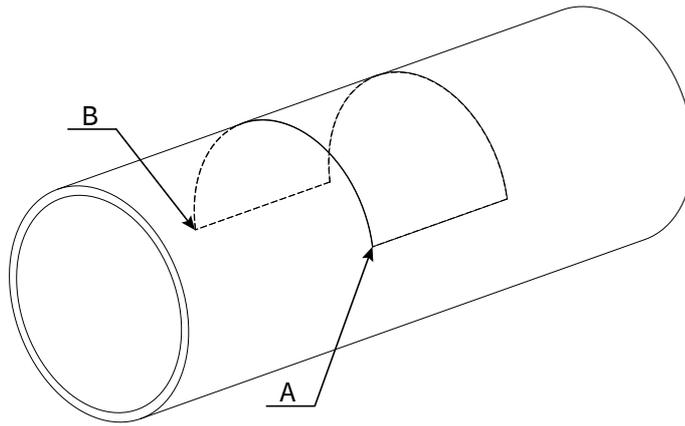
4) From point B draw the straight line "D" parallel to the pipe axis and equal to the value, showed in M25, previously calculated to identify point "E".
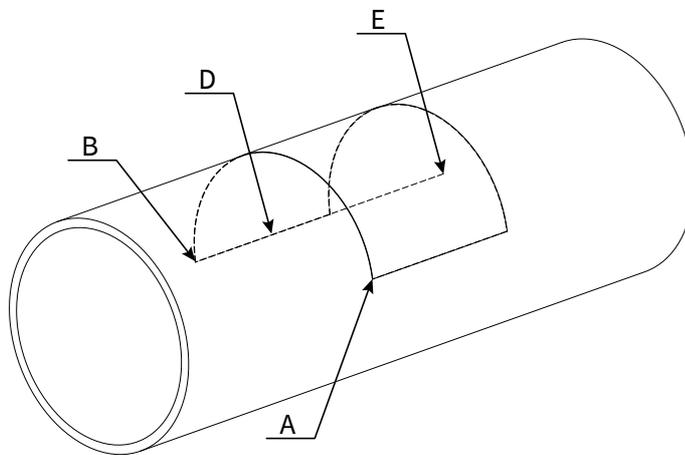
5) Points "A" and "E" are the mounting positions of the transducers.
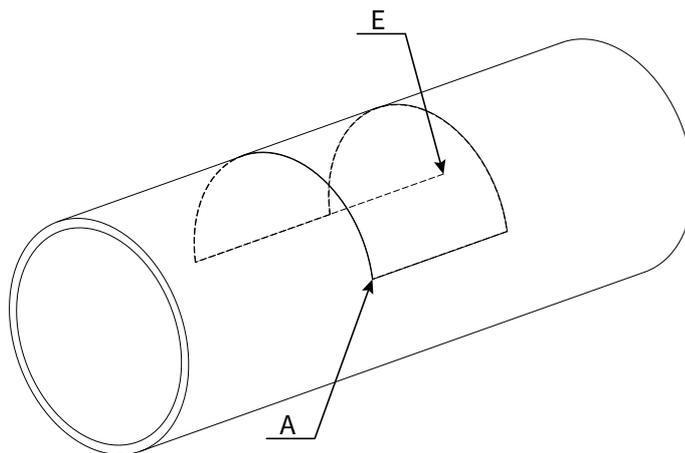
6.5.2 - V and W type positioning

For a correct transducers positioning, proceed as follows:

1) Identify point "A", which will be the mounting position of the first transducer.
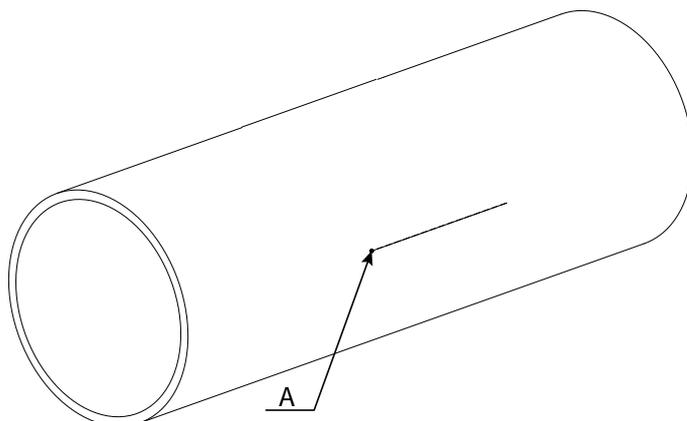
2) From point "A" draw a straight line "S" parallel to the pipe axis, and equal to the value, showed in M25, previously calculated to identify point "E".
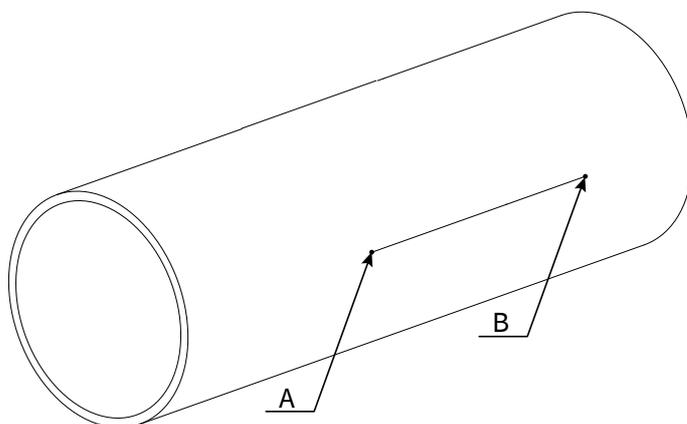
6.6 - PIPE SURFACE CLEANING

Clean the pipe surface with a sander, removing any trace of rust, paint, coating, pipe outer coating or else.
The treated area must be extended, according to the transducers model, at least as shown in the following table:
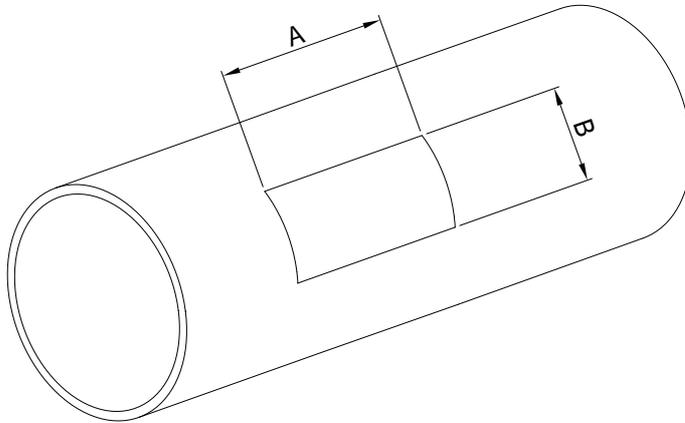
	TS-2	TM-1	TL-1
A	70mm	90mm	140mm
B	40mm	55mm	80mm

6.7 - CLAMP-ON TRANSDUCERS FIXING

1) On the transducer lower surface apply a thick layer of acoustic coupling grease.
2) Fix the transducer on the pipe surface at the transducer installation point, already cleaned.
3) Securely fasten the transducers on the pipe with the supplied steel hose clamps.

WARNING - do not overtighten in order to avoid damages to the transducers.

7-INSTALLATION

7.1 - MEASURING POINT SELECTION

The transducers must be mounted on a pipe section which allows to respect the minimum distance between the element of resistance to flow, such as curves or derivations, and the measuring point.
See the following table.

Flow resistance element	Upstream side	Downstream side
90° curves	15 x DN	5 x DN
T junction	40 x DN	5 x DN
Adaptors	18 x DN	5 x DN
Valves	40 x DN	5 x DN
Pumps	20 x DN	
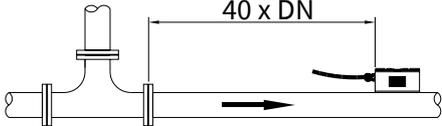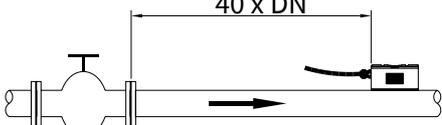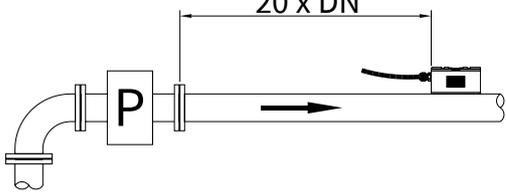
In the event that the minimum values shown in previous table 4 can not be met, it is necessary to adopt every precautions to mitigate the flow turbulence and improve the homogeneity of the flow velocity in the pipe.
One of the best device is the transducers upstream installation of a fluid threads rectifier, which allows to have a straight section length of the pipe less than indicated.

   The pipe where the transducers are placed must have the following characteristics:
   - smooth surface without rust or other surface deterioration;
   - circular cross section.

The ideal points for the transducer positioning are:
- hydraulic circuit lowest point (a);
- vertical pipes with the upward flow (b);
- inclined pipes with the upward flow (c);
- vertical open drain pipes with a section restriction to avoid sudden pipe emptying during flow measurement (d)
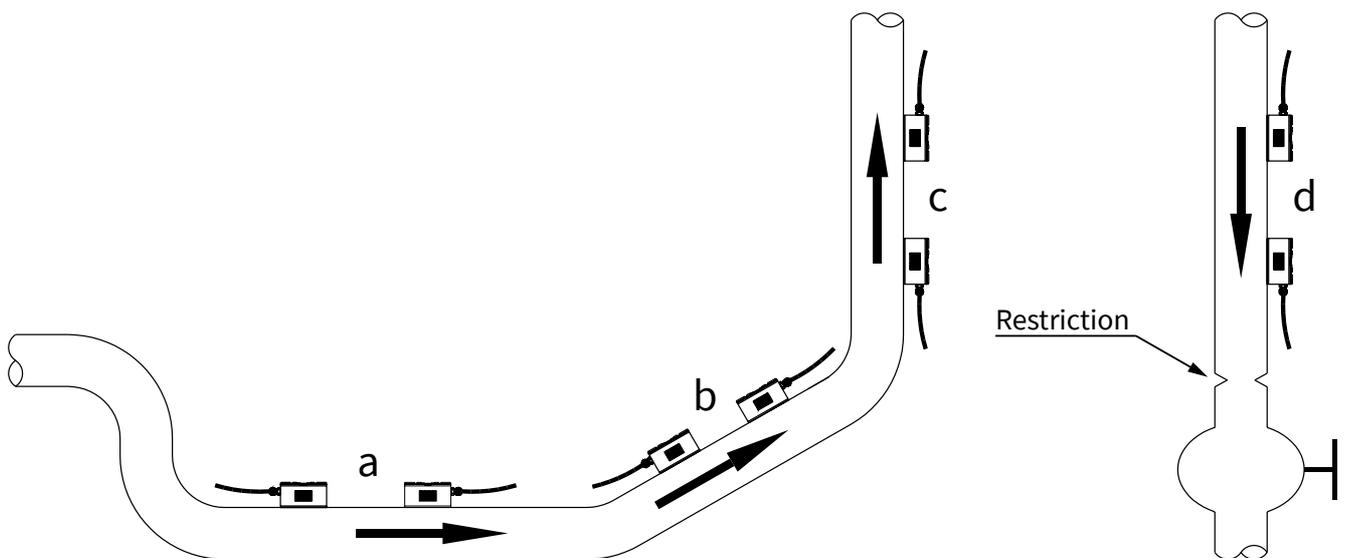
In the case of a horizontal pipe, the transducers positioning should be between ± 45 ° relative to the horizontal center line of the pipe.
This is to avoid that any air bubbles can interfere with the flow velocity detection, Furthermore, in the case of buried pipe must observe the following measures:
with insertion type transducers L>540mm; with clamp-on type transducers L>400mm.
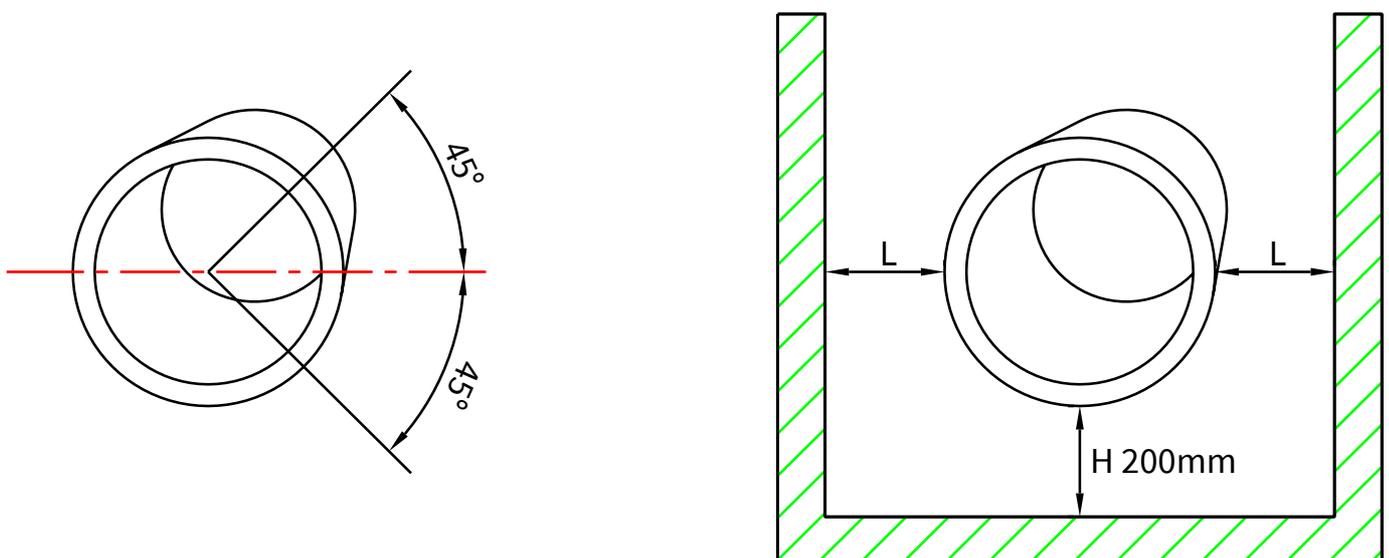
The transducers positioning points to be avoided are:
- vertical pipes with the downward flow, because they may not be completely filled with fluid.
- inclined pipes with the downward flow, because they may not be completely filled with fluid.
- the transducers must never be placed in the highest point of the concerned hydraulic circuit, because there is greater chance that in that pipeline section will create air pockets.
- vertical open drain pipes without a section restriction to avoid sudden pipe emptying during flow measurement.
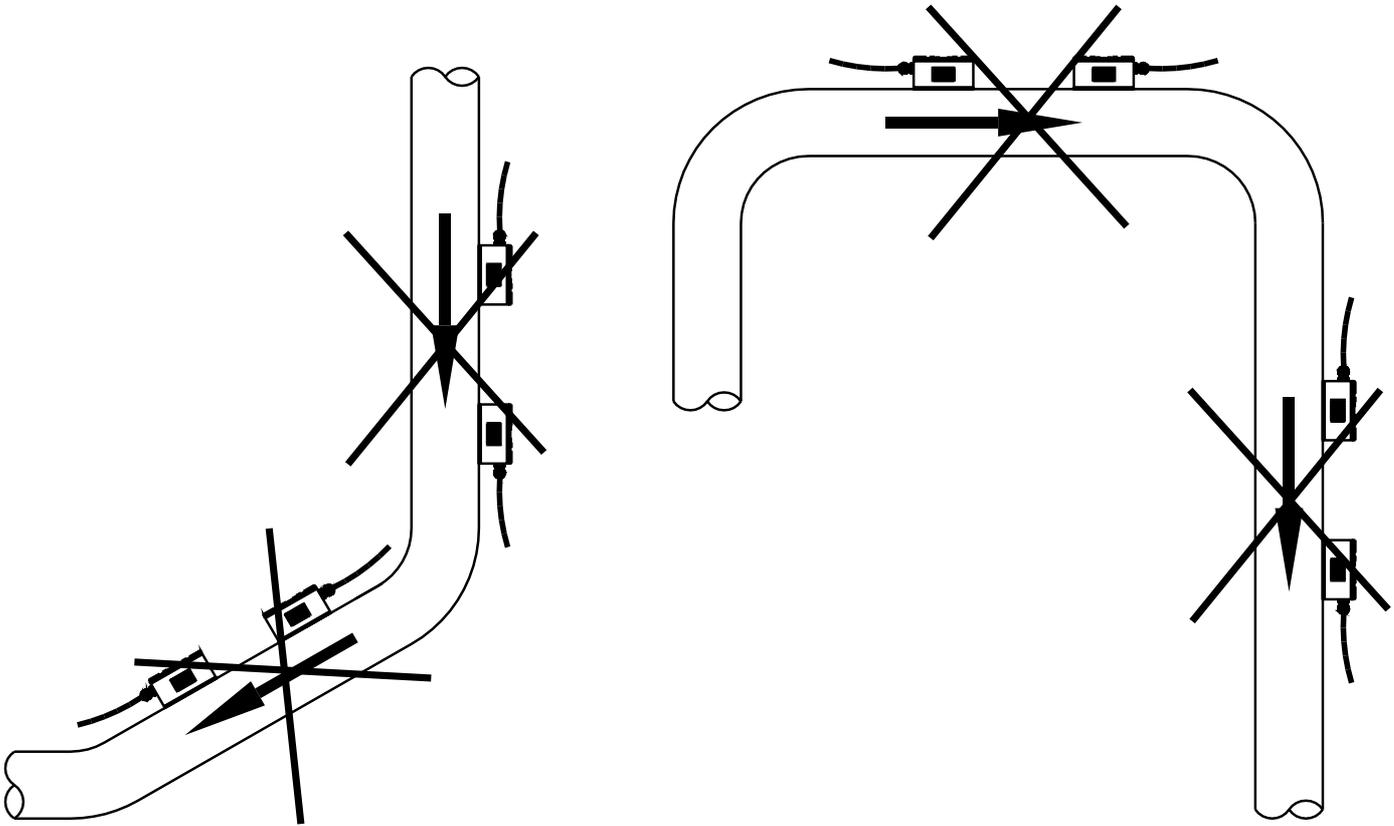
7.2 - POSITIONING DISTANCE

The value (calculated automatically by the system) shown in menu M25 refers to the "Lout" mounting distance between the two transducers, as shown in the following figures.
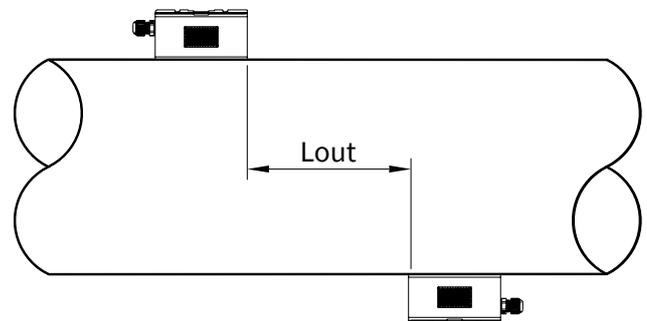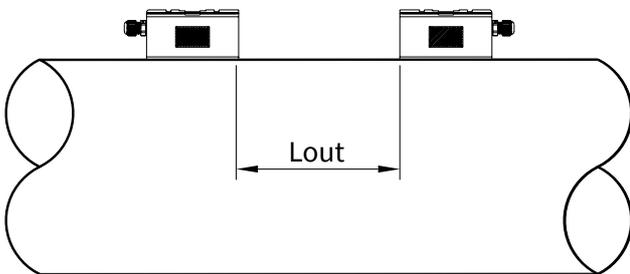
7.3 - V INSTALLING

Is the installation method for pipes with diameters in the DN50÷250 range.

Upstream
transducer

Downstream
transducer

Forward flow
direction
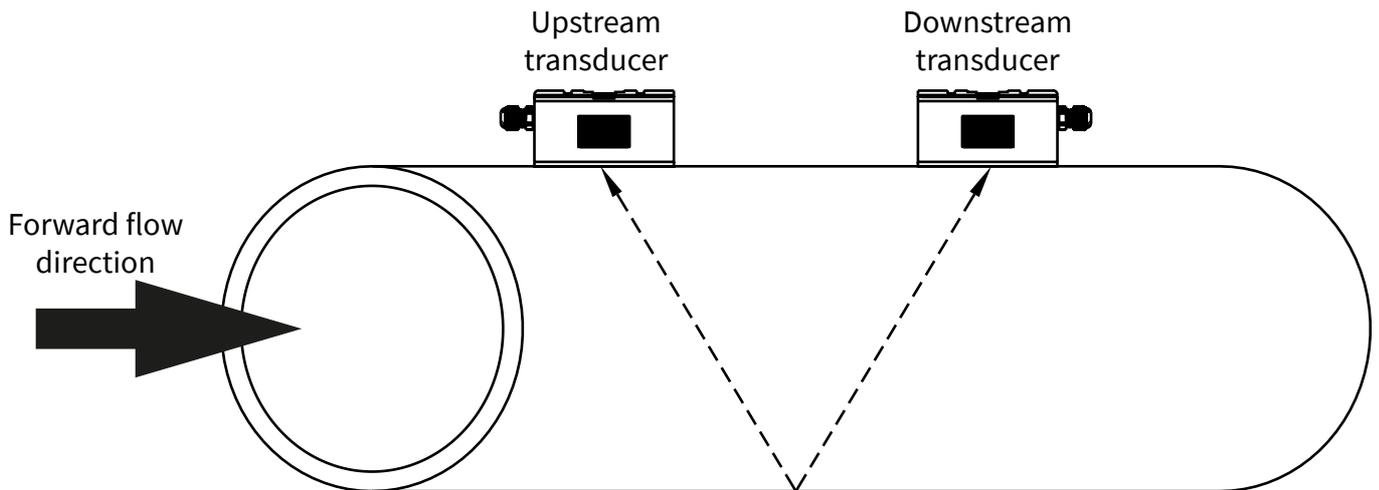
7.4 - Z INSTALLING

Is the installation method for pipes with diameters in the DN300÷4000 range.

Upstream
transducer

Forward flow
direction

Downstream
transducer
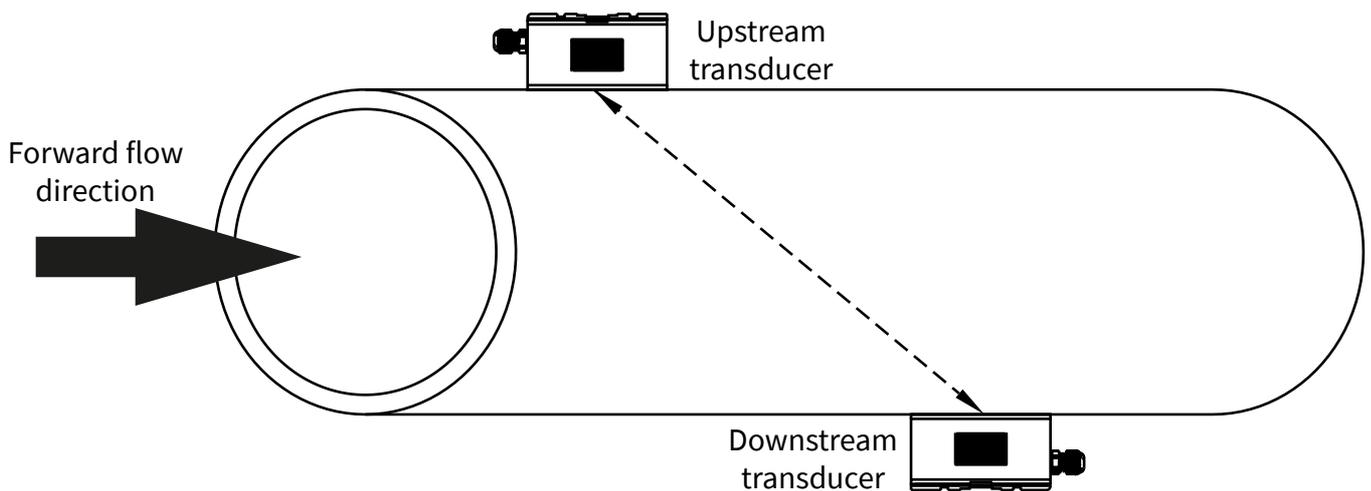
7.5 - W INSTALLING

Is the installation method for pipes with diameters in the DN20÷50 range.

Upstream
transducer

Downstream
transducer

Forward flow
direction
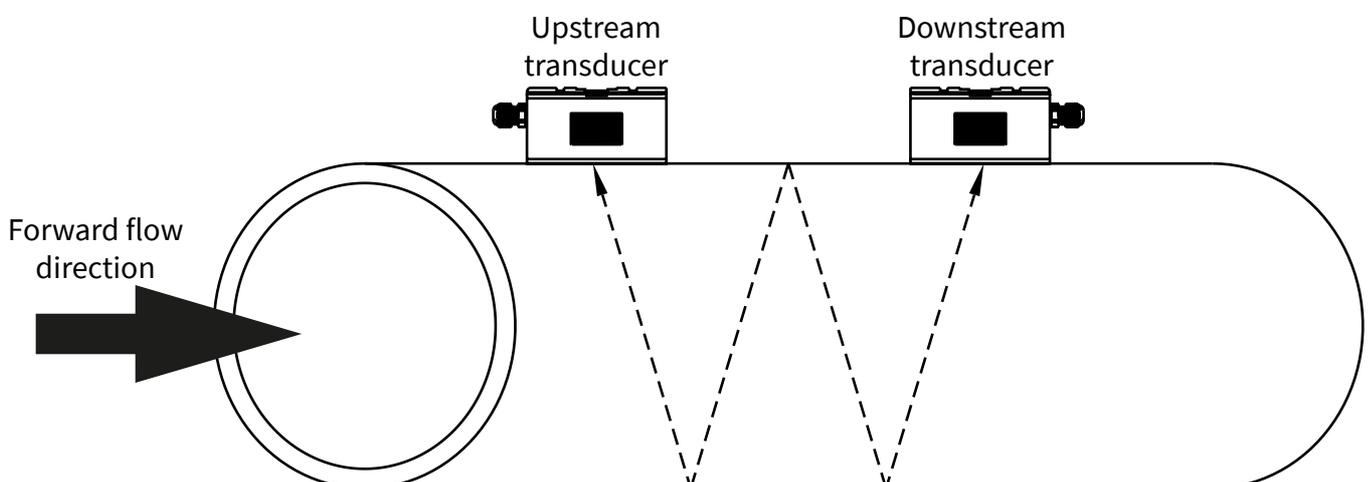
7.6 - INSERTION TRANSDUCER INSTALLATION

Steps required for proper installation:
1 - with encased pipe, check that there is the minimum space required for the transducers installation.
2 - with encased pipe, check that the free section length of the pipe is the minimum required.
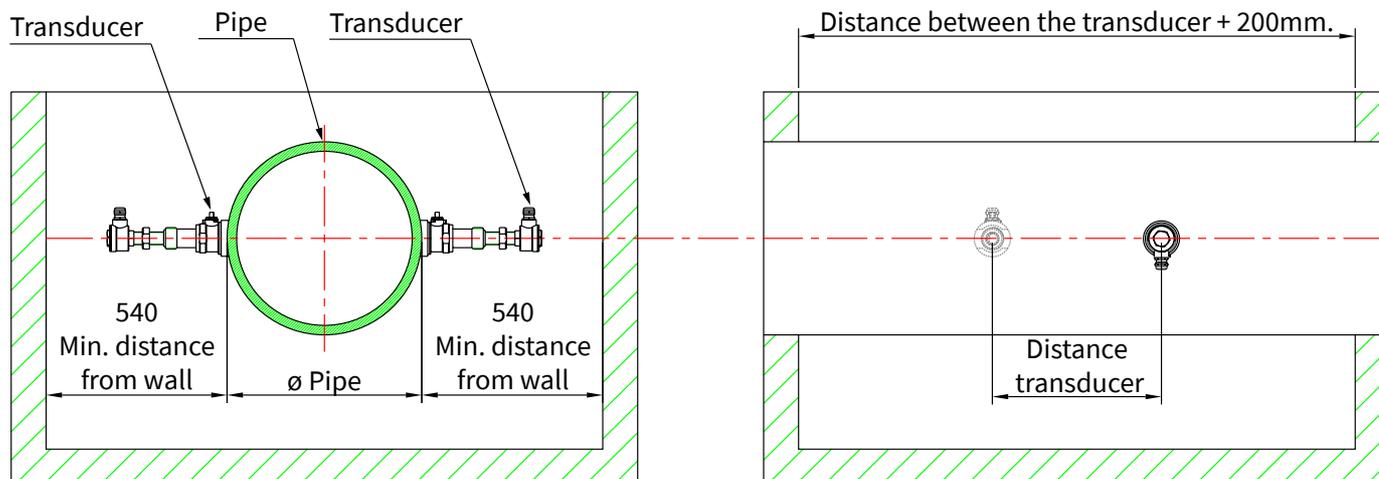
3 - Procuring the necessary equipment for drilling the pressure pipes .
4 - Set the pipe parameters: in the menu M23 choose the option 17 or 21 (TC-1 or TLC-2 insertion transducer);
   in the menu M24 choose 1. (Z installation) and in the menu M25 check the positioning distance.
5 - Determine the best location for installation on pipe.
6 - Installing the ball valve base.
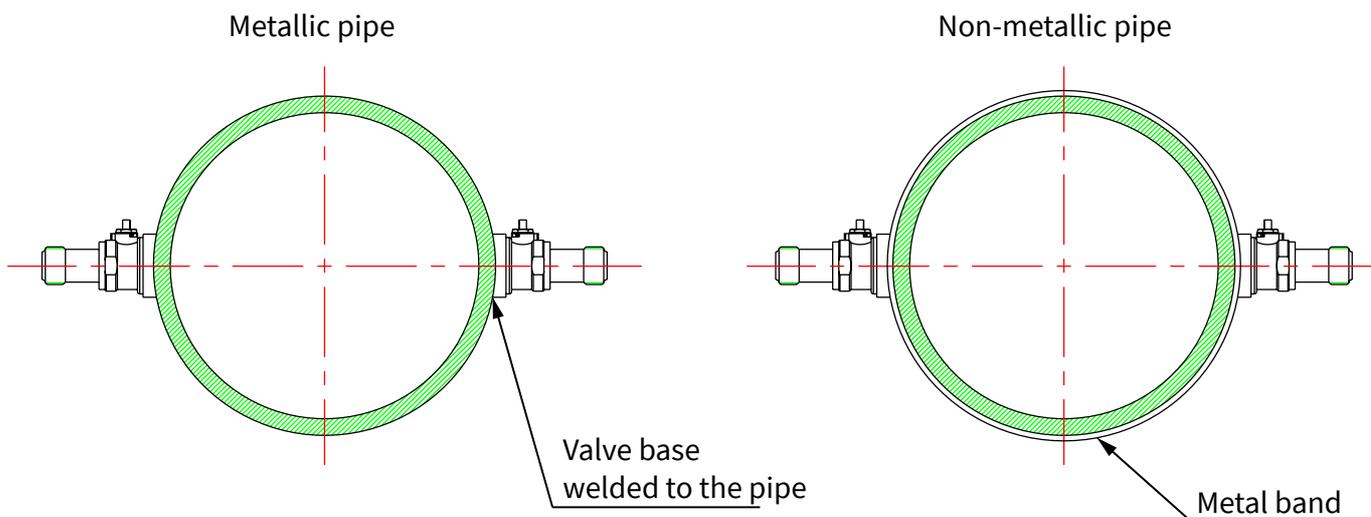
7.6.1 - Base valve Fixing
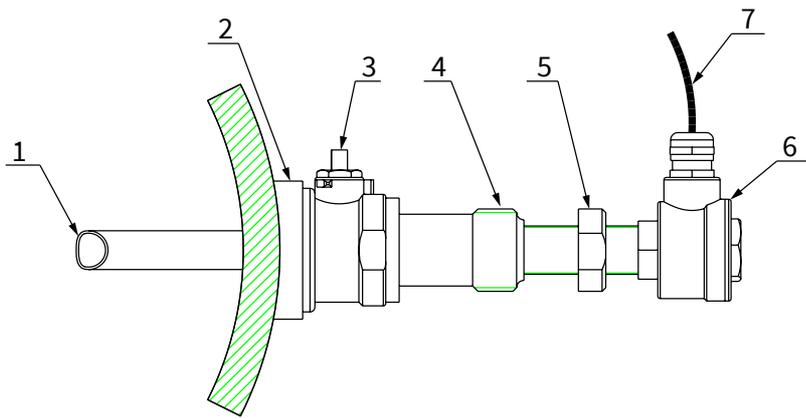
1. ultrasonic transducer signal emitter.
2. ball valve base.
3. ball valve.
4. male thread for drill.
5. sealing nut.
6. head with terminals for electrical connection.
7. connection cable.
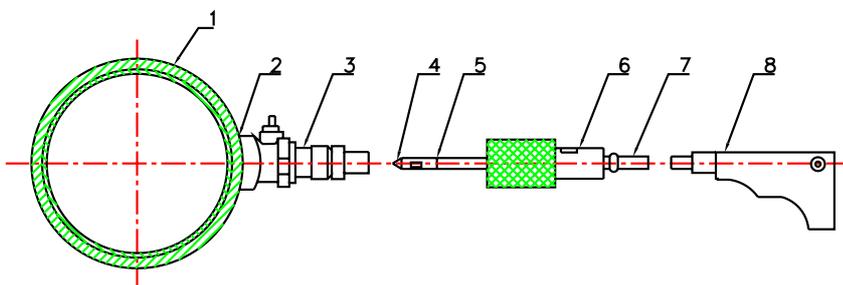
1. pipe.
2. ball valve base.
3. ball valve.
4. drill bit Ø19mm.
5. drill chuck.
6. seal gland.
7. drill rod.
8. power drill.

1. Weld or fix the valve base on the pipe.
2. Screw the ball valve and tighten to ensure the seal. The valve must be opened.
3. Insert the drill bit in the ball valve and tighten the seal gland on the male threads, so that there is no leakage. Fasten the power drill to rod.
4. Turn on the drill and drill pipe.
5. Unscrew the seal gland and slowly pull out the drill; as soon as possible, close the ball valve to avoid leakage.
   Use a meter, or a caliper to measure the A dimension.
   Slowly insert the transducer into the valve support and open the ball valve.
   Measure the distance "L" between the outer surface of the pipe and the upper part of the head of the transducer.
   L=A-pipe thickness.
   The transducer insertion will be installed properly when the C dimension will be equal to 0 (zero), ie when L=A-B.
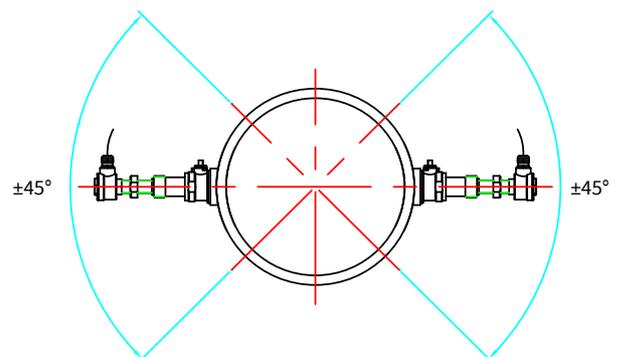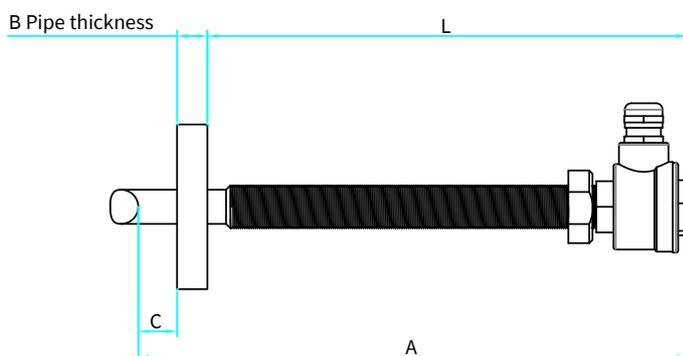
To check the transducers ultrasonic signal emitting orientation, check that:

1. The outputs cables of both transducers are oriented orthogonally to the pipe axis.
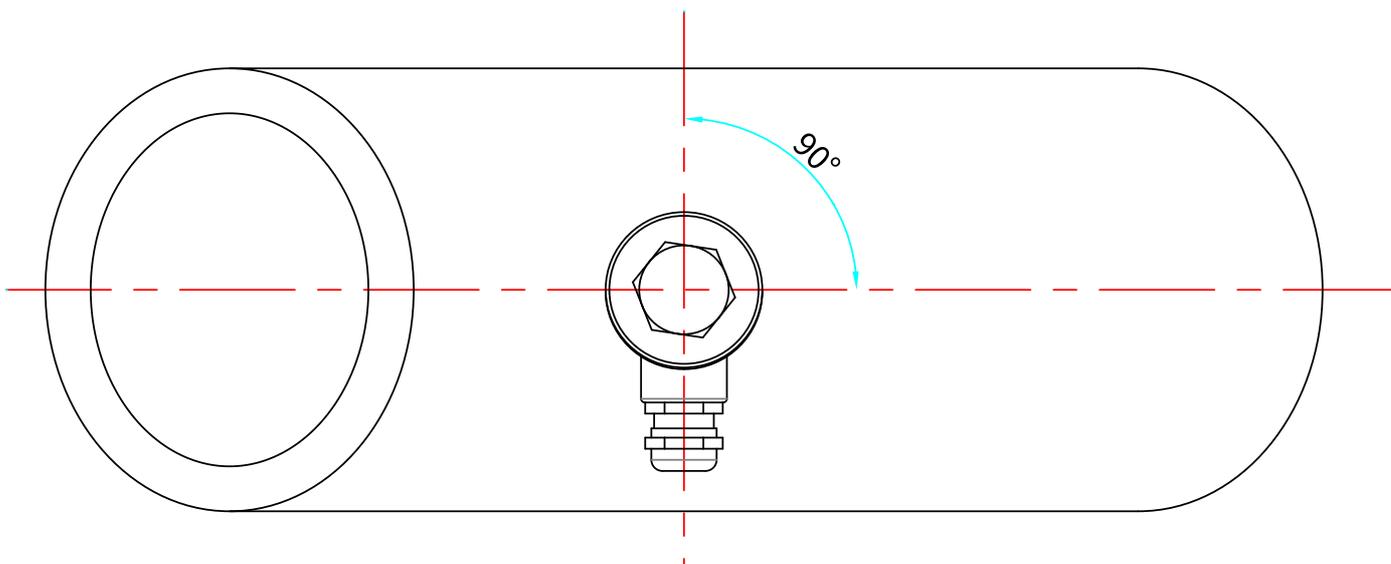
2. The outputs cable on the transducers have the same direction.
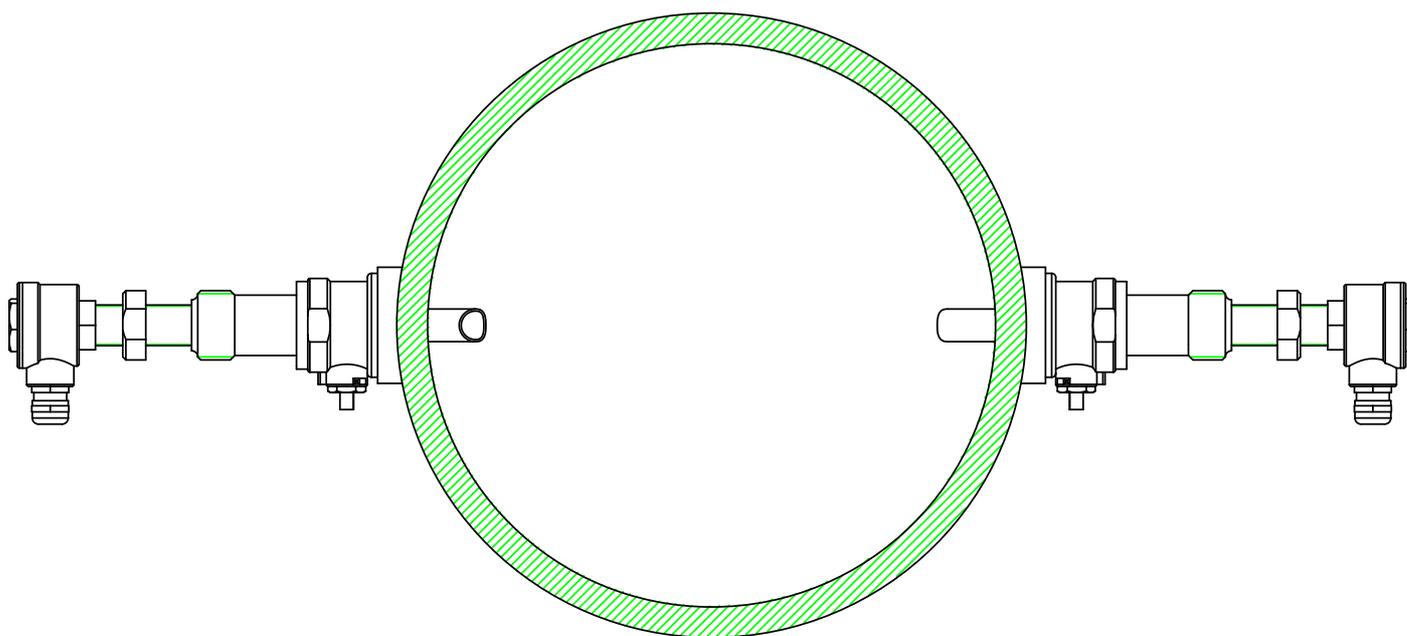
3. The inclined surfaces of the ultrasonic transducer signal emitter should be directed. towards each other.
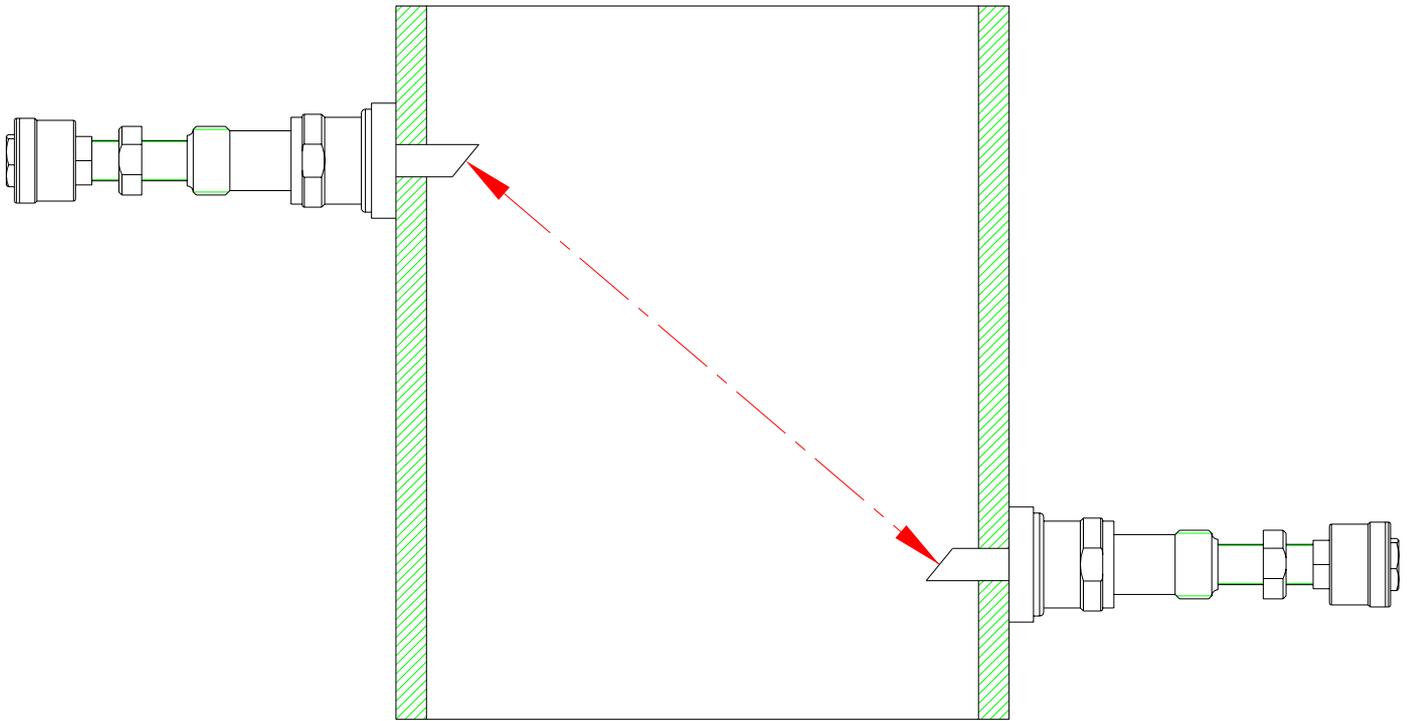
4. Proceed to the electrical connection.
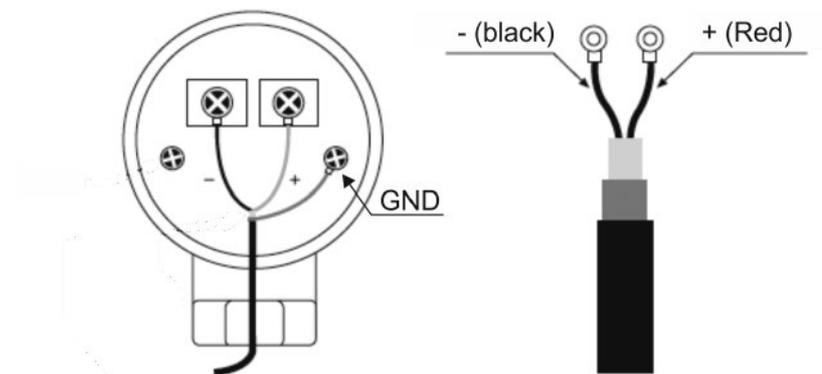
8-ELECTRICAL CONNECTIONS

8.1 - CONNECTIONS

1) Separate the engine control cables or power cables from the SGM-101F connection cables.
2) Remove the caps from the cable glands and open the cover by unscrewing the screws.
3) Lead the cables into the transmitter through the cable glands.
4) Close the cap and tighten the cable glands.
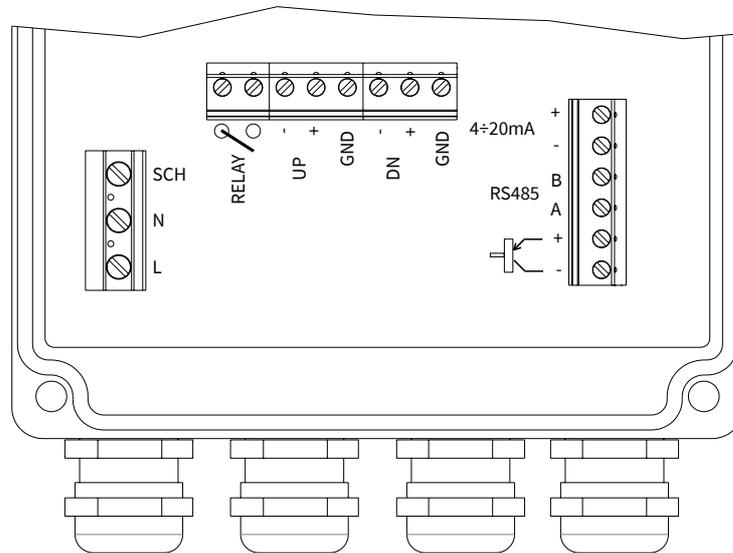
8.2 - POWER CONNECTION

8.2.1 - Supply voltages in AC

POWER
SUPPLY

L
N
GROUND
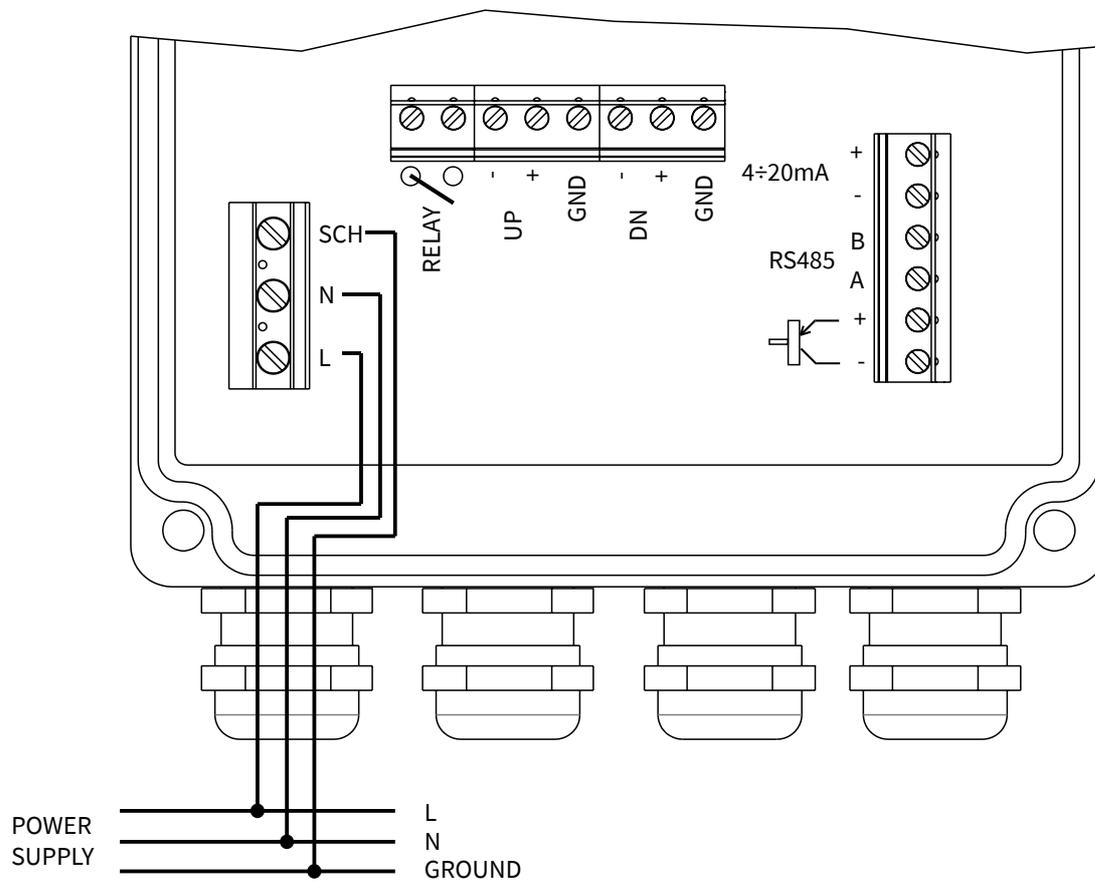
8.2.2 - Supply voltage in 10÷30Vdc
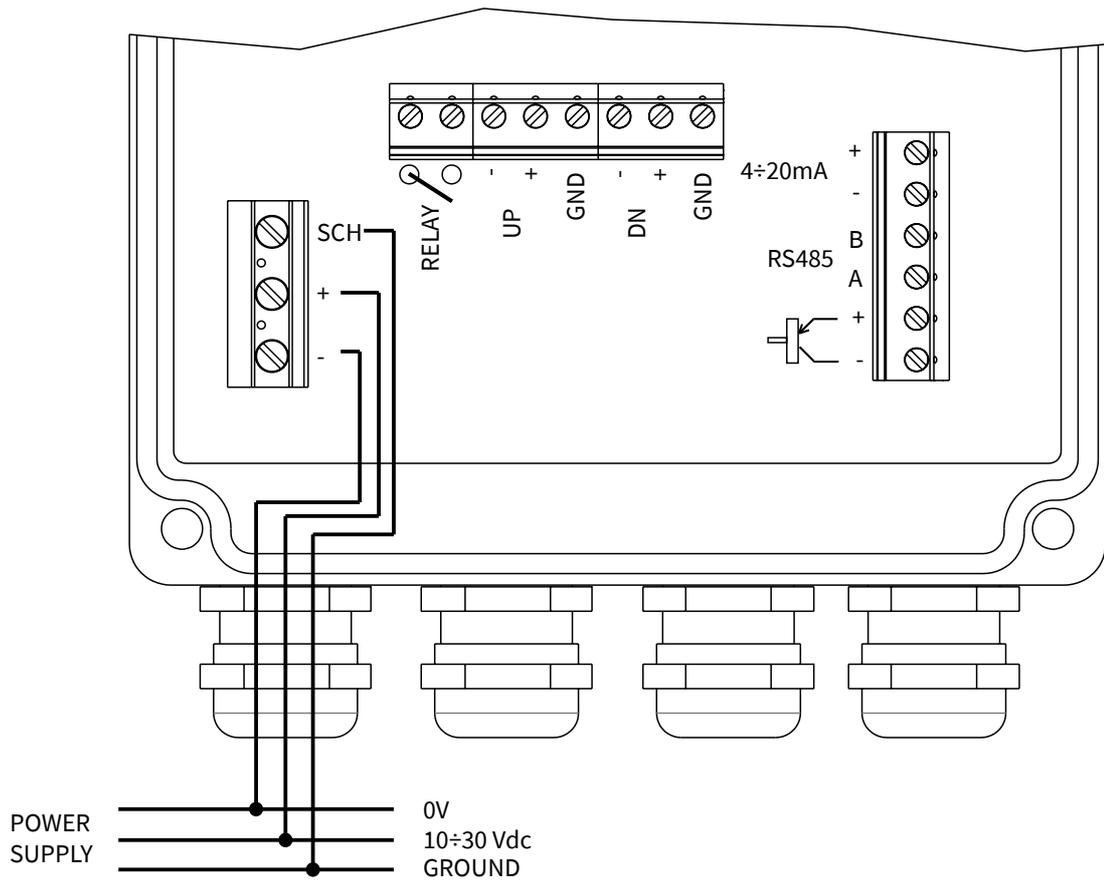
8.3 - TRANSDUCER CONNECTION
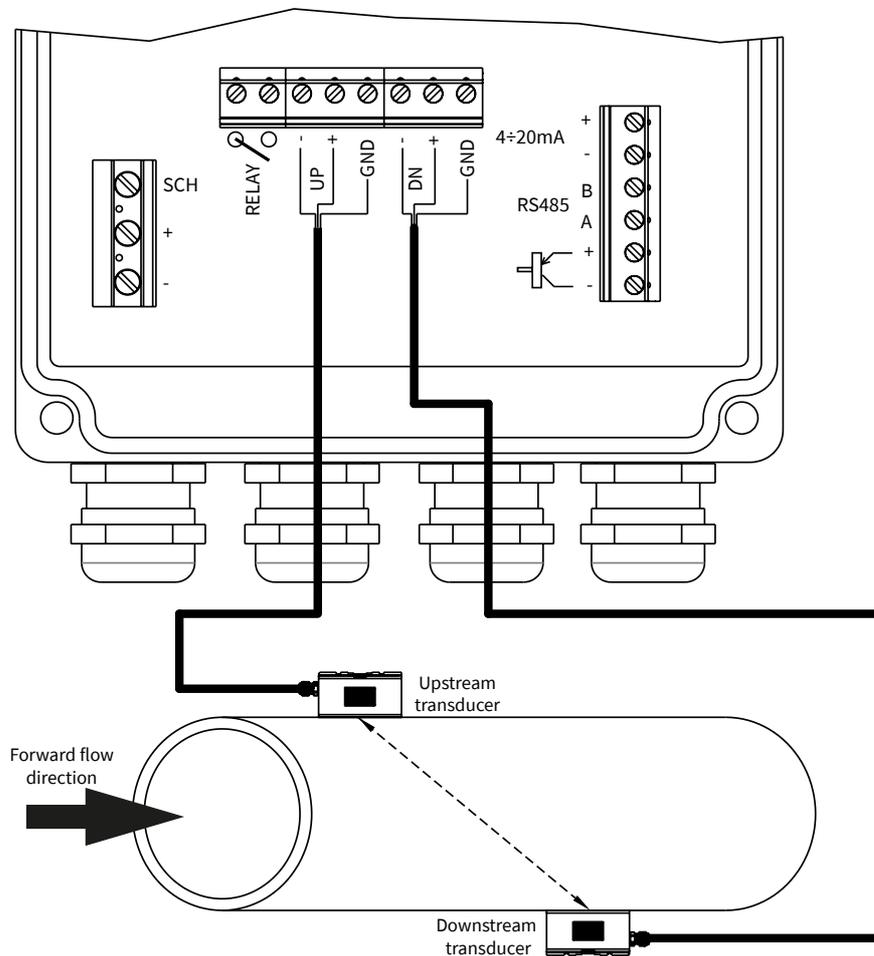
8.4 - OUTPUT SIGNALS CONNECTION

8.4.1 - Analog output

SLM2XH3
Totalizer +
Flow rate
4÷20mA input

8.4.2 - Pulse output

199-B1X
Pulse counter
Pulse input

Internal circuit

Programmable
pulse width (M54)
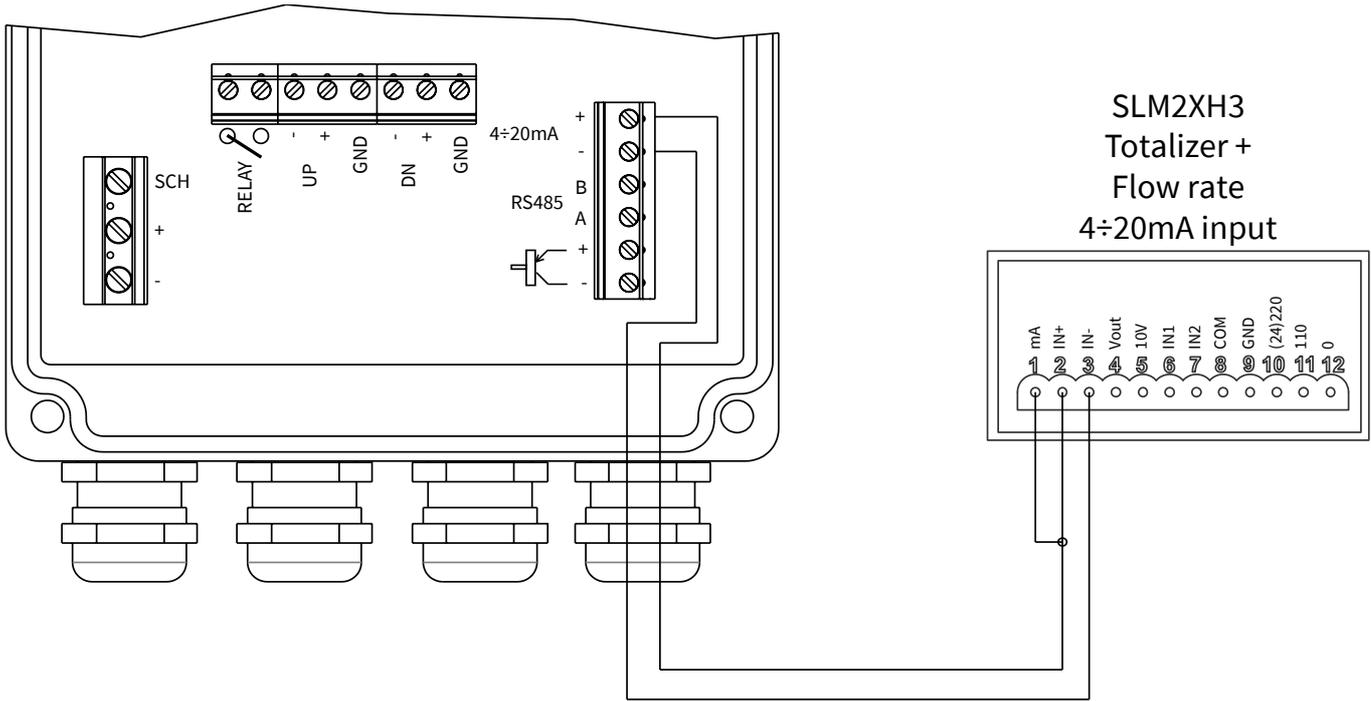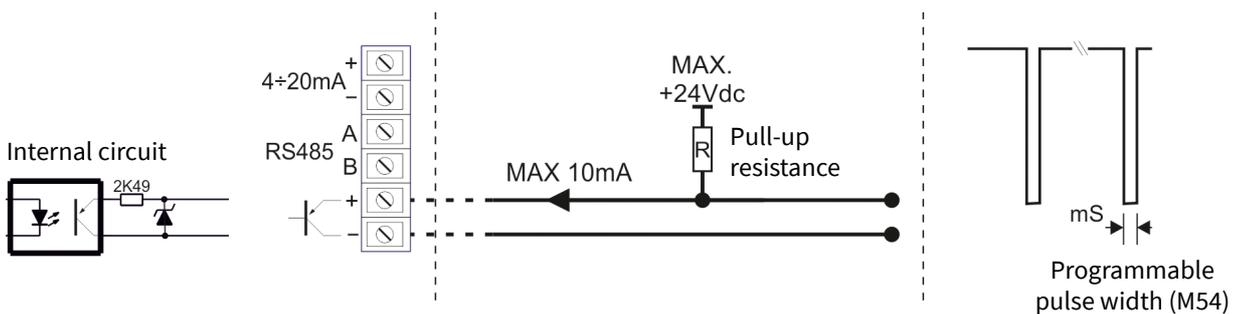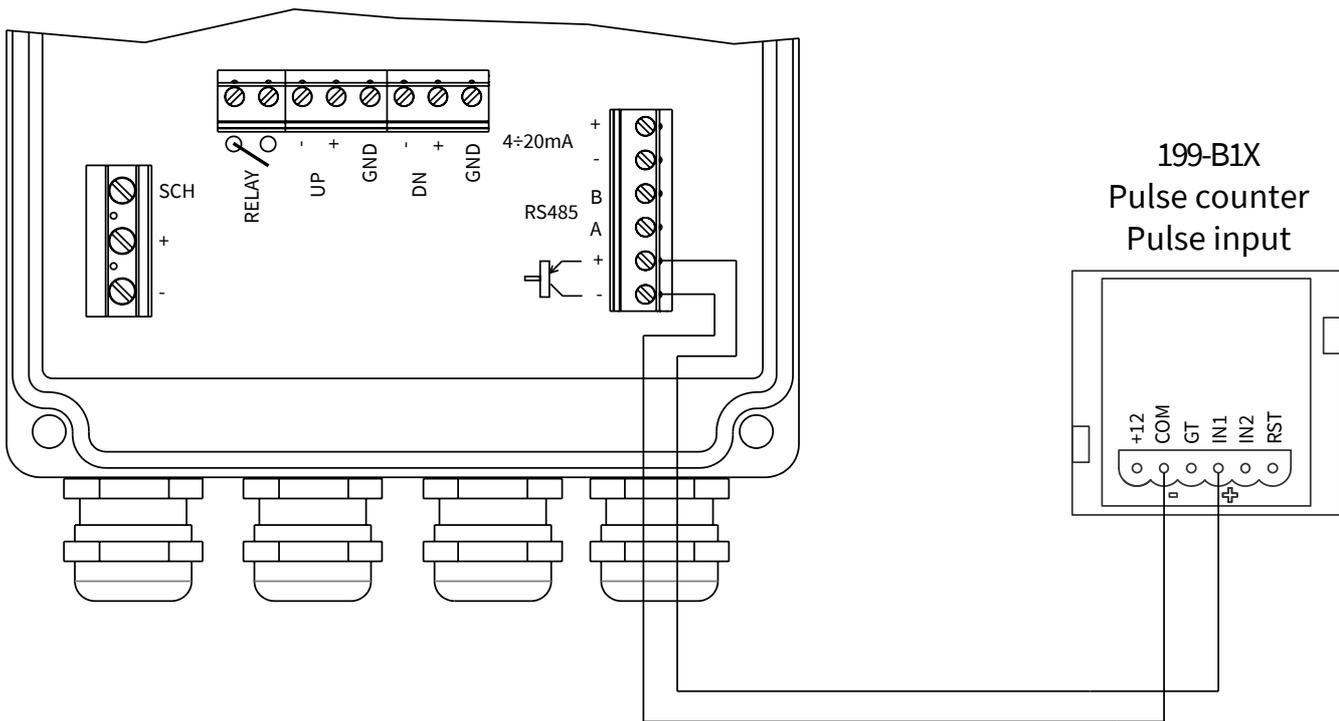
8.4.3 - MODBUS port
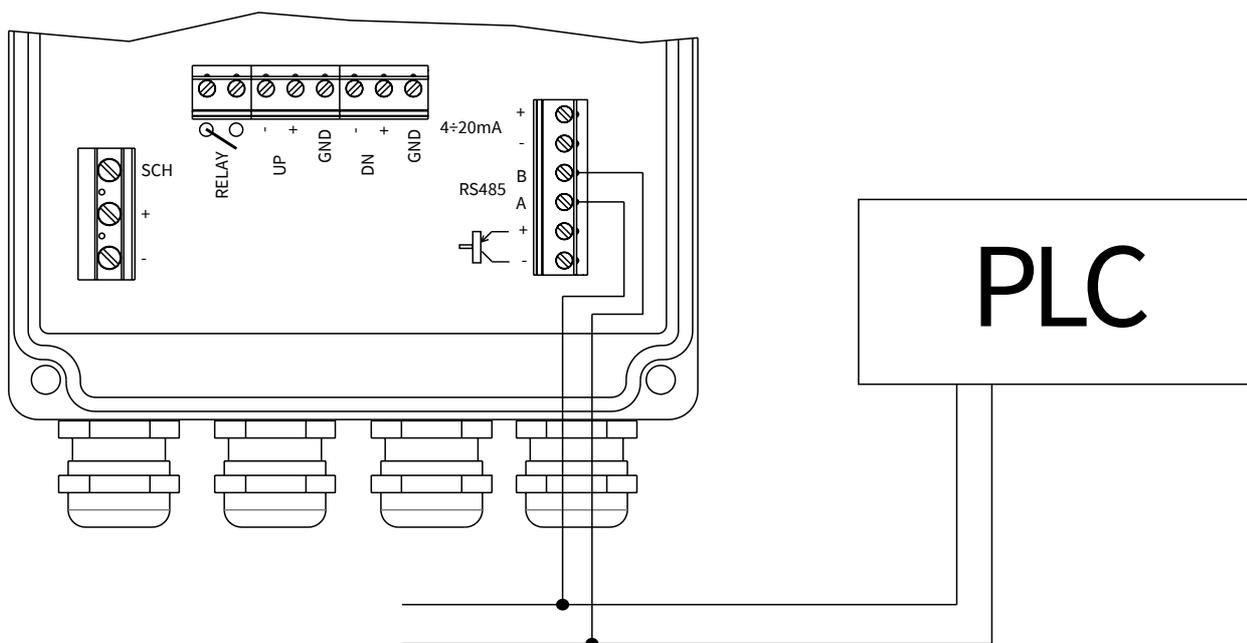
8.5 - HEAT METER PT100 CONNECTION

Cable connector

Pin 1	Blue
Pin 2	Brown
Pin 3	
Pin 4	Black
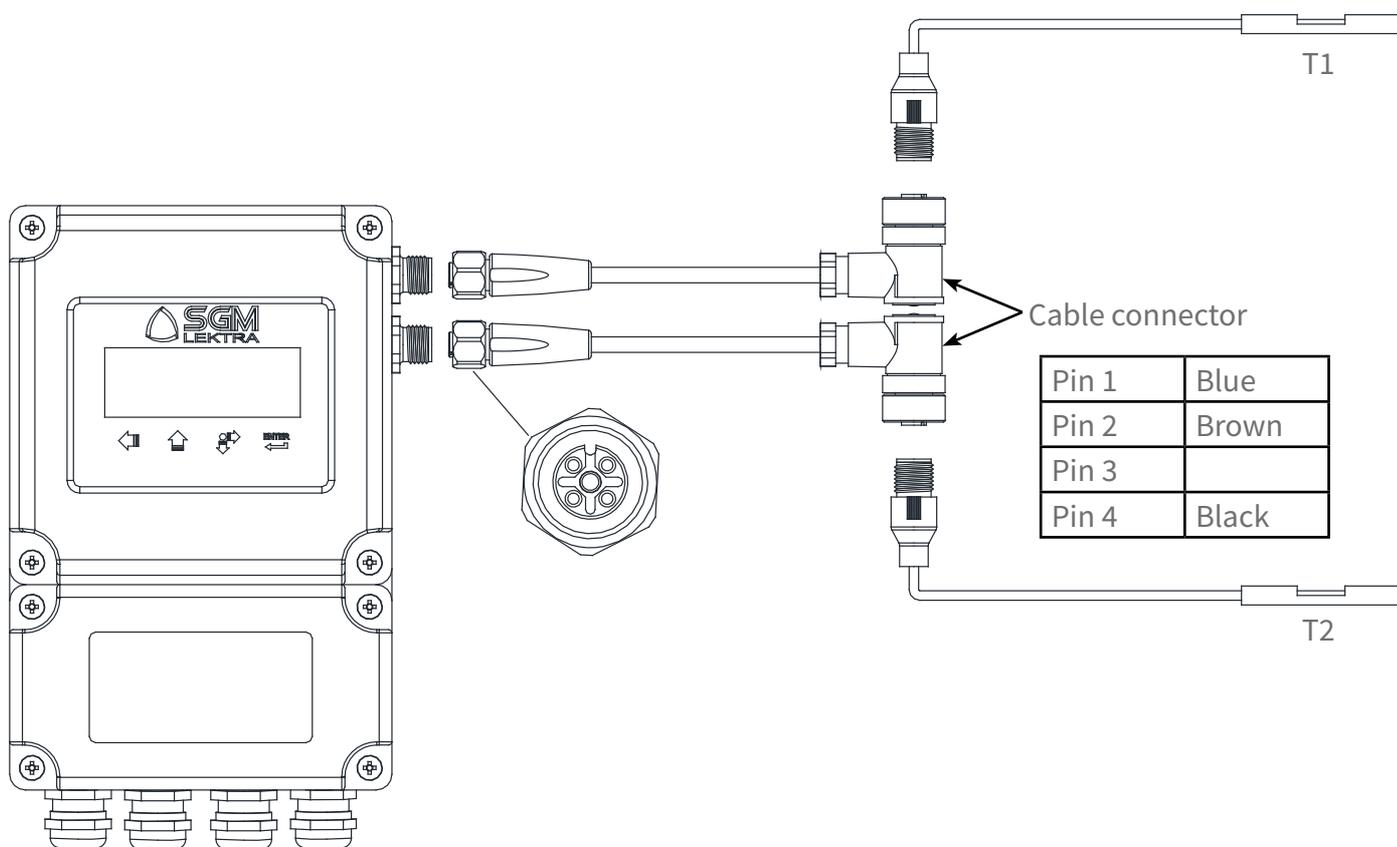
9-CONFIGURATION

9.1 - TURN ON THE DIGITAL CONVERTER

Before connection check the supply voltage.
When switched on, a program for self-diagnostic controls the hardware and the software.
In case of malfunction, an error message is displayed.
After checking, the system will display the last selected menu before turning off, for example, if the menu "02" was the last selected menu (from now on indicated with M02), the instantaneous flow rate and direct totalizer will be directly displayed.
During the sliding and/or displaying of the various windows menu, the measurement is not interrupted.
Only when the user sets the new pipe parameters (and each time the instrument is turned on), the SGM-101F initiates a check-up for the signal reception automatic optimization, that status will be displayed at the top right of the display, *R means normal status.
In case of re-positioning of the transducers, the instrument will automatically adjust the signal reception.
All configurations set by the user are stored in memory, but it's good to make sure that the menu M26, "Default Settings" is set to "1. SOLIDIFY SETTING".

9.2 - KEYBOARD

SGM-101F has 4 buttons:

Press (LEFT ARROW) to activate the programming or displaying menu direct selection.

Press (UP ARROW):
  - select to the previous menu (during normal menu displaying).
  - edit the selected digit (during menu programming or selecting).
  - select the previous option (during menu programming).

Press (SCROLL):
  - select the next menu (during normal menu displaying).
  - select the digit to the right (during menu programming or selecting).
  - select the next option (during menu programming).

Press (ENTER):
  - access to the programming menu (during the programming menu displaying).
  - confirms the entered or selected data (during the programming menu).

9.3 - MENUS

The menus are numbered from M00 to M99 and from M+0 to M+9.
There are two ways to select a menu:
1) Direct access, press "LEFT ARROW" followed by the number of the desired menu.
   For example, to select M11 (the pipe outer diameter) press in the order:
   "LEFT ARROW" (enables the menu direct selection), "UP ARROW" (edit the selected digit),
   "SCROLL" (select the digit to the right), "UP ARROW" (edit the selected digit), "ENTER" (confirms the entered data).
2) Search using "UP ARROW" or "SCROLL". Each time "UP ARROW" is pressed, will access to the previous menu
   (for example, to switch from M12 to M11), and each time "SCROLL" is pressed, will access to the next menu
   (for example, to switch from M11 to M12).

There are three menus types:
1) Programming menu with alphanumeric or numeric settings (eg. pipe outer diameter, M11).
2) Programming menu with option selection (eg. pipe material, M14).
3) Displaying menu (eg. instantaneous flow rate and forward flow totalizer, M02).

9.4 - PROGRAMMING MENU TABLE

M00	Instantaneous flow rate and total net displaying	**M53**	AL5 analog input displaying
M01	Instantaneous flow rate and velocity displaying	**M54**	OCT output pulse width programming
M02	Instantaneous flow rate and forward tot. displaying	**M55**	Analog output mode programming
M03	Instantaneous flow rate and reverse tot. displaying	**M56**	4mA (or 0mA) output programming
M04	Instantaneous flow rate with date and time displaying	**M57**	20mA output programming
M05	Heat meter totalizer displaying (for specific version only)	**M58**	Analog output simulation
M06	T1 and T2 displaying (Heat meter only)	**M59**	Analog output status displaying
M07	AL3 and AL4 analog input displaying	**M60**	System date and time programming
M08	Measurement status and error codes displaying	**M61**	SGM101-F info displaying
M09	Daily totalizer displaying	**M62**	Serial port configuration programming
M10	Pipe outer circumference programming	**M63**	Communication protocol programming
M11	Pipe outer diameter programming	**M64**	AL3 analog input programming
M12	Pipe thickness programming	**M65**	AL4 analog input programming
M13	Pipe inner diameter programming	**M66**	AL5 analog input programming
M14	Pipe material programming	**M67**	Frequency output range programming
M15	Pipe material sound velocity programming (*)	**M68**	Frequency output low flow rate programming
M16	Pipe inner lining material programming	**M69**	Frequency output high flow rate programming
M17	Inner lining material sound velocity programming (**)	**M70**	Backlight interval programming
M18	Pipe inner lining thickness programming	**M71**	LCD contrast programming
M19	Inner ABS thickness programming	**M72**	Operation time displaying
M20	Fluid type programming	**M73**	#1 Q min. alarm programming
M21	Fluid sound velocity programming (***)	**M74**	#1 Q max. alarm programming
M22	Fluid viscosity programming (***)	**M75**	#2 Q min. alarm programming
M23	Transducers type programming	**M76**	#2 Q max. alarm programming
M24	Transducers mounting method programming	**M77**	Buzzer operation programming
M25	Transducers mounting distance displaying	**M78**	OCT output programming
M26	Data storage mode programming	**M79**	Relay output programming
M27	Default settings library	**M80**	Batch output programming
M28	HOLD mode programming	**M81**	Batch volume programming
M29	Empty pipe condition threshold programming	**M82**	SGM-101F unit events displaying
M30	Measurement units standard programming	**M83**	Totalizers automatic correction Enabling
M31	Instantaneous flow rate unit programming	**M84**	Heat meter unit programming
M32	Totalizers unit programming	**M85**	Temperature sensor input programming
M33	Totalizers multiplier programming	**M86**	Specific heat programming
M34	Net totalizer activation programming	**M87**	Heat meter totalizer programming
M35	Forward totalizer activation programming	**M88**	Heat meter totalizer multiplier programming
M36	Reverse totalizer activation programming	**M89**	Temperature differential displaying
M37	Totalizers reset	**M90**	Transducers signal power and quality displaying
M38	Partial totalizer	**M91**	TOM/TOS % displaying
M39	Language menu programming	**M92**	Sound velocity in the fluid displaying
M40	Damping programming	**M93**	Flight time and delta T.
M41	Low flow cut-off programming	**M94**	Reynolds number displaying
M42	Zero flow automatic calibration	**M+0**	Date/time/flow displaying when the unit was power off
M43	Zero flow calibration reset	**M+1**	Total operating time displaying
M44	Zero flow manual calibration	**M+2**	Last power off date/time displaying
M45	Correction factor programming	**M+3**	Last measured flow rate displaying
M46	MODBUS network address programming	**M+4**	SGM-101F on/off times number displaying
M47	Protection password programming	**M+5**	Calculator and converter
M48	Calibration data programming	**M+6**	Velocity threshold programming
M49	MODBUS serial port test	**M+7**	Monthly totalizer displaying
M50	Data logger programming	**M+8**	Annual totalizer displaying
M51	Data logger timer programming	**M+9**	Echo absence error total time displaying (*H)
M52	Data transmission programming		

(*)   Available only with 9 option selected in **M15**
(**)   Available only with 11 option selected in **M16**
(***) Available only with 8 option selected in **M20**

9.5 - QUICK SETUP GUIDE

9.5.1 - How to evaluate if the instrument is working properly.

If in the display upper right, the 'R' letter is displayed, the instrument is working properly.
If the 'H' letter is flashing, it means poor signal input (refer to diagnostics chapter).
If the 'I' letter is displayed, it means no signal.
If the 'J' letter is displayed, it means that instrument hardware is not working properly (refer to troubleshooting chapter).

9.5.2 - How to detect the fluid flow direction.

1) Check that the instrument is working properly.
2) If the display shows a positive value, the flow direction is from the "UP" to the "DOWN" transducer;
   If the display shows a negative value, the flow direction is from the "DOWN" to the "UP" transducer.

9.5.3 - How to change the measurement units.

The default value is the Metric System:
1) Use the M30 menu to select the British system (in) for the pipe sizes, etc..
2) Use the M31 menu to select the instantaneous flow rate measurement unit.
3) Use the M32 menu to select the flow totalizer measurement unit.

9.5.4 - How to enable and disable the totalizers.

Use the M34, M35 and M36 menu to enable and disable the forward (POS), reverse (NEG) or net (NET) flow totalizer.

9.5.5 - How to reset the totalizers.

Use the M37 menu.

9.5.6 - How to use the delay time.

The delay time acts as a filter to make stable the measure. By setting "0" in the M40 menu, there is no filter.
The maximum setting is 9990sec, that refers to a response time of 9990 seconds.
The delay time is normally used 10s.

9.5.7 - How to use the low-cutoff.

The value shown in the M41 is called low-cutoff.
The instantaneous flow rate measurements to below the low-cutoff value will be displayed by the instrument with '0 '.
In this way is avoided the invalid values accumulation.

9.5.8 - How to calibrate the zero flow rate.

Make sure that the flow has stopped completely and enter the menu M42 for the calibration.

9.5.9 - How to change the correction factor (Scale Factor).

The correction factor is the ratio between the actual flow and the value indicated by the instrument.
The value is obtained during testing at our headquarters, by comparing the master flow measurement with the SGM-101F unit flow measurement. For any changes, go to M45.

9.5.10 - How to enable protection password.

The protection password prevents accidental configuration data changes.
Unlocking is possible by pressing the "ENTER" key and entering the password.
To set the password to access the M47 menu.

9.5.11 - **How to use the integrated data logger.**

Use the menu M50 to activate the data logger and to select items.
Use the menu M51 to set the start time, interval time and the recordings number.
Use the menu M52 for sending data. The default setting is sending data via RS485.

9.5.12 - **How to use the frequency output.**

The output frequency signal represents the instantaneous flow rate value and is used for connection with other instruments.
The frequency output is fully configurable by the user.
Enter the minimum flow in the "M68" menu, the maximum flow rate in the "M69" and the two of the frequency range values in the M67".
For example, assuming that the the instantaneous flow rate varies from 0m3 to 3000m3/h, and the output signal has 1000Hz maximum frequency and 200Hz minimum frequency, as required by the instrumentation connected
to the SGM-101F.
The user must enter 0 in "M68", 3000 in "M69", 200 and 1000 in "M67".
The user must select the 24 option in the M78 menu (OCT Output Setup) to direct the output frequency to the OCT.

9.5.13 - **How to use the pulse output, totalizer repetition.**

The totalized volume can be sent as an output pulse. The totalizer will generate one pulse per volume unit.
The pulse totalizer can be generated by the OCT, relays or BUZZER hardware devices.
For example: configure the forward flow pulse output (POS), where each pulse corresponds to 0.1 cubic meters of flow, the pulse output will be configured with the OCT output so that, for every 0.1 cubic meter of volume, OCT emits a pulse.
Will need the following steps:
1) Select "Cubic Meter" in the M32 menu.
2) Select "2. X0.1" in the M33 menu.
3) Select "9. POS Int Pulse" in the M78 menu.

9.5.14 - **How to set the alarm signals.**

There are three different types of hardware available to transmit the alarm signal: sonorous, OCT output (Open Collector) or relay output.
The sources that generate an alarm are:
1) No signal.
2) Poor signal.
3) Instrument is not in measurement mode.
4) Reverse flow.
5) Frequency output over-range.
6) Flow out of range.

In addition there are two flow range alarm: the #1 alarm and #2 alarm; the flow range can be configured by the user via the M73, M74, M75, M76.
For example, set the relay to emit an alarm signal when the flow rate is less than 300 m3/h, or is higher than 2000 m3/h.
Will need the following steps:

1) Set 300 in M73 for #1 alarm (insufficient flow).
2) Set 2000 in M74 for #1 alarm (excessive flow).
3) Select option "6" (ALARM #1) in M79.

9.5.15 - How to use acoustic alarms (Buzzer).

    The Integrated Buzzer is user settable. Can be used as an alarm.
    M77 for setting.

9.5.16 - How to use the OCT output (Open Collector).

    The OCT output is user settable via M78.

9.5.17 - How to change the internal calendar.

    If it is necessary to change the calendar, use M60.

9.5.18 - How to adjust the LCD contrast.

    Use M71. The change will be saved in EEPROM.

9.5.19 - How to set the RS485 serial interface.

    Use M62 for setting.

9.5.20 - How to display the partial totalizers.

    Use M82 to display the partial totalizer (daily, monthly or yearly).

9.5.21 - How to use the manual totalizer.

    Use M38, then press "ENTER" to start and stop the totalizer.

9.5.22 - How to check the ESN and other minor details.

    The ESN is an 8-digit code that identifies the product, the version and the manufacture date.
    The user can use the ESN also for the instrumentation management.
    Can be found in M61.
    Other details of the instrument are the total working time (displayed in M+1) and the turn-on time (displayed in M+4).

9.6 - STORING CHANGE SETTING

To store the setting go to the M26 menu and proceed as follows:

 1) Press "ENTER".
 2) Select option "1".
 3) To confirm, press "ENTER".

N.B. Do this procedure after each parameter programming change.

10-PROGRAMMING MENU

10.0 - M00 - Instantaneous flow rate and total net displaying

Displaying only.
The display shows the instantaneous flow rate and net totalizer value.
The "*R" symbol indicates that the transducers echo signal quality is good;
The "*H" symbol indicates that the transducers echo signal quality is insufficient to ensure the correct flow measurement.

```
Flow.  25.36 m3/h  *R
NET.    24780x1  m3
```

10.1 - M01 - Instantaneous flow rate and velocity displaying

Displaying only. The display shows the instantaneous flow rate and the fluid velocity value in the pipe.

```
Flow.  25.36 m3/h  *R
Vel.   1.6841x1  m/s
```

10.2 - M02 - Instantaneous flow rate and forward tot. displaying

Displaying only. The display shows the instantaneous flow rate and forward totalizer (POS) value.

```
Flow.  25.36 m3/h  *R
POS.    32562x1  m3
```

10.3 - M03 - Instantaneous flow rate and reverse tot. displaying

Displaying only. The display shows the instantaneous flow rate and reverse totalizer (NEG) value.

```
Flow  25.36 m3/h  *R
NEG.   7782x1  m3
```

10.4 - M04 - Instantaneous flow rate with date and time displaying

Displaying only. The display shows the instantaneous flow rate value and the date (year-month-day) and time (hours: minutes: seconds).

```
14-04-26   15:43:15   *R
Flow    25.36   m3/h
```

10.5 - M05 - Heat meter totalizer displaying (for specific version only)

Displaying only. The display shows the energy flow and Heat meter totalizer value.

```
EFR  2.2450   GJ/h  *R
E.T.          12E+0 GJ
```

10.6 - M06 - T1 and T2 displaying (Heat meter only)

Displaying only. The display shows the T1 and T2 inputs.

```
T1= 32.812C,   112.76
T2= 32.812C,   112.76
```

10.7 - M07 - AL3 and AL4 analog input displaying

NOT AVAILABLE.

```
AI3=   0.0152,   0.0729
AI4=   0.0152,   0.0729
```

10.8 - M08 - Measurement status and error codes displaying

Displaying only. The display shows the system codes and messages.
A summary codes table is on page 55.

```
*H-------------------H--
Poor Signal Detected
```

10.9 - M09 - Daily totalizer displaying

Displaying only. The display shows the daily flow totalizer.

```
Net Flow Today  M09
       592 m3
```

10.10 - M10 - Pipe outer circumference programming

The display shows the previously set value. By entering a new value, the system will automatically calculate the pipe outer diameter new value (M11).

```
Pipe  Outer  Perimeter
        314.159 mm
```

10.11 - M11 - Pipe outer diameter programming

The display shows the previously set value.
By entering a new value, the system will automatically calculate the pipe outer circumference new value (M10).

```
┌─────────────────────────────┐
│ Pipe  Outer  Diameter       │
│                    100 mm   │
└─────────────────────────────┘
```

10.12 - M12 - Pipe thickness programming

The display shows the previously set value.
By entering a new value, the system will automatically calculate the pipe inner diameter new value (M13).

```
┌─────────────────────────────┐
│ Pipe  Wall  Thickness       │
│                    2 mm     │
└─────────────────────────────┘
```

10.13 - M13 - Pipe inner diameter programming

The display shows the previously set value. By entering a new value, the system will automatically calculate the pipe thickness new value (M12).

```
┌─────────────────────────────┐
│ Pipe  Inner  Diameter       │
│                    96 mm    │
└─────────────────────────────┘
```

10.14 - M14 - Pipe material programming

The display shows the previous setting.
The available materials are:

     0. Carbon Steel
     1. Stainless Steel
     2. Cast Iron
     3. Ductile Iron
     4. Copper
     5. PVC (Plastics in general)
     6. Aluminium
     7. Asbestos
     8. Fiberglass-Epoxy
     9. Other (the 9 option actives M15 for the sound speed in the pipe material)

```
┌─────────────────────────────┐
│ Pipe Material               │
│   1. Stainless Steel        │
└─────────────────────────────┘
```

10.15 - M15 - Pipe material sound velocity programming (*)

The display shows the previously set value.
(*) Available only with 9 option selected in M14.

```
┌─────────────────────────────┐
│ Pipe  Sound  Velocity       │
│                    3604 m/s │
└─────────────────────────────┘
```

10.16 - M16 - Pipe inner lining material programming

The display shows the previous setting.
The available materials are:

     0. None, No Liner
     1. Tar Epoxy
     2. Rubber
     3. Mortar
     4. Polypropylene
     5. Polystyrol
     6. Polystyrene
     7. Polyester
     8. Polyethylene
     9. Ebonite
     10. Teflon
     11. Other (the 11 option actives M17 for the sound speed in the lining material)

```
┌─────────────────────────────┐
│ Linear  Material            │
│   10. Teflon                │
└─────────────────────────────┘
```

10.17 - M17 - Inner lining material sound velocity progr. (**)

The display shows the previously set value.
(**) Available only with 11 option selected in M16.

```
Liner  Sound  Velocity
          2505 m/s
```

10.18 - M18 - Pipe inner lining thickness programming

The display shows the previously set value.

```
Liner Thickness
              10 mm
```

10.19 - M19 - Inner ABS thickness programming

The display shows the previously set value.

```
Inside  ABS  Thickness
              0
```

10.20 - M20 - Fluid type programming

The display shows the previous setting.
The available fluids are:
  0. Water (general)
  1. Sea Water
  2. Kerosene
  3. Gasoline
  4. Fuel Oil
  5. Crude Oil
  6. Propane (-45°C)
  7. Butane (0°C)
  8. Other Liquid (the 8 option actives M21 for the sound speed in the fluid)
  9. Diesel Oil
  10. Castor Oil
  11. Peanut Oil
  12. Gasoline #90
  13. Gasoline #93
  14. Alcohol
  15. Water (125°C)

```
Fluid  Type
  0. Water (General)
```

10.21 - M21 - Fluid sound velocity programming (***)

The display shows the previously set value.
(***) Available only with 8 option selected in M20.

```
Fluid  Sound  Velocity
          2720 m/s
```

10.22 - M22 - Fluid viscosity programming (***)

The display shows the previously set value.
(***) Available only with 8 option selected in M20.

```
Fluid  Viscosity
          1.0038 cST
```

10.23 - M23 - Transducers type programming

The display shows the previous setting.
The available models are (catalog models highlighted in bold):
0.   Standard-M
1.   Insertion Type C
2.   Standard-S
3.   User Type (some additional menus are activated for the
      non-standard transducers characteristics when 3 option is selected)
4.   Standard-B
5.   Insertion B(45)
6.   Standard-L
7.   JH-Polysonics
8.   Standard-HS
9.   Standard-HM
10.   Standard-M1
11.   Standard-S1
12.   Standard-L1
13.   PI-Type
14.   FS410 (FUJI)
15.   FS510 (FUJI)
16.   Clamp-on TM-1 (see features on page 8)
17.   Insertion TC-1 (see features on page 9)
18.   Clamp-on TS-1
19.   Clamp-on TS-2 (see features on page 7)
20.   Clamp-on TL-1 (see features on page 8)
21.   Insertion TLC2 (see features on page 9)
22.   Clamp-on M2
23.   Clamp-on L2

```
Transducer  Type
 16. Clamp-on TM-1
```

10.24 - M24 - Transducers mounting method programming

The display shows the previous setting.
The available mounting methods are:
    0. V
    1. Z

```
Transducer Mounting
  0.   V
```

10.25 - M25 - Transducers mounting distance displaying

The display shows the automatically calculated transducers mounting distance.

```
Transducer  Spacing
            34.334mm
```

10.26 - M26 - Data storage mode programming

The display shows the previous setting.
Available settings:
    0. Use RAM Settings; all the latest programming changes are automatically
       stored in the RAM.

    1.Solidify Setting (recommended); to store in the EEPROM the latest
      changes to any menu, must go back to M26 and press "ENTER".

```
Default   Setting
1. Solidify Setting
```

10.27 - M27 - Default settings library

The display shows the previous setting.
Here it is possible save or load the flow measurement default settings, from M10 to M24, previously stored on EEPROM, (es. pipe diameter, thickness, etc.). Outputs and other configuration parameters aren't saved or modified.

```
Save/Load  Parameters
1: 110mm, V, PVC
```

10.27.1 - Default setting loading

To load a default setting, proceed as follows:
press "ENTER".

```
Save/Load   Parameters
1: 110mm, V, PVC
```

Select the default setting to be loaded with "UP ARROW" or "SCROLL" and press "ENTER".

```
Save/load  Parameters
4: 259mm, Z, Stainles
```

Confirm the selection by pressing "ENTER".
The system automatically displays M23.

```
Save/Load   Parameters
>0. Load   Parameters
```

10.27.2 - Storing default setting

To store a new default setting, proceed as follows:
press "ENTER".

```
Save/Load   Parameters
1: 110mm, V, PVC
```

Select with "UP ARROW" or "SCROLL" to replace the default setting and press "ENTER".

```
Save/load  Parameters
4: 259mm, Z, Stainles
```

To select the "1." option, press "UP ARROW" or "SCROLL" and confirm by pressing "ENTER".
The system automatically displays M23.

```
Save/Load   Parameters
> 1. Save   Parameters
```

10.28 - M28 - HOLD mode programming

The display shows the previous setting.
Selecting "YES", in the case of transducer echo signal temporary loss, the SGM-101F maintains the last valid measurement.
Selecting "NO", the instantaneous flow rate measured value will go to zero.

```
Hold  On  Poor  Signal
          YES
```

10.29 - M29 - Empty pipe condition threshold programming

The display shows the previous setting.
This threshold is related to the Q value (see M90).
When the Q value will be lower than the threshold value, set here, SGM-101F activates the empty pipe condition by zeroing the flow measurement.
Default value: 20

```
Empt Pipe Setup
              20
```

10.30 - M30 - Measurement units standard programming

The display shows the previous setting.
Select the system for standardized units: for the mechanical dimensions in M10, M11, M12 and M25; for the velocity in M41, M92 and M+6.
Available settings:
    0. Metric; magnitudes expressed in "mm" or "m/s"
    1. English; magnitudes expressed in "in" or "ft/s"

```
Measurement  Unit  In
  0. Metric
```

10.31 - M31 - Instantaneous flow rate unit programming

The display shows the previous setting.
To set the instantaneous flow rate measurement unit proceed as follows:
press "ENTER".

Press "UP ARROW" or "SCROLL" to select the volume measure unit
and press "ENTER" to confirm.
Available settings: Cubic Meter (m3); Liter (l); US Gallon (Gal);
UK Gallon (IGL); Million US Gallon; Cubic Feet (CF); US Oil Barrel (OB);
UK Oil Barrel (IB).

Press "UP ARROW" or "SCROLL" to select the time measure unit and
press "ENTER" to confirm.
Available settings: /hour (/h); /min (/m); /sec. (/s); /day (/d)
NB - On the top line displays the volume measure unit previously set.

```
┌─────────────────────────┐
│ Flow  Rate  Unit        │
│             m3/h        │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Flow:       Unit/Time   │
│ > Cubic Meter   (m3)    │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Cubic Metric   (m3)     │
│ >           /hour       │
└─────────────────────────┘
```

10.32 - M32 - Totalizers unit programming

The display shows the previous setting.
To set the Totalizers measurement unit proceed as follows:
press "ENTER".

Press "UP ARROW" or "SCROLL" to select the volume measure unit
and press "ENTER" to confirm.
Available settings: Cubic Meter (m3); Liter (l); US Gallon (Gal);
UK Gallon (IGL); Million US Gallon; Cubic Feet (CF); US Oil Barrel (OB);
UK Oil Barrel (IB)

```
┌─────────────────────────┐
│ Totalizer  Units        │
│    Cubic Meter   (m3)   │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Totalizer  Unit         │
│ >   Liter        ( l )  │
└─────────────────────────┘
```

10.33 - M33 - Totalizers multiplier programming

The display shows the previous setting.
Default value: x1
Available settings:
     0. x0.001 (1E-3)
     1. x0.01
     2. x0.1
     3. x1
     4. x10
     5. x100
     6. x1000
     7. x10000 (1E+4)

```
┌─────────────────────────┐
│ Totalizer   Multiplier  │
│      3.    x1           │
└─────────────────────────┘
```

10.34 - M34 - Net totalizer activation programming

The display shows the previous setting.
To activate the net totalizer, between the forward totalizer and reverse
totalizer, need to set "ON".
Available settings: ON; OFF.

```
┌─────────────────────────┐
│ NET   Totalizer         │
│            ON           │
└─────────────────────────┘
```

10.35 - M35 - Forward totalizer activation programming

The display shows the previous setting.
To activate the forward totalizer need to set "ON".
Available settings: ON; OFF.

```
┌─────────────────────────┐
│ POS   Totalizer         │
│            ON           │
└─────────────────────────┘
```

10.36 - M36 - Reverse totalizer activation programming

The display shows the previous setting.
To activate the forward totalizer need to set "ON".
Available settings: ON; OFF.

```
┌─────────────────────────┐
│ NEG   Totalizer         │
│            ON           │
└─────────────────────────┘
```

10.37 - M37 - Totalizers reset

To avoid unwanted reset, the reset confirmation shall be done
in 2 distinct sub-menu.
It is also possible to reset all totalizer or single totalizer.
To reset, proceed as follows: press "ENTER".

Select with "UP ARROW" or "SCROLL" "YES" and press "ENTER".
Selecting "NO" the reset procedure is canceled .
Default value: NO

Select with "UP ARROW" or "SCROLL" the required option and press
"ENTER", the confirmation message will appear after the reset.
Selecting "NONE" the reset procedure is canceled. Default value: NONE
Available settings:
None
All;
NET Totalizer
POS Totalizer
NEG Totalizer
Energy NET Total
Energy POS Total
Energy NEG Total
Master Erase
Net Flow Today
Monthly Totalizer
Yearly Totalizer

```
┌─────────────────────────┐
│   Totalizer  Reset?     │
│        Selection        │
└─────────────────────────┘
┌─────────────────────────┐
│   Totalizer  Reset?     │
│   >          YES        │
└─────────────────────────┘
┌─────────────────────────┐
│   Select  Totalizer     │
│   >    All              │
└─────────────────────────┘
┌─────────────────────────┐
│   Select    Totalizer   │
│   Reset    Finished     │
└─────────────────────────┘
```

10.38 - M38 - Partial totalizer

In this menu a partial totalizer with manual start and stop is available.
To start the partial totalization press "ENTER".

Pressing "ENTER" will stop the totalization.
Further pressing "ENTER" will reset and restart the partial totalizer.
Press "UP ARROW" or "SCROLL" to exit.

```
┌─────────────────────────┐
│      Totalizer          │
│  Press ENT When Ready   │
└─────────────────────────┘
┌─────────────────────────┐
│   128.73SEC,    5.2547  │
│ ON 21  m3               │
└─────────────────────────┘
```

10.39 - M39 - Language menu programming

The display shows the previous setting.
Available settings:
    English
    Italian

```
┌─────────────────────────┐
│ Language       LINGUA   │
│    English     INGLESE  │
└─────────────────────────┘
```

10.40 - M40 - Damping programming

The display shows the previous setting.
In this menu it's possible to change the damping value, in seconds.
Range: 0÷9990 Sec

```
┌─────────────────────────┐
│ Damping                 │
│              10   Sec   │
└─────────────────────────┘
```

10.41 - M41 - Low flow cut-off programming

The display shows the previous setting.
In this menu it's possible to change the velocity threshold, in m/s
(f/s if M30 is setted to "English"), under this threshold value the SGM-101F will
show zero flow, and also the totalizer increase will be stopped.

```
┌─────────────────────────┐
│ Low  Flow  Cutoff  Val. │
│            0.03  m/s     │
└─────────────────────────┘
```

10.42 - M42 - Zero flow automatic calibration

In this menu it's possible to do the zero flow automatic calibration.
This calibration is used to compensate the possible measurement errors at zero.
Under normal conditions not need to do this calibration.

```
Set  Zero
            Press ENT to go
```

Press "ENTER" to perform the calibration.
By pressing "ENTER" during the calibration procedure is stopped.
The digit at the bottom left indicates the remaining reads number for
the calibration completion.
N.B.- During calibration, the signal status must always be in "R"
(see the letter in the upper right), otherwise, the calibration procedure
will not be completed.

```
Flow    0.0000 m3/h ☀R
VEL     0.0000 m/s  38
```

WARNING - The fluid inside the pipe must be still during the
automatic calibration procedure.

10.43 - M43 - Zero flow calibration reset

In this menu it's possible to cancel the automatic calibration of zero flow,
previously done in M42. SGM-101F will set the default value.

```
Reset  Zero
            NO
```

10.44 - M44 - Zero flow manual calibration

In this menu it's possible to set an Offset value to be added or subtracted from
the instantaneous flow rate.

```
Manual  Zero  Point
                0   m3/h
```

10.45 - M45 - Correction factor programming

In this menu it's possible to set the correction factor.
Verify on matched ultrasonic transducers the presence of a label indicating the
value to set.
Default value: 1

```
Scale  Factor
                1
```

10.46 - M46 - MODBUS network address programming

In this menu it's possible to set the UID address.
Default value: 1

```
Network  IDN
                1
```

10.47 - M47 - Protection password programming

In this menu it's possible to set a password to protect the system from
tampering or other.
To store a new password and protect the system proceed as follows:
press "ENTER".
Change the digit with "UP ARROW" and move the cursor to the right with
"SCROLL", max. value: 99999
Press "ENTER" to store the new password and protect the system by blocking
the changes to the programming.

```
System  Lock
oooo  Unlocked  oooo
```

```
System  Lock
> 11111_
```

To unlock the changes to the programming, proceed as follows:
press "ENTER".

```
System  Lock
oooo  Unlocked  oooo
```

Enter the previously stored password, modifying the digit with "UP ARROW" and
moving the cursor to the right with "SCROLL".
Press "ENTER" to confirm and unlock the programming changes.

```
Input   Old   Password
> 11111_
```

10.48 - M48 - Calibration data programming

Only for headquarters use.

```
Entry to Calib. Data
Press ENT When Ready
```

10.49 - M49 - MODBUS serial port test

Only for headquarters use.

```
Serial  Port  Traffic
[data  display  here]&
```

10.50 - M50 - Data logger programming

In this menu it's possible to enable the data logger.
To enable the data logger, proceed as follows: press "ENTER".

```
Data Logger Option
        OFF
```

Select "ON" with "UP ARROW" and press "ENTER".

```
Data Logger Option
>       ON
```

Pressing "UP ARROW" is possible to select which data to include in the data logger.
To enable the data storage press "ENTER",
select "ON" and confirm with "ENTER".

See the table below for the available data.

```
0. Data and Time
>       ON
```

0	DATE AND TIME
1	SYSTEM STATUS
2	CURRENT WINDOWS
3	SIGNAL STRENGTH
4	FLOW RATE
5	VELOCITY
6	NET TOTALIZER
7	POS TOTALIZER
8	NEG TOTALIZER
9	ENERGY FLOW RATE
10	ENERGY NET TOTALIZER
11	ENERGY POS TOTALIZER
12	ENERGY NEG TOTALIZER
13	FLUID VELOCITY
14	RTD T1
15	RTD T2
16	ANALOG INPUT 3
17	ANALOG INPUT 4
18	ANALOG INPUT 5
19	WORKING TIMER
20	FLOW TODAY
21	SERIAL NUMBER

10.51 - M51 - Data logger timer programming

In this menu it's possible set the timer data logger timer.
To set the timer, proceed as follows:
press "ENTER".

Set the data logger start time. Change the digit with "UP ARROW"
and move the cursor to the right with "SCROLL".
Press "ENTER" to store the start time.

Set the data logger interval time between a recording and the other.
Change the digit with "UP ARROW" and move the cursor to the right
with "SCROLL".
Press "ENTER" to store the data logger interval time.

Set the data logger recordings number to be made.
Change the digit with "UP ARROW" and move the cursor to the right
with "SCROLL .
Press "ENTER" to store the storage number.
Setting a value between 8000 and 9000 data will be stored until the
available memory on the SD card is exhausted

Set the timer, M51 will display the next data recording time and
the data recording number still to be made.

```
Data Logger Set up
  Next =00:00:00 0000
```

```
Data Logger Set up
  Start Time= 15:50:00
```

```
Data Logger Set up
  Interval    = 00:01:00
```

```
Data Logger Set up
  Log Times  =  1000
```

```
Data Logger Set up
  NEXT =17:13:50 0977
```

10.52 - M52 - Data transmission programming

In this menu it's possible to set the data transmission mode.
Default mode: 1. INVIA CON RS-485
Available settings:
    1. Send To RS-485
    2. Internal SerBus (data sending to SD card)

```
Send  Logo-Data to
 1. Send to RS-485
```

10.53 - M53 - M53 - AL5 analog input displaying

NOT AVAILABLE.

```
Analog  Input  AL5
  AL5= 0.0194, -1,4928
```

10.54 - M54 - OCT output pulse width programming

In this menu it's possible to set the OCT output pulse width.
Range: 1÷500mS.

```
OCT  Pulse  Width
           39.8864 mS
```

10.55 - M55 - Analog output mode programming

In this menu it's possible to set the analog output mode.
Default value: 0. 4-20mA
Available settings:
    0. 4-20mA
    1. 0-20mA
    2. 0-20mA via RS232 (RS485)
    3. 4-20mA vs.Sound
    4. 20-4-20mA
    5. 0-4-20mA
    6. 20-0-20mA
    7. 4-20mA vs.Vel.
    8. 4-20mA vs.Energy

```
CL  Mode  Select
 0.  4-20 mA
```

10.56 - M56 - 4mA (or 0mA) output programming

In this menu it's possible to set analog output scale beginning.
The measure unit is in M55 programming function, per es: with M55 set to "0. 4-20mA", the measure unit is m3/h; with M55 set to "3. 4-20mA vs.Vel." the measure unit is m/s.

```
CL  4mA  Output  Value
               0 m3/h
```

10.57 - M57 - 20mA output programming

In this menu it's possible to set the analog output full scale.
The measure unit is in M55 programming function, per es: with M55 set to "0. 4-20mA", the measure unit is m3/h; with M55 set to "3. 4-20mA vs.Vel." the measure unit is m/s.

```
CL  20mA  Output  Value
            10000 m3/h
```

10.58 - M58 - Analog output simulation

In this menu it's possible to force the analog output signal value to check the drives connected to the 4÷20mA signal.
To start the simulation, press "ENTER" and select with "UP ARROW" or "SCROLL" the desired option.
Available settings:
   0   output signal 0mA
   4   output signal 4mA
   8   output signal 8mA
   12   output signal 12mA
   16   output signal 16mA
   20   output signal 20mA

```
CL Checkup (mA)
Press ENT When Ready
```

```
CL Checkup (mA)
>     0
```

10.59 - M59 - Analog output status displaying

In this menu it's possible to display the analog output signal instantaneous value.
NB - It is not a measured value, but a value derived from a mathematical calculation depending on the M55, M56 and M57 settings.

```
CL Current Output
         4.0000    mA
```

10.60 - M60 - System date and time programming

In this menu it is possible to set the date and the time.

```
AA-MM-GG  HH:MM:SS
14-04-17      09:28:00
```

10.61 - M61 - SGM101-F info displaying

In this menu, the SGM-101F unit details are available.

```
SGM-100         VER18.55
      S/N=18330924
```

10.62 - M62 - Serial port configuration programming

In this menu it's possible to set the serial port configuration.
The default settings are:

BAUDRATE	9600
PARITY	NONE
Data Bits	8
Stop Bits	1

```
RS-485/RS-232 Setup
      9600,None,8,1
```

10.63 - M63 - Communication protocol programming

In this menu it's possible to set the communication protocol mode.
Default setting: MODBUS RTU Only.
Available settings:
      MODBUS RTU Only
      MODBUS ASCII+ TDS7

```
Select  Comm  Protocol
     MODBUS RTU Only
```

10.64 - M64 - AL3 analog input programming

NOT AVAILABLE.

```
AI3   Value   Range
20  ~  100
```

10.65 - M65 - AL4 analog input programming

NOT AVAILABLE.

```
AI4    Value   Range
20  ~  100
```

10.66 - M66 - AL5 analog input programming

NOT AVAILABLE.

```
AI5   Value   Range
0  ~  6
```

10.67 - M67 - Frequency output range programming

In this menu it's possible to set the OCT output range when it set as a frequency output proportional to the measured instantaneous flow rate.

```
FO Frequency Range
 0  ~  1000 Hz
```

10.68 - M68 - Frequency output low flow rate programming

In this menu it's possible to set the frequency output low flow rate.

```
Low FO Flow Rate
              0 m3/h
```

10.69 - M69 - Frequency output high flow rate programming

In this menu it's possible to set the frequency output high flow rate.

```
High FO Flow Rate
            10800 m3/h
```

10.70 - M70 - Backlight interval programming

In this menu it's possible to set the display backlight time.
Range: 0÷60000 seconds.

```
LCD  Backlight  Option
             10 Sec
```

10.71 - M71 - LCD contrast programming

In this menu it's possible to set the LCD contrast.
Range: 00÷31
Press "ENTER" to enter, then increase the contrast with the "UP ARROW" or decrease the contrast with "SCROLL".
Press "ENTER" to store.

```
LCD   Contrast
    18
```

10.72 - M72 - Operation time displaying

In this menu it's possible to display the SGM-101F operation total time, since the last timer reset.
To reset the timer, proceed as follows:

Press "ENTER" 2 times to enter, then select "YES" with "UP ARROW" and press "ENTER" to confirm the reset.

```
Working  Timer
    00000175:42:15
```

```
Reset  Working  Timer
>         YES
```

10.73 - M73 - #1 Q min. alarm programming

In this menu it's possible to set the minimum flow threshold for the #1 alarm.

```
1# Alarm LOW Value
               0  m3/h
```

10.74 - M74 - #1 Q max. alarm programming

In this menu it's possible to set the maximum flow threshold for the #1 alarm.

```
1# Alarm High Value
         10000  m3/h
```

10.75 - M75 - #2 Q min. alarm programming

In this menu it's possible to set the minimum flow threshold for the #2 alarm.

```
2# Alarm Low Value
             0  m3/h
```

10.76 - M76 - #2 Q max. alarm programming

In this menu it's possible to set the maximum flow threshold for the #2 alarm.

```
2# Alarm Hight Value
         10000  m3/h
```

10.77 - M77 - Buzzer operation programming

In this menu it's possible to set the SGM-101F unit acoustic signal function.
Available settings:

0. No Signal	14. Energy NET Pulse
1. Poor Signal	15. MediaVel=>Thresh
2. Not Ready (No *R)	16. MediaVelo<Thresh
3. Reverse Flow	17. ON/OFF via RS845
4. AO Over 100%	18. Timer (M51 Daily)
5. Fo Over 120%	19. Timed Alarm #1
6. Alarm #1	20. Timed Alarm #2
7. Reverse Alarm #2	21. Batch Total Full
8. Batch Controller	22. Timer by M51
9. POS Int Pulse	23. Batch 90% Full
10. NEG Int Pulse	24. Key Stroking ON
11. NET Int Pulse	25. Disable BEEPER
12. Energy POS Pulse	
13. Energy NEG Pulse	

```
BEEPER SET-UP
 24. Key Stroking ON
```

10.78 - M78 - OCT output programming

In this menu it's possible to set the function associated to the OCT digital
output. Available settings:

0. No Signal	14. Energy NET Pulse
1. Poor Signal	15. MediaVel=>Thresh
2. Not Ready (No *R)	16. MediaVelo<Thresh
3. Reverse Flow	17. ON/OFF via RS845
4. AO Over 100%	18. Timer (M51 Daily)
5. Fo Over 120%	19. Timed Alarm #1
6. Alarm #1	20. Timed Alarm #2
7. Reverse Alarm #2	21. Batch Total Full
8. Batch Controller	22. Timer by M51
9. POS Int Pulse	23. Batch 90% Full
10. NEG Int Pulse	24. Flow Rate Pulse
11. NET Int Pulse	25. Disable OCT
12. Energy POS Pulse	
13. Energy NEG Pulse	

```
OCT  Output  Setup
 9. POS Int Pulse
```

10.79 - M79 - Relay output programming

In this menu it's possible to set the function associated to the relay output.
Available settings:

0. No Signal
1. Poor Signal
2. Not Ready (No *R)
3. Reverse Flow
4. AO Over 100%
5. Fo Over 120%
6. Alarm #1
7. Reverse Alarm #2
8. Batch Controller
9. POS Int Pulse
10. NEG Int Pulse
11. NET Int Pulse
12. Energy POS Pulse
13. Energy NEG Pulse

14. Energy NET Pulse
15. MediaVel=>Thresh
16. MediaVelo<Thresh
17. ON/OFF via RS845
18. Timer (M51 Daily)
19. Timed Alarm #1
20. Timed Alarm #2
21. Batch Total Full
22. Timer by M51
23. Batch 90% Full
24. Flow Rate Pulse
25. Disable Relay

```
RELAY  Output  Setup
6. Alarm #1
```

10.80 - M80 - Batch output programming

In this menu it's possible to set the batch activation mode.
Available settings:

0. Key Pressing
1. Serial Port
2. Al3 Rising Edge
3. Al3 Falling Edge
4. Al4 Rising Edge
5. Al4 Falling Edge
6. Al5 Rising Edge
7. Al5 Falling Edge
8. Timer-Periodical
9. Time-daily

```
Batch   Trigger   Select
 0. Key Pressing
```

10.81 - M81 - Batch volume programming

In this menu it's possible to preset the batch volume value.
To preset the batch volume proceed as follows:
press "ENTER".

```
FlowBatch   Controller
        1000 m3
```

Set the predetermined volume.
Change the digit with "UP ARROW" and move the cursor to the right
with "SCROLL".
Press "ENTER" to store.

```
FlowBatch   Controller
>    500
```

With M80 set to "0. Key Pressing", the display will show the message
"Press ENT When Ready"; pressing "ENTER" starts the batch cycle.

```
        100   m3
Press ENT When Ready
```
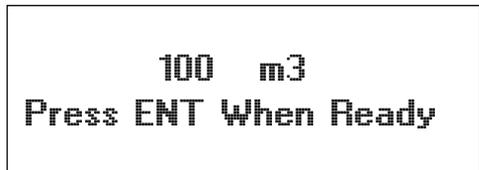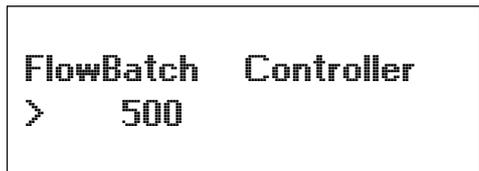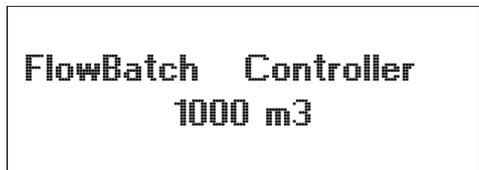
During the batch cycle, the display shows:

1   The predetermined volume value.
2   The performed cycles Bach number (including the cycle in progress).
3   The batch status: ON active, OFF inactive.
4   The increase in the batch counter.

By pressing "ENTER" will stop the batch cycle.
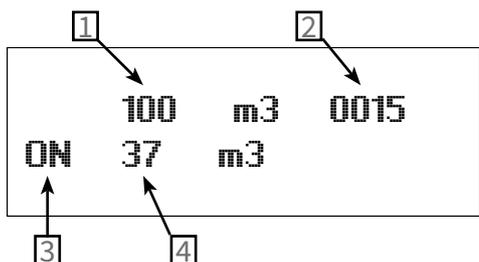
10.82 - M82 - SGM-101F unit events displaying

In this menu it's possible to display the SGM-101F recorded daily, monthly and annual events.
To display the events, proceed as follows:
press "ENTER".

Select the events display mode with "UP ARROW" or "SCROLL".
Available settings:
0. Browse by Day; 1. Browse by Month; 2. Browse by Year.
Press "ENTER" to confirm.

The display shows:

1. Event storage sequence number.
2. Events storage period, with format: YY-MM-DD; YY-MM; YY
3. System status codes of the displayed storage period.
4. Net totalization of the displayed storage period.

Press "UP ARROW" or "SCROLL" to select events in succession.
Press "ENTER" to exit.

```
Date   Totalizer
0. Browse by Day
```

```
Date   Totalizer
> 0. Browse by Day
```

```
 1         2          3
001  14-03      --G--HH-
NET +1254.2348      m3
            4
```

10.83 - M83 - Totalizers automatic correction Enabling

In this menu it's possible to enable the flow totalizers automatic correction during the period in which the unit SGM-101F is turned off.
An average flow rate value is calculated using the measured flow rate before shutdown and the flow rate measured after the system restarts.
This calculated average flow rate value is then used to increase the flow totalizer.

```
Automatic   Amending
        OFF
```

10.84 - M84 - Heat meter unit programming

The display shows the previous setting.
Available settings:
    0. Giga Joule (GJ)
    1. Kilocalorie (Kc)
    2. KWh
    3. BTU

```
Energy   Unit   Select
0.  Giga  Joule   (GJ)
```

10.85 - M85 - Temperature sensor input programming

In this menu it's possible to select the supply and return temperatures source.

```
Temperature   Select
0. From  T1, T2
```

10.86 - M86 - Specific heat programming

The display shows the previous setting.
Available settings:
    0.   GB
    1.   Fix Specific Heat

```
Specific  Heat  Select
0. GB
```

10.87 - M87 - Heat meter totalizer programming

In this menu it's possible to enable the heat meter totalizer.

```
Energy  Totler  ON/OFF
        ON
```

10.88 - M88 - Heat meter totalizer multiplier programming

The display shows the previous setting.
Default value: x1
Available settings:

0. x0.0001 (E-4)
1. x0.001 (1E-3)
2. x0.01
3. x0.1
4. x1
5. x10
6. x100
7. x1000
8. x10000 (E4)
9. x100000 (E5)
10. x1000000 (E6)

```
Energy  Multiplier
 4. X1            (E0)
```

10.89 - M89 - Temperature differential displaying

In this menu it's possible to display the temperature difference between supply and return.

```
Temperature  Diff.
     0.0039       C
```

10.90 - M90 - Transducers signal power and quality displaying

In this menu it's possible to display the ultrasonic transducers efficiency (UP and DN) and the ultrasonic signals quality (Q) processed by SGM-101F.
For the "UP" (upstream transducer) and "DN" (downstream transducer) the 00.0 value indicates the ultrasonic signal non-reception, while the 99.9 value indicates the ultrasonic signal excellent reception;
Normally the value is greater than 60.0.
The processed ultrasonic signals quality (Q), has a range from 00.0 to 99.9.
Normally the "Q" value is greater than 60.0.

```
Strength + Quality
UP:78.5  DN:78.8  Q=92
```

10.91 - M91 - TOM/TOS % displaying

In this menu it's possible to display the ratio between the calculated and the measured transit time.
Normally the value should be 100 ±3%.
Differences in excess of the above, could mean improper transducers mounting, or incorrect programming values.

```
T O M / T O S
     3.9478   %
```

10.92 - M92 - Sound velocity in the fluid displaying

In this menu it's possible to display the sound speed in the fluid, measured by the SGM-101F. Normally the value should be similar to what is set in M21, accessible when M20 is set to "Other Liquid".
A significant values difference, could mean improper transducers mounting, or incorrect M21 programming values.

```
Fluid  Sound  Velocity
    1486.35 m/s
```

10.93 - M93 - Flight time and delta T.

In this menu it's possible to display the flight time measured by the SGM-101F and the difference in flight times, UP - DN.

```
TotalTime,   DeltaTime
624.72uS     251.67nS
```

10.94 - M94 - Reynolds number displaying

In this menu it's possible to display the calculated Reynolds number value.

```
Reynolds   No,   Profile
  12354.8        0.97563
```

10.95 - M+0 - Date/time/flow displaying when the unit was power off

In this menu it's possible to display the SGM-101F power on or off events. Press "ENTER" to access.

Up to 64 events are recorded, in the range 00÷63.
Select the event with "UP ARROW" or "SCROLL".
Press "ENTER to exit.

```
Power ON/OFF Time
Press ENT When Ready
```

```
03  14-04-23  13:26:21
ON  03  24 m3/h
```

10.96 - M+1 - Total operating time displaying

In this menu it's possible to display the SGM-101F total operating time.

```
Total  Work  Hours
   00000142:38:41
```

Pressing "ENTER" can be displayed the instantaneous negative flow rate measurement total time.
Press "ENTER" to exit.

```
NEG  Flow  Total  Hours
   00000001:46:18
```

10.97 - M+2 - Last power off date/time displaying

In this menu it's possible to display the last power off date and time of the SGM-101F.

```
Last  Power  Off  Time
   14-04-18  08:04:37
```

10.98 - M+3 - Last measured flow rate displaying

In this menu it's possible to display the last measured instantaneous flow rate value.

```
Last  Flow  Rate
   24.5 m3/h
```

10.99 - M+4 - SGM-101F on/off times number displaying

In this menu it's possible to see how many times the unit SGM-101F has been switched on and off.

```
ON-OFF  Times
   00000024
```

10.100 - M+5 - Calculator and Converter

In this menu it's possible to use the scientific calculator or the PT100 temperature converter.
Press "ENTER" to use the calculator.

```
Calculator:  Input  X=
        0
```

Enter number: with "UP ARROW" to change the digit and "SCROLL" to move the cursor to the right (max. 13 digits).
Press "ENTER" to confirm.

```
Calculator:  Input  X=
>  110_
```

Select the operation with "UP ARROW" or "SCROLL" and press "ENTER" to confirm (in the example shown next, the "PT100<>Temperature" function).
Available operations: +; -; x; /; 1/x; abs (x); x*x; sqrt (x); exp (x); ln (x); log (x); power(x,y); sin (x); cos (x); arcsin (x); arccos (x); arctan (x); Store in M (x=>M); Read M (x<=M); Add to M; Move x to y; PT100<>Temperature

```
2.Select  Operation
>  PT100<>Temperature
```

The display now shows the selected operation result: 25.684°C

```
Calculator:  Input  X=
        25.684
```

10.101 - M+6 - Velocity threshold programming

In this menu it's possible to set the maximum speed threshold to generate an alarm on the relay or on OCT.

```
Media Vel. Threshold
                1400 m/s
```

10.102 - M+7 - Monthly totalizer displaying

In this menu it's possible to display the monthly totalizer.

```
Total  Flow  for  Month
       135.248 m3
```

10.103 - M+8 - Annual totalizer displaying

In this menu it's possible to display the annual totalizer.

```
Total  Flow  This Year
       35874.8 m3
```

10.104 - M+9 - Echo absence error total time displaying (*H)

In this menu it's possible to display the echo absence error condition total time.

```
TIMER NO PRONT/G   *G
      00000001:06:42
```

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11-MAIN PARAMETERS DESCRIPTION

Name	Displaying	Description	Menu
Pipe Ø	Pipe Outer Diameter	Pipe Outer diameter (Pipe cross section)	**M11**
Pipe thickness	Pipe Wall Thickness	Pipe thickness (Pipe cross section)	**M12**
Pipe material	Pipe Material	Carbon Steel; Stainless Steel; Cast Iron; Ductile Iron; Copper; PVC (Plastics in general); Aluminium; Asbestos; Fiberglass-Epoxy Other	**M14**
Inner lining material	Liner Material	None, No Liner; Tar Epoxy; Rubber; Mortar; Polypropylene; Polystyrol; Polystyrene; Polyester; Polyethylene; Ebonite; Teflon; Other	**M16**
Pipe inner lining thickness	Liner Thickness	Pipe inner lining thickness (Pipe cross section)	**M18**
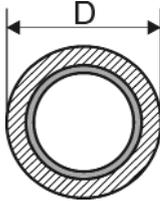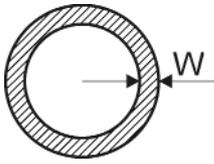
Name	Displaying	Description	Menu
Transducers mounting method	Transducer Mounting	Z mode V and W mounting method — The transducers may be mounted on the pipe in 4 different methods: V; Z; W. The mounting method choice is in application conditions function. The most frequently used mounting methods are V and Z.	**M24**
Transducers mounting distance	Transducer Spacing	Lout Lout — The mounting axial distance, Lout, is automatically determined based on the following previously entered data: Ø pipe; pipe thickness; pipe material; eventual inner lining and its thickness; transducers mounting method.	**M25**
Instantaneous flow rate measure unit	Flow Rate Unit	Measure units associated with the instantaneous flow rate measurement. Is possible to select 8 different measure units for the volume: Cubic Meter (m3); Liter (l); US Gallon (Gal); UK Gallon (IGL); Million US Gallon; Cubic Feet (CF); US Oil Barrel (OB); UK Oil Barrel (IB); and 4 measure units for the time: hour (/h); /min (/m); /sec. (/s); /day (/d)	**M31**
Flow totalizers measure unit	Totalizer Units	Measure units associated with the flow totalizers. Is possible to select 8 different measure units: Cubic Meter (m3); Liter (l); US Gallon (Gal); UK Gallon (IGL); Million US Gallon; Cubic Feet (CF); US Oil Barrel (OB); UK Oil Barrel (IB)	**M32**
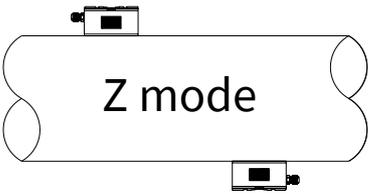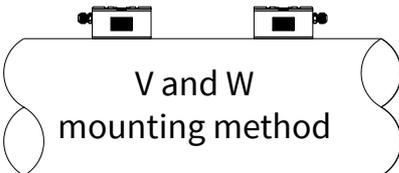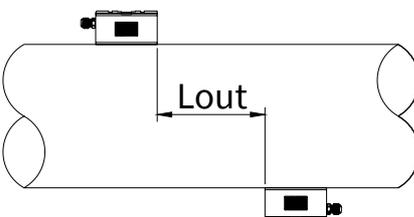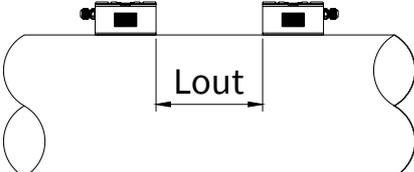
Name	Displaying	Description	Menu
Damping time	Damping	The damping time defines the displayed flow measurement refresh rate in relation to the detected flow measurement variation. Range: 0÷9990 seconds 	**M40**
Flow velocity cut-off value	Low Flow Cutoff Val.	When the measured flow velocity is less than the cutoff value, the display will show the instantaneous flow rate measure at fixed 0. Range 0.000 ÷ 0.25m/s 	**M41**
Zero flow calibration	Set Zero	When the fluid in the pipe is stopped, the flow value must be equal to 0. In case it is not, need to calibrate the Zero flow. **NB -** Make sure that the fluid is perfectly stopped and that the Pipe is full	**M42**
Correction coefficient	Scale Factor	Coefficient for correcting the measurement accuracy. Range 0.5 ÷ 1.5	**M45**
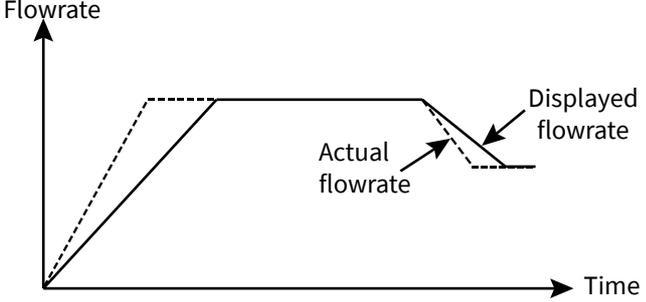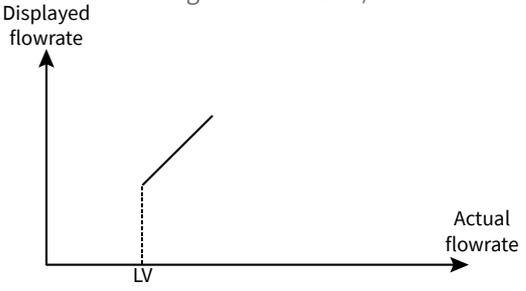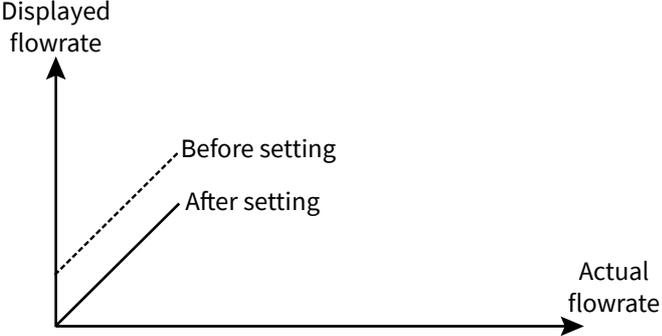
Name	Displaying	Description	Menu
System protection password	System Lock	The system protection password is used to prevent programming modification, or to not allow resetting totalizers. **NB** - write down your password	**M47**
Flow velocity cut-off value	Low Flow Cutoff Val.	Is possible toset the digital pulse width during the counting. Range:0.01÷500ms Pulse→ Pulse Width (mS)	**M54**
4÷20mA output	CL Mode Select	N. 9 selectable analog signal output mode: 4-20mA; 0-20mA; 0-20mA via RS232 (RS485); 4-20mA vs.Sound; 20-4-20mA; 0-4-20mA; 20-0-20mA; 4-20mA vs.Vel.; 4-20mA vs.Energy	**M55**
4÷20mA output scale beginning	4mA Output Value	It's the value of quantity, babed on M55 choice, that is associatet to analog output begin scale.	**M56**
4÷20mA output full scale	VALORE RIF. A 20 mA	It's the value of quantity, babed on M55 choice, that is associatet to analog output end scale.	**M57**
Date and Time	YY-MM-DD HH:MM:SS	Time and date maintaining is secured by an internal battery with life of about 10 years. In the case where the battery power is exhausted, turning off the **SGM-101F** all the time and date data will be lost.	**M60**
Digital output	OCT Output Setup	The digital output "OCT" can be set with 26 different functions. It's possible to set the digital output to remotely send the totalizer pulse with option # 24: Flow Rate Pulse.	**M78**
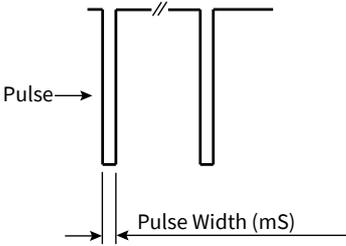
12-TROUBLESHOOTING

12.1 - Error messages and corrective actions

The SGM-100F has a self-diagnosis system which detects hardware problems.
The instrument will show "*F" in the top left corner of the display and it will be necessary to power on again the SGM-100F in order to see the error message and the solution:

Error message	Cause	Solution
Memory Checking Error	System ROM illegal or error	**Contact the producer**
Stored Data Error	Memory parameter data error	**Press ENT key and restore default parameters**
System Data Memory Error	System stored data block error	**Restart or contact headquarters**
Circuit Hardware Error	Sub-CPU circuit fatal error	**Restart or contact headquarters**
Timer Slow/Fast Error	System Clock error	**Restart or contact headquarters**
Clock Error	Abnormal clock inside the hardware	**Contact headquarters**
CPU or IRQ Error	--------	**Restart**
Host resetting Repeatedly	--------	**Contact headquarters**
Time or date Error	Date/Time system chip error	**Reset data/Time**
No display	Bad wiring connection	**Check for electrical connections**
Stroke key - No response	Keypad locked	**Enter the password to unlocking**

12.2 - Error codes and solutions

When the instrument detects an operating error, a letter will appear on the top left corner of the display.
In M00 , M01, M02 , M03 , M90 and M08 can be displayed the error message. Refer to the following table for the solution:

Error codes	Displayed message	Cause	Solution
R	System Normal	No error	
I	Detected No Signal	1) No detected signal 2) Sensors installed improperly 3) Too many encrustations 4) Pipe lining too thick 5) The transducer cables are not properly connected	1) **Tight the transducers on the pipe** 2) **Check the setted parameters** 3) **Clean the pipe surface and remove any rust** 4) **Change installing position** 5) **Wait until the new liner is dry** 6) **Check the cables.**
J	Hardware Error	Hardware problems	**Contact headquarters**
H	PoorSig Detected	1) Weak signal detected 2) Sensors installed improperly 3) Too many encrustations 4) Pipe lining too thick 5) The transducer cables are not properly connected	1) **Tight the transducers on the pipe** 2) **Check the setted parameters** 3) **Clean the pipe surface and remove any rust** 4) **Change installing position** 5) **Wait until the new liner is dry** 6) **Check the cables.**
E	Current Loop over 20mA	1) 4÷20mA current loop over 100% 2) Current output Improper settings	**Check the values setted in menu M56 and if the actual flow is too high**
Q	Frequ OutputOver	1) Frequency output over 120% 2) frequency output Improper setting or actual flow too high	**Check the values setted in menu M66-M67-M68 and M69 and if the actual flow is too high**
F	Refer to table 2	1) Error in self-diagnosis during power-on 2) Permanent hardware error	1) **Restart** 2) **Contact headquarters**
G	Adjustig gain S1-S2-S3-S4 (displayed on M00, M01,M02 and M03)	The instrument is running the automatic checkup and the numbers indicate the sequential progress.	
K	Empty pipe	1) No liquid inside the pipe 2) Setting error in M29	1) **Reposition the transducer where the pipe is filled with fluid** 2) **Set 0 in M29**

12.3 - Other problems and solutions

1) The actual flow inside the pipe is not standstill, but the instrument displays 0.0000 for the flow rate, and 'R' displaying signal strength and the signal quality Q (value) has a satisfactory value.
   The problem are likely caused by the user who has used the 'Set Zero' function on this non-standstill flowing pipe.
   To solve this problem, use the 'Reset Zero' function on menu window M43.

2) The displayed flow rate is much lower or much higher than the actual flow rate in the pipe under normal working conditions.

   a) There is probably an offset value wrongly entered by the user in M44. Enter '0' in M44.
   b) Check the transducers installation.
   c) There is a 'Zero Point' setted. Try to 'zero' the instrument by using M42 and make sure that the flow inside the pipe should be standstill.

13-COMMUNICATION PROTOCOL

The SGM-101F has a RS485 standard communication interface, modbus registers are available on request.

14-NOTE

15-FACTORY TEST AND QUALITY CERTIFICATE

CE

In conformity to the company and check procedures I certify that the equipment:

(Transit time ultrasonic flowmeter)

is conform to the technical requirements on Technical Data and it is made in conformity to the procedure

Quality Control Manager: .... Production and check date: ....

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