SGM-200H

Transit time ultrasonic flowmeter

825B130C

Features

Rechargeable battery:	**24h lasting**
Battery charger:	**100÷240Vac**
Display:	**3.5", 320x240pixel, 65536 colori**
Keypad:	**8 pushing buttons**
Displayed data:	**flow rate, flow totalizer and more**
Housing:	**ABS**
Linearity:	**± 0.5%**
Repeatability:	**± 0.2%**
Total accuracy:	**± 1%**
Max medium speed:	**±12 m/s**

Clamp-on transducers:

TS-2C suitable for pipes from 20 to 100mm (-30÷90°C)
TM-1C suitable for pipes from 50 to 700mm (-30÷90°C)
TL-1C suitable for pipes from 300 to 4000mm (-30÷90°C)

Clamp-on transducers mounted on metric frame:

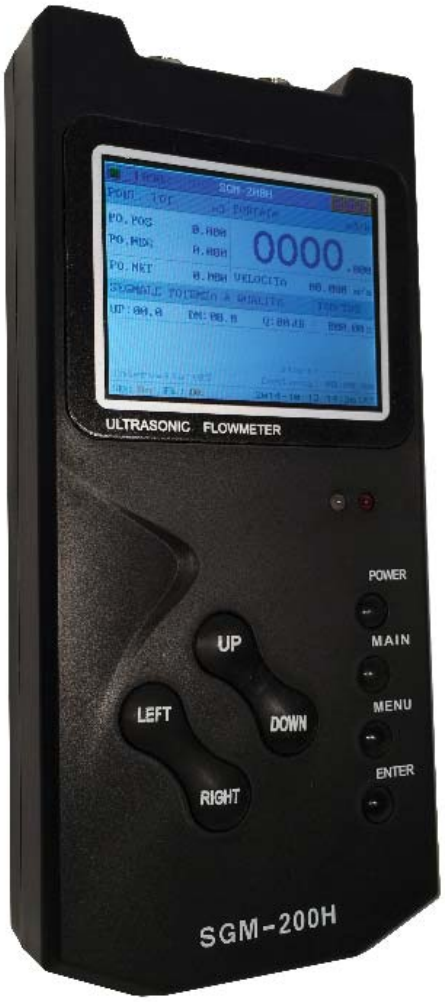
S1F suitable for pipes from 20 to 100mm (0÷70°C)
M1F suitable for pipes from 50 to 700mm(0÷70°C)

Clamp-on transducers for high temperature:

TS2H suitable for pipes from 20 to 100mm (-30÷160°C)
TM1H suitable for pipes from 50 to 700mm (-30÷160°C)

Totalizer: **7 digits for positive, negative and net flow**

Data logger: **16GB SD can store up to 10 years**



General

The **SGM-200H** is composed by a digital converter and two clamp-on ultrasonic transducers.
It is designed to measure the fluid velocity of a liquid inside a closed conduit. The transducers are a non-contacting, clamp-on type, which provide benefits of non-fouling operation and easy installation.
The DSP digital technology (Digital Signal Processing) ensure a low sensibility of the instrument against potential transient factors.

The **SGM-200H** 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)***
- ***Applicable to various pipes materials (eg. SS316, copper, plastic, etc.), with or without an inner lining***
- ***Measuring ranges from <0,2m³/h to >30000m³/h***
- ***Battery power supply***

1. WORKING PRINCIPLE

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 function 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-200H** 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, as shown in figure 2-1

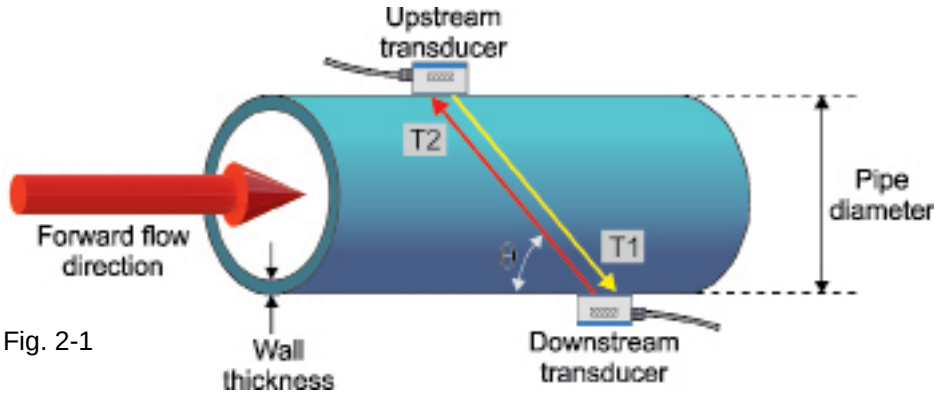


Fig. 2-1

$$V = \frac{MD}{\sin 2\theta} \cdot \frac{\Delta T}{T1 \cdot T2}$$

Where:

θ	=	sonic section angle
M	=	sonic section length
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	=	Tup-Tdown

1 GENERAL FEATURES

1.1 Applications

The **SGM-200H** can be applied to a wide range of measurement. The range of pipe dimensions is from 20 to 4000 mm (from 0,8 to 118 inches) and the liquids can be: ultra-pure, potable water, chemicals, raw sewage, cooling water, river water, plant effluent ecc. As the instrument and the transducers are non-contacting and have no moving parts, the flow meter cannot be affected by system pressure, fouling or wear.

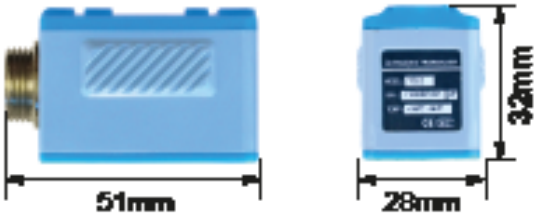
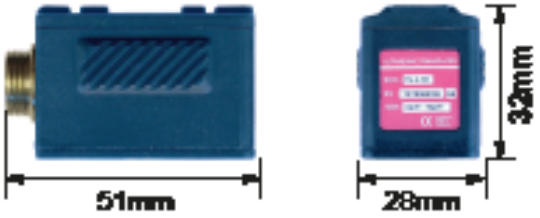
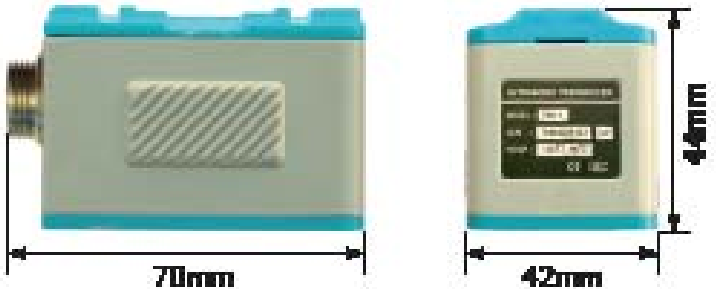
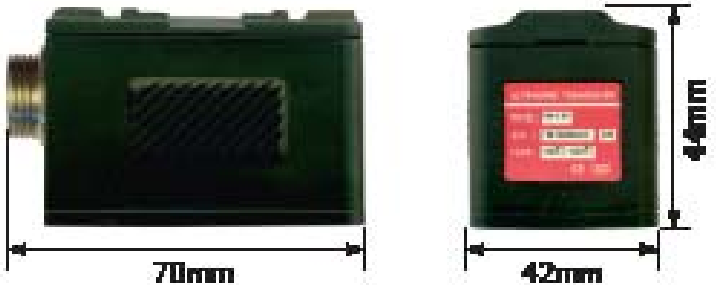
1.2 Data Integrity

All configuration values setted by the user are saved into the EE PROM.
A time-keeper is integrated in the flow meter for the index of date totalizing and works as the time base of flow accumulation. It keeps operating as long as the battery's terminal voltage is over 1.5V.In case of battery failure it will loose time values and the user must re-enter them.
An improper time value affects no other functions but the date totalizer.

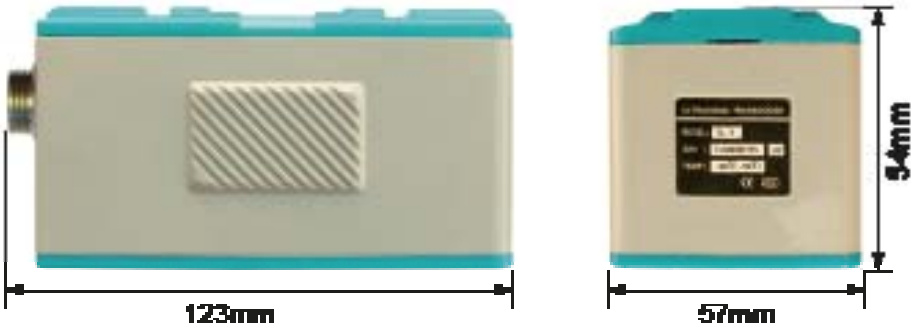
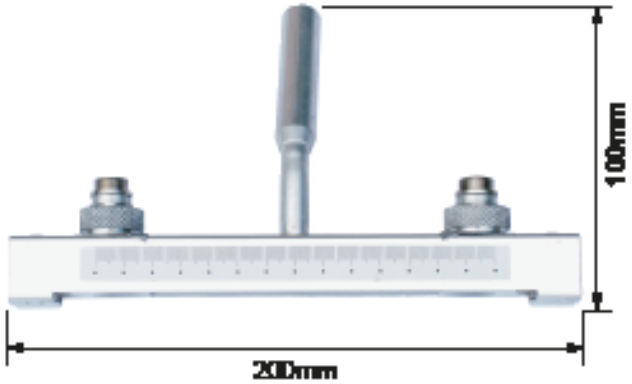
1.3 Specifiche

Linearity:	**0,5%**
Repeatability:	**0,2%**
Accuracy:	**±1%; di lettura > 0,3mps**
Max speed:	**±12m/s**
Pipe sizes:	**DN20÷DN4000, (using different transducers)**
SD card:	**512MB ÷ 32GB, SD or SDHC**
Data record method:	**Year and month is the folder, day and measure SN number is the file name**
Recording interval:	**5s, 10s, 20s, 30s, 60s**
Max data stored:	**According to the SD used, 16GB can store data for 10 years**
Data curve reading time:	**min. 20m; max 4h**
Menu languages:	**English, Italian**
Display:	**3.5", 320x240pixel, 65536 colours**
Temperature:	**-20°÷+60°C**
Power supply:	**Ni-MH integrate batteries. When fully recharged they last about 24 hours. 100÷253Vac for the charger**
Electric current:	**Average 100mA, max 310mA, stand-by 100microA**
Housing material:	**ABS**
Size:	**218x103x35mm**
Weigh:	**400g**
Materiali tubo:	**Acciaio al carbonio, acciaio inossidabile, ghisa, ghisa sferoidale, rame, PVC, alluminio, amianto, fibra di vetro-epossidica, altro**
Pipe materials:	**Carbon steel, stainless steel, cast iron, ductile iron, copper, PVC, aluminium, asbestos, fiber-glass-epoxy, other**
Liquids:	**Water (general), sea water, kerosene, gasoline, fuel oil, crude oil, propane (-45°C), Butane (0°C), other liquid, diesel oil, castor oil, peanut oil, gasoline #90, gasoline #93, alcohol, water (125°C)**
Measure method:	**V, Z, W, N**
TS-2C sensors:	**DN20÷DN100, -30÷+90°C**
TM-1C sensors:	**DN50÷DN700, -30÷+90°C**
TL-1C sensors:	**DN300÷DN4000, -30÷+90°C**
S1F sensors (frame):	**DN20÷DN100, 0÷+70°C**
M1F sensors (frame):	**DN50÷DN700, 0÷+70°C**
TS2HC sensors:	**DN20÷DN100, -30÷+160°C**
TM1HC sensors:	**DN50÷DN800, -30÷+160°C**

2. TRANSDUCERS

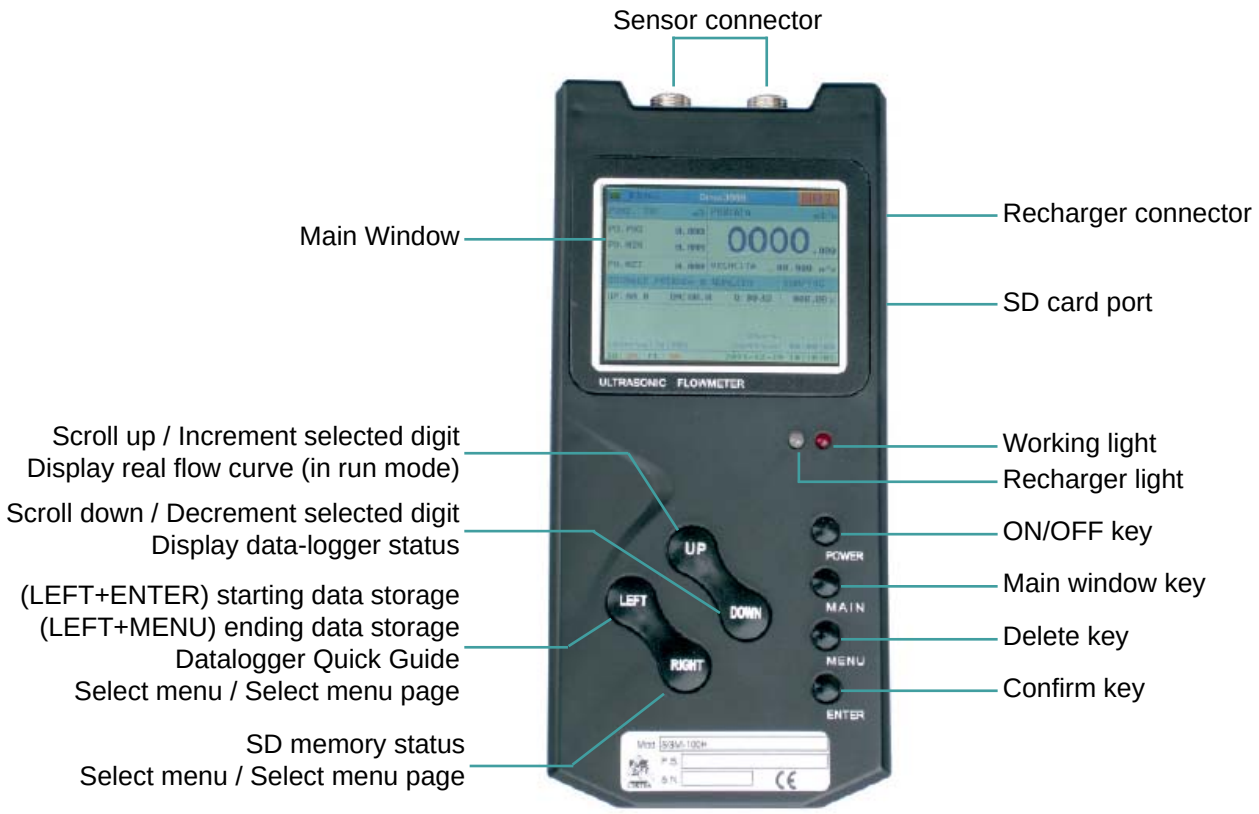
Transducer Type		Features
TS-2C	***Dimensions***	
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +90°C
	#13 parameter	>STANDARD S1
TS2HC	***Dimensions***	
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +160°C
	#13 parameter	>STANDARD S1
TM-1C	***Dimensions***	
	Pipe Ø range	50÷700mm (2" ÷ 28")
	Temperature	-30 ÷ +90°C
	#13 parameter	>STANDARD M1
TM1HC	***Dimensions***	
	Pipe Ø range	50÷700mm (2" ÷ 28")
	Temperature	-30 ÷ +160°C
	#13 parameter	>STANDARD M1

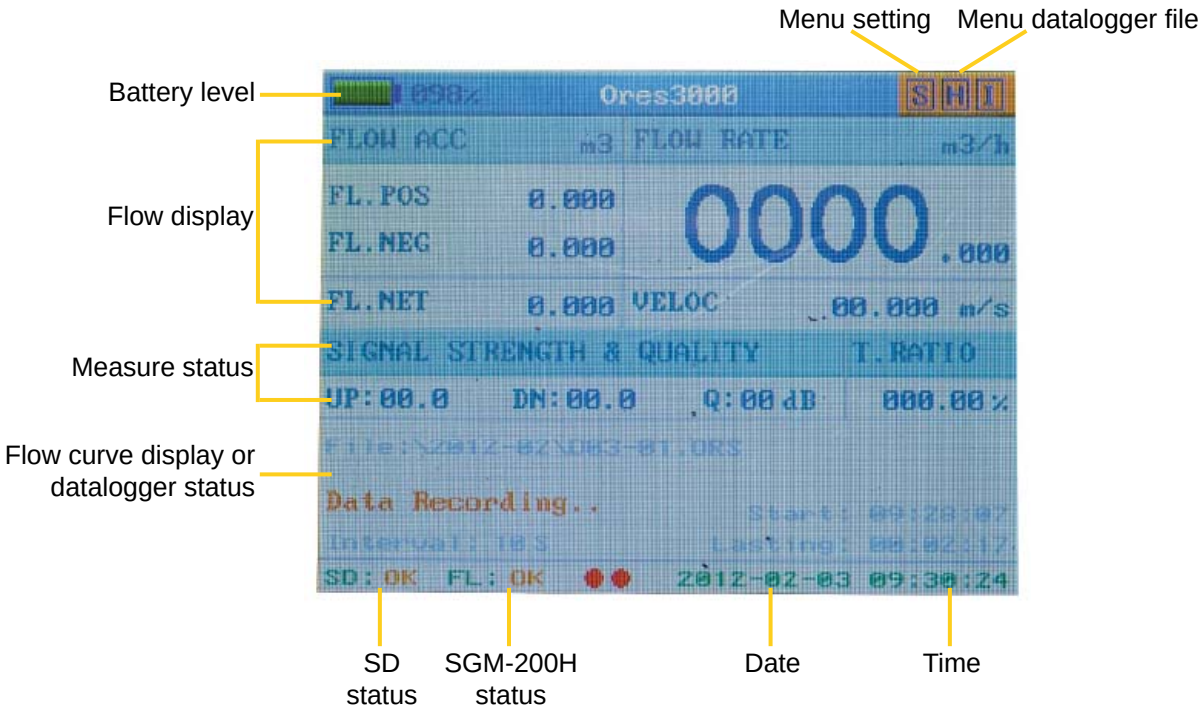
Tab. 2

Transducer Type		Features
TL-1C	***Dimensions***	
	Pipe Ø range	300÷4000mm (12” ÷ 160”)
	Temperature	-30 ÷ +900°C
	#13 parameter	>STANDARD L1
S1F	***Dimensions***	
	Pipe Ø range	20÷100mm (¾” ÷ 4”)
	Temperature	0 ÷ +70°C
	#13 parameter	>STANDARD S1
M1F	***Dimensions***	2x 
	Pipe Ø range	50÷700mm (2” ÷ 28”)
	Temperature	0 ÷ +70°C
	#13 parameter	>STANDARD M1

3 WINDOWS AND KEYPAD

3.1 Keypad





3.1.1 ON/OFF

Premendo il pulsante “POWER”, l’SGM-200H si avvia ed il led “ON” si accende.
Premendo nuovamente il pulsante “POWER”, l’SGM-200H si arresta ed il led “ON” si spegne.

Nota:
Lo strumento si spegne automaticamente quando non è utilizzato.
Lo strumento durante la misura di portata blocca automaticamente la tastiera, si sblocca premendo il tasto “POWER”.
Durante una fase di memorizzazione dati non è possibile spegnere lo strumento.

3.1.2 Funzione dei pulsanti

I pulsanti hanno diverse funzioni

Parameter selection	“UP” and “DOWN” to scroll
	“LEFT” or “RIGHT” to change the menu page
	“ENTER” to confirm selection
	“MENU” to undo any changes to the parameter
	“MAIN” back to the main window
Numbers setting	“ENTER” to confirm selection, the number will be red.
	“UP” or “DOWN” to increase or decrease the digit value
	“LEFT” or “RIGHT” to select the digit to edit
	“ENTER” to save
options setting	“ENTER” to confirm selection, the written will be red.
	“UP” or “DOWN” to change the parameter option.
	“ENTER” to save

3.1.3 Menu selection

In the display, top right, there are 3 letters that indicate which menu is displayed:
“S” indicates the parameter setting menu
“H” indicates the datalogger file management menu
Pressing “MENU” button, the letter “S” will be highlighted, using the “LEFT” and “RIGHT” buttons to select the menu, and press “ENTER” button to display the selected menu

3.2 Rechargeable battery

When the battery level indicates 5% it’s better to recharge it, because if the battery voltage is below 4.6 V, the meter turns off automatically.

3.2.1 How to recharge the batteries

While charging the battery the LED light is red, when charging is completed the LED light turns green
To increase the batteries lifetime, and to prevent the memory effect, it would be appropriate to recharg when the batteries are low.

3.2.2 Save power

During the flow rate measurement, if the keys are not pressed for at least 45 seconds, the SGM-200H automatically starts the screen saver mode.
In the absence of the flow rate measurement and signal from the ultrasonic sensors, after 3 minutes, the instrument turns off automatically.

4 SGM-200H PARAMETERS

4.1 Parameters table

Basic setting	**01**	Pipe Outer Cir.	**02**	Pipe Outer Dia.	**03**	Pipe Thickness
	04	pipe Inner Dia.	**05**	Pipe Material	**06**	Pipe Sound Vel.
	07	Liner Material	**08**	Liner Sound Vel.	**09**	Liner Thickness
	10	Fluid Type	**11**	Fluid Sound Vel.	**12**	Fluid Viscosity
	13	Transducer Type	**14**	Transducer Mount	**15**	Transducer Space
Flow rate	**16**	Measurement unit	**17**	Flow Rate Unit	**18**	Totalizer Unit
	19	Totalizer Multi.	**20**	NET Totalizer SW	**21**	POS Totalizer SW
	22	NEG Totalizer SW	**23**	Totalizer Reset	**24**	Low Flow Cutoff
System parameters	**25**	Set Static Zero	**26**	Set Default Zero	**27**	Manual Set Zero
	28	Damping Factor	**29**	Scale Factor	**30**	Series No.
	31	Language	**32**	Record Interval	**33**	Date & Time Set
	34	Curve Range Set	**35**	Not used	**36**	Not used

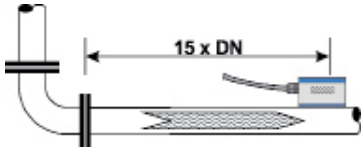
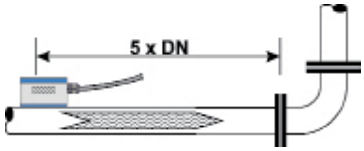
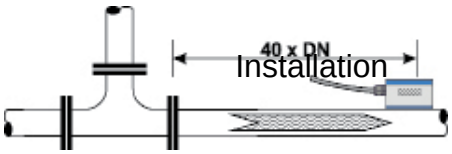
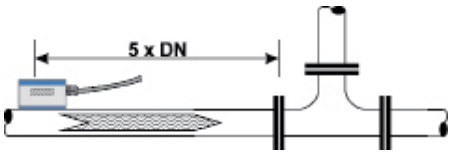
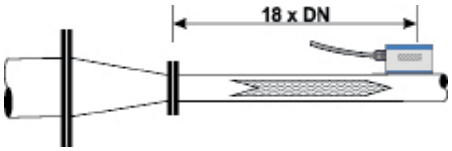
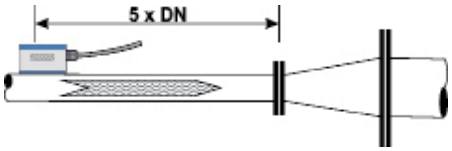
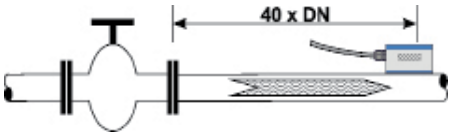
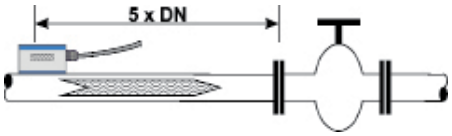
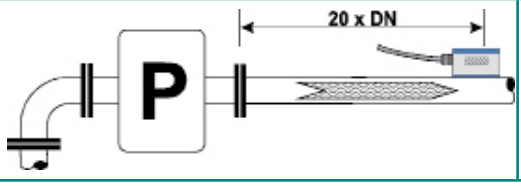
4.2 Basic parameters

01 Pipe outer circumference
02 Pipe outer diameter; from 0 to 18000mm
03 Pipe wall thickness
04 Pipe inner diameter
05 Pipe material; if no option in the menu, you can select “other”, and enter velocity in 6th parameter
06 Pipe material speed; only for non-standard pipe materials
07 Liner material, select none for pipes without any liner; if no option in the menu, you can select “other”, and enter velocity in 8th parameter
08 Liner material speed; only for non-standard liner materials
09 For entering the liner thickness, if there is a liner
10 For selecting fluid type; if no option in the menu, you can select “other”, and enter velocity in 11th parameter
11 For entering the fluid sonic velocity only for non-standard liquids
12 For entering the viscosity of the non-standard liquids
13 For selecting the proper transducers
14 For selecting the transducer mounting methods
15 Display the transducer mounting spacing (automatically calculated by the SGM-200H)

5. INSTALLATION

5.1 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		
T junction		
Adaptors		
Valves		
Pumps		

In the event that the minimum values shown in table 4 can not be met, it is necessary to adopt every mechanical devices to mitigate the flow turbulence and improve the homogeneity of the flow velocity in the pipe. One of the best devices 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 (fig.9-1/a);
- vertical pipes with the upward flow (fig.9-1/b);
- inclined pipes with the upward flow (fig.9-1/c);
- vertical open drain pipes with a section restriction to avoid sudden pipe emptying during flow measurement (fig.9-2)

Correct transducers positioning example

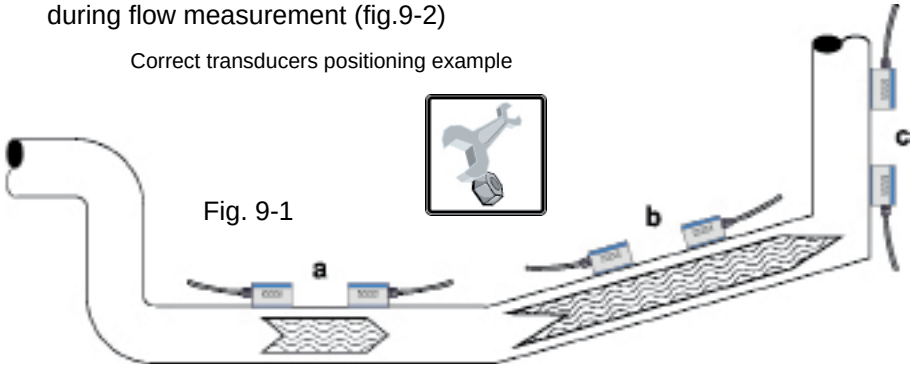


Fig. 9-1

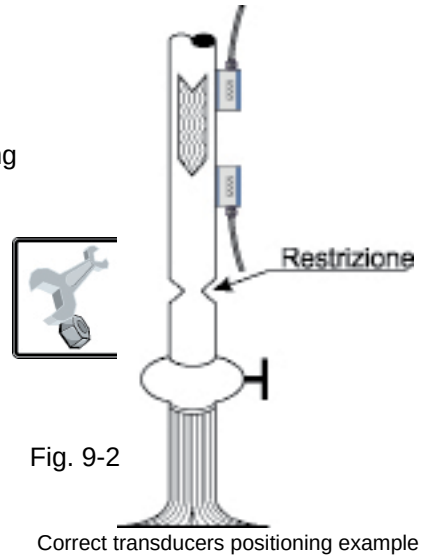


Fig. 9-2

Correct transducers positioning example

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>600mm; with clamp-on type transducers L>400mm

Fig. 10-1

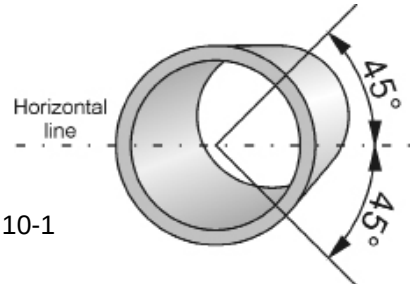
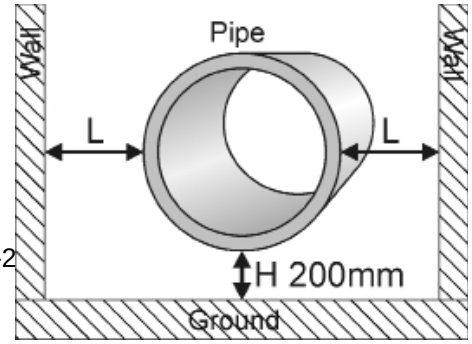


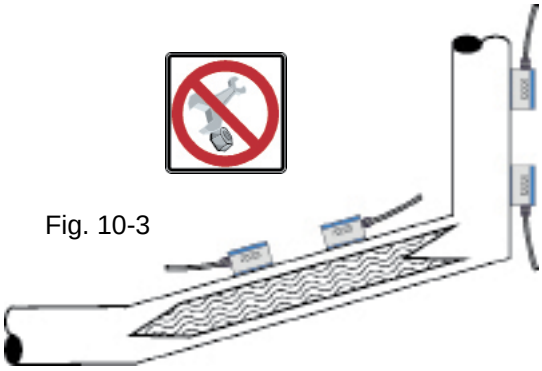
Fig. 10-2



Transducers positioning on a horizontal tube

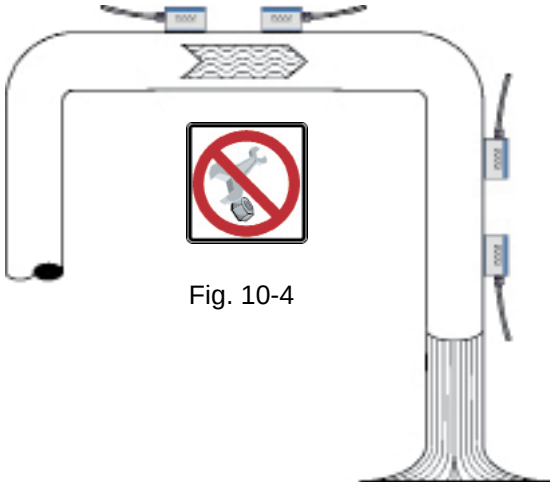
The transducers positioning points to be avoided are:
- vertical pipes with the downward flow, because they may not be completely filled with fluid
- inclined pipes with the downward flow, because they may not be completely filled with fluid
- the transducers must never be placed in the highest point 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

Fig. 10-3



Positioning to avoid example

Fig. 10-4



Positioning to avoid example

5.2 Positioning distance

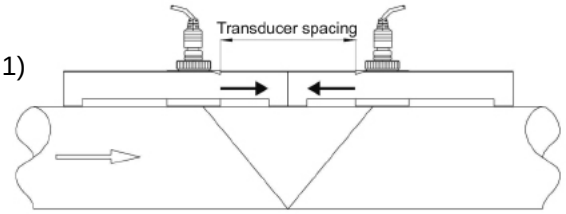
The value shown in parameter 15 refers to the “Lout” mounting distance between the two transducers
N.B. - The transducer mounting accuracy is important in order to a greater measurement accuracy.

5.2.1 V installing

Is the installation method for pipes with diameters in the 20÷300mm range.

5.2.1.1 S1F and M1F transducers Installation

To install the **S1F** and **M1F** transducers, to the # 13 parameter the transducer correct model must be select (standard S1 or M1) and the mounting distance specified in # 15 parameter must be observe

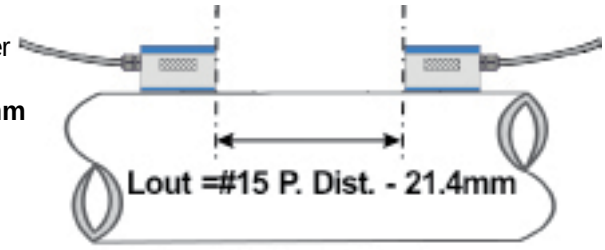


5.2.1.2 TS-2C and TS2HC transducers Installation

To install the **TS-2C** and **TS2HC** transducers, to the # 13 parameter the transducer correct model must be select (Standard S1).
The **Lout** mounting distance is obtained by subtracting **6.7mm** to the value specified in # 15 parameter (Transducer Space).
Ex: with a Ø 50mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 39.8mm; therefore the correct **Lout** distance result:
39.8mm-6.7mm=33.1mm

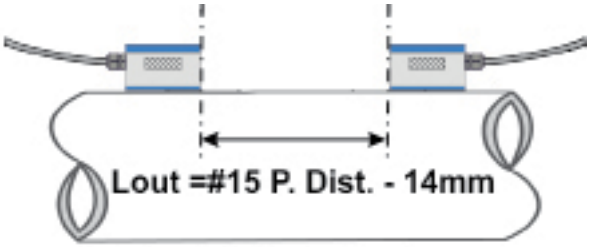
5.2.1.3 TM-1C and TM1HC transducers Installation

To install the **TM-1C** and **TM1HC** transducers, to the # 13 parameter the transducer correct model must be select (Standard M1).
The **Lout** mounting distance is obtained by subtracting **21.4mm** to the value specified in # 15 parameter (Transducer Space).
Ex: with a Ø 100mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 67.3mm; therefore the correct **Lout** distance result:
67.3mm-21.4mm=45.9mm



5.2.1.3 TL-1C transducers Installation

To install the **TL-1C** a transducers, to the # 13 parameter the transducer correct model must be select (Standard L1).
The **Lout** mounting distance is obtained by subtracting **14mm** to the value specified in # 15 parameter (Transducer Space).
Ex: with a Ø 200mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 124.7mm; therefore the correct **Lout** distance result:
124.7mm-14mm=110.7mm

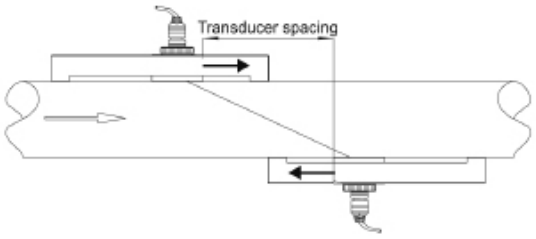


5.2.2 Z installing

Is the installation method for pipes with diameters in the 300÷4000 mm range.

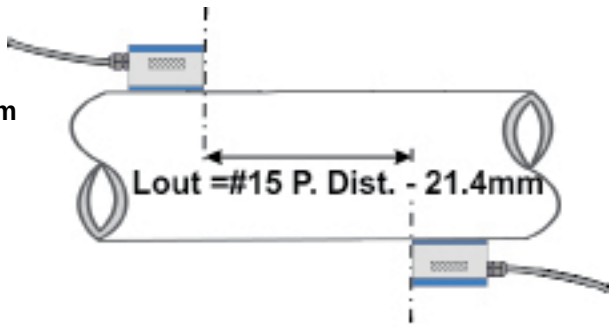
5.2.2.1 M1F transducers Installation

To install the **M1F** transducers, to the # 13 parameter the transducer correct model must be select (standard M1) and the mounting distance specified in # 15 parameter must be observe



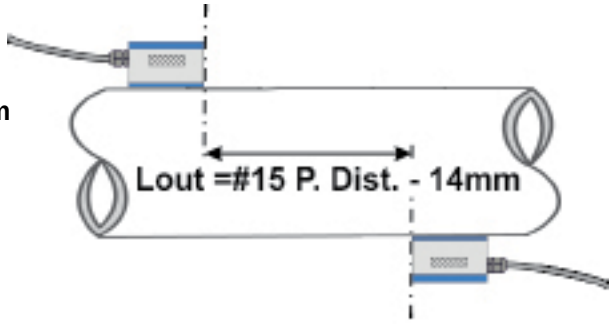
5.2.2.3 TM-1C and TM1HC transducers Installation

To install the **TM-1C** and **TM1HC** transd., to the # 13 parameter the transducer correct model must be select (Standard M1). The **Lout** mounting distance is obtained by subtracting **21.4mm** to the value specified in # 15 parameter (Transducer Space). Ex: with a Ø 400mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 166.5mm; therefore the correct **Lout** distance result: **166.5mm-21.4mm=145.1mm**



5.2.2.3 TL-1C transducers Installation

To install the **TL-1C** a transducers, to the # 13 parameter the transducer correct model must be select (Standard L1). The **Lout** mounting distance is obtained by subtracting **14mm** to the value specified in # 15 parameter (Transducer Space). Ex: with a Ø 600mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 223.8mm; therefore the correct **Lout** distance result: **223.8mm-14mm=209.8mm**

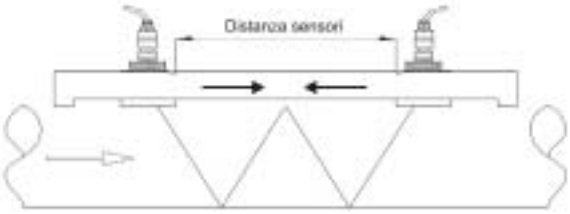


5.2.3 W installing

Is the installation method for pipes with diameters in the 20÷50 mm range.

5.2.3.1 S1F transducers Installation

To install the **S1F** transducers, to the # 13 parameter the transducer correct model must be select (standard S1) and the mounting distance specified in # 15 parameter must be observe



5.2.3.2 S-2C and TS2HC transducers Installation

To install the **TS-2C** and **TS2HC** transducers, to the # 13 parameter the transducer correct model must be select (Standard S1). The **Lout** mounting distance is obtained by subtracting **6.7mm** to the value specified in # 15 parameter (Transducer Space). Ex: with a Ø 20mm and 2mm thickness stainless steel pipe, to the # 15 parameter is shown a mounting distance of about 26.2mm; therefore the correct **Lout** distance result: **26.2mm-6.7mm=19.5mm**

5.3 Installation Check-up

Through the checkup of the installation, one can check: the receiving signal strength, the signal quality Q value, the traveling time difference of the signals, the estimated liquid speed, the measured traveling time of the signals and the calculated traveling time ratio..

5.3.1 Signal strength

Signal strength indicates the amplitude of receiving ultrasonic signals by a 3-digit number. [00.0] means there is no signal detected, and [99.9] refers to the maximum signal strength that can be received.
Although the instrument works well if the signal strength ranges from 50.0 to 99.9, stronger signal strength should be pursued, because a stronger signal means a better result. The following methods are recommended to obtain stronger signals:

1) Choose a mounting position more favorable.
2) Clean the outside pipe surface and apply more coupler grease.
3) During the reception control signal, move the transducers both vertically and horizontally until the detected power has reached the maximum value (always checking that the Lout distance between the two transducers is equal to the calculated value or to the value specified in # 15 parameter)

5.3.2 Signal quality (Q)

Signal quality is indicated as the Q value on the instrument. A higher Q value would mean a higher Signal and Noise Ratio (short for SNR), and accordingly a higher degree of accuracy would be achieved. Under normal pipe condition, the Q value is in the range of 60÷90, the higher the better.
Causes for a lower Q value could be:

1) Interference of other instruments and devices such as a powerful transverter working nearby. Try to relocate the flow meter to a new place where the interference can be reduced.
2) Bad sonic coupling for the transducers with the pipe. Try to apply more coupler grease or clean the surface etc
3) Pipes are difficult to be measured. Relocation is recommended

5.3.3 Time ratio (T.RATIO) between the Measured Total Transit Time and the Calculated Time

This ratio would be used to check the transducer installation. If the pipe parameters are entered correctly and the transducers are installed properly, the value for this ratio should be in the range of 100±3. If this range is exceeded, the user should check:

1) If the pipe parameters are correctly entered.
2) If the actual spacing of the transducers is right and the same as what the window M25 shows.
3) If the transducers are installed properly in the right directions.
4) If the mounting location is good and if the pipe has changed shape.
5) If there is too much fouling inside the pipe.

6. PIPE SPECIFICATIONS

6.1 Outside pipe diameter

In the event that an appropriate instrument to measure the pipe outside diameter of the is not available (programming in #**02** parameter), 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**" parameter (#**01**), **SGM-200H** will automatically calculate the correct pipe diameter value

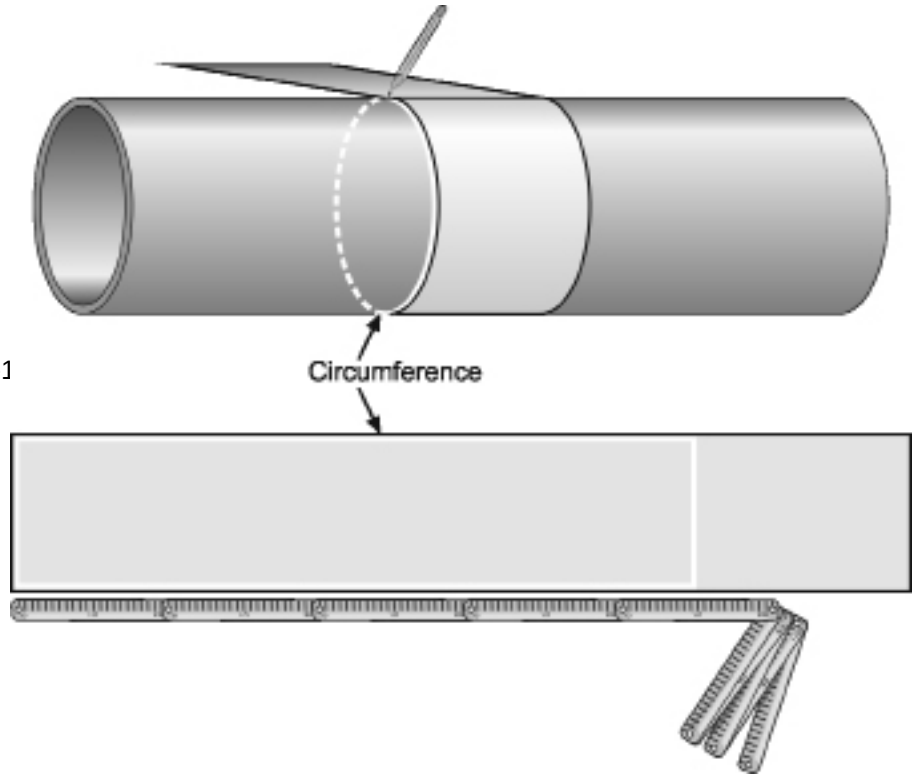


Fig. 13-1

6.2 Pipe thickness

Value measured on site using an appropriate tool (caliper, ecc.), or from the technical data of the hydraulic interested (programming in #**03** parameter). In the presence of tubes without inner lining, is possible to use the **SGM-100T** thickness gauge.

6.3 Pipe material

Value detectable on site, or from the technical data of the hydraulic interested (programming in **#05** parameter)

6.4 Materiale del rivestimento interno del tubo

Value detectable on site, or from the technical data of the hydraulic interested (programming in **#07** parameter)

6.5 Spessore del rivestimento interno del tubo

Value measured on site using an appropriate tool (caliper, ecc.), or from the technical data of the hydraulic interested (programming in **#09** parameter).

7. TRANSDUCERS POSITIONING

7.1 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 - W (small pipe)
DN20÷250 - recommended installation: **V**
DN250÷4000 - recommended installation: **Z**

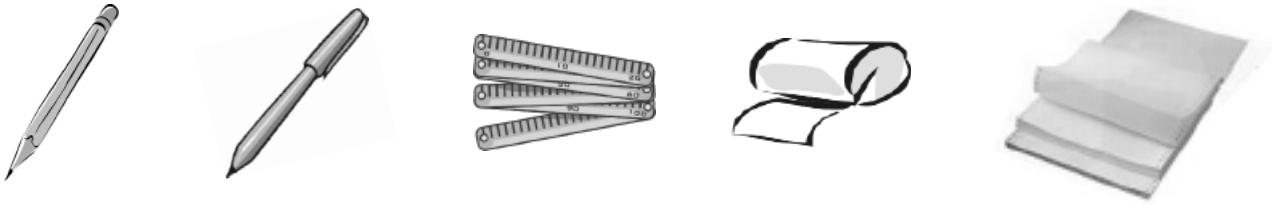
7.2 Marking positioning

After the pipe parameters and transducers positioning type programming, the conversion unit automatically calculates the mounting axial distance between the two transducers: **#15**, **Transducer Spacing**.
The **#15** value is used to mark out on the pipe the exact transducers positioning .

7.3 Marking tools

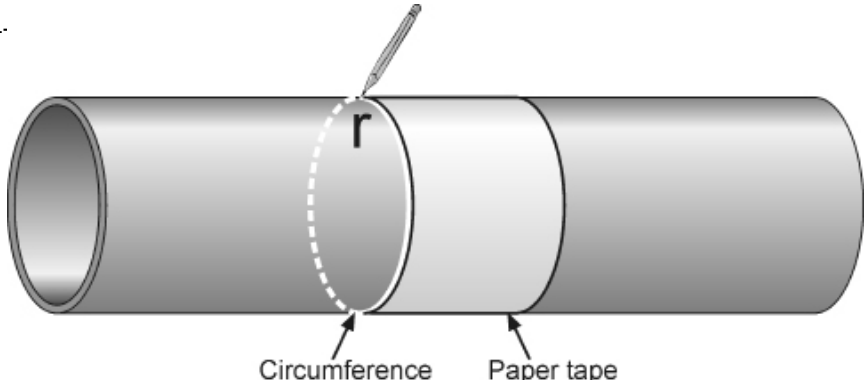
To trace on the pipe surface the transducers positioning points are sufficient simple tools, but effective at the same time:

- a paper roll piece (like that calculators) with a width greater than the pipe circumference, or a piece of continuous form for printer according to the pipe diameter.
- a pencil or a thin tip pen
- a meter



Pencil | Thin tip pen | Meter | paper roll for calculators | Continuous form for printer

Fig. 14



7.3 Marking modes

7.3.1 - Z mounting mode

For the transducers correct positioning, proceed as follows:

1) wrapping the pipe with the paper roll, or with the continuous form, making sure that the edges are perfectly superimposed between them. With the pencil, or with the thin tip pen, draw the "**r**" circle on the pipe and, at the same time, draw on the paper roll, the circumference measuring point.

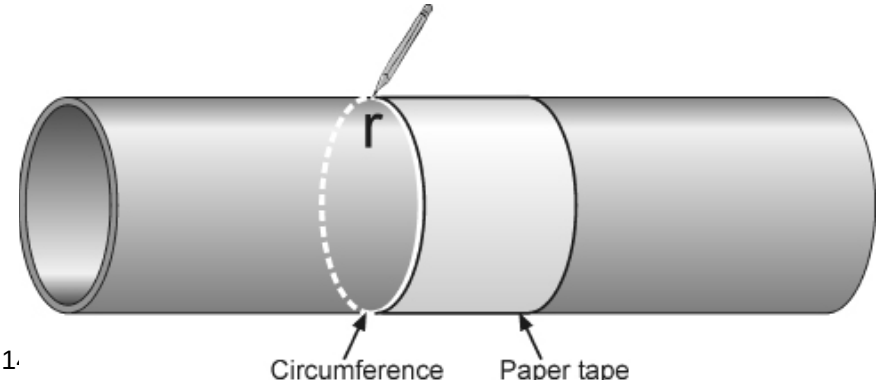


Fig. 1

2) remove the paper roll and fold in half the portion corresponding to the circumference. Reposition the paper roll, so as previously folded, on the pipe and draw a straight line, called "**S**", perpendicular to the "r" circumference line. The intersection point, called "**a**", is the mounting position of a transducer.

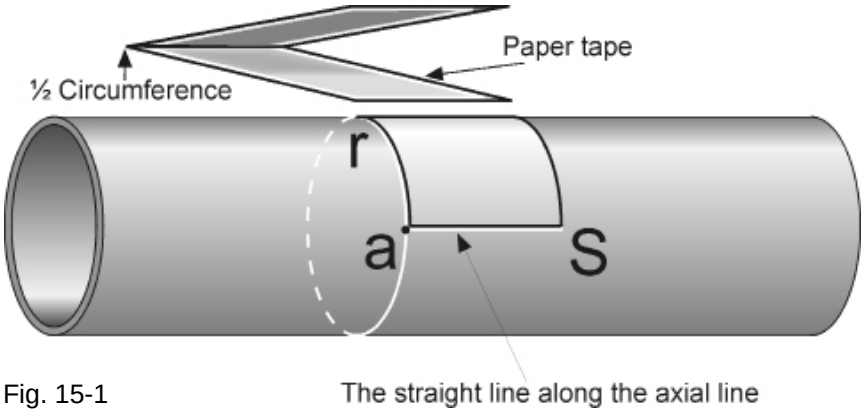


Fig. 15-1

3) now extend the "**S**" straight line from the "**a**" point to a length equal to half the "**r**" circumference. Next, at 180 degrees on the circumference "**r**" from point "a", draw a straight line, called "**D**", parallel to the straight line "**S**" and with equal length. The intersection point between the "**D**" straight line and the "**r**" circumference is called "**b**".

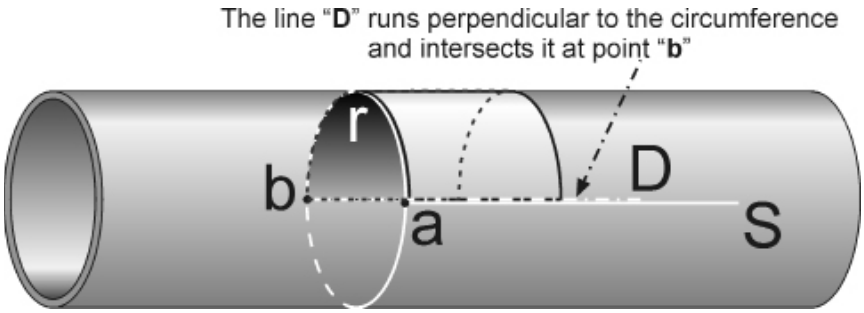


Fig. 15-2

4) now mark the "**c**" point on the "**D**" straight line, at a distance from "**b**" point equals the "**Lout**" measure previously calculated and displayed by the conversion unit in **#15** parameter. Now the mounting positions of both transducers are known:
- point marked with the letter "**a**"
- point marked with the letter "**c**"

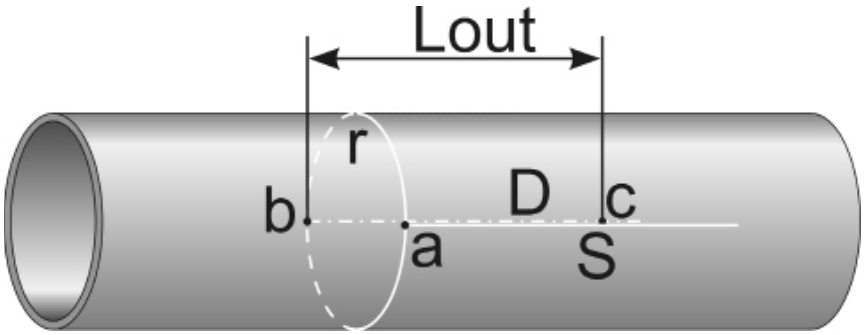


Fig. 15-3

7.3.1 - V or W mounting mode

For the transducers correct positioning, proceed as follows:

1) as in step 9.3.1 1)
2) as in step 9.3.1 2)
3) now mark the "**c**" point on the "**S**" straight line, at a distance from "**A**" point equals the "**Lout**" measure previously calculated and displayed by the conversion unit in **#15** parameter. Now the mounting positions of both transducers are known:
   - point marked with the letter "**a**"
   - point marked with the letter "**c**"

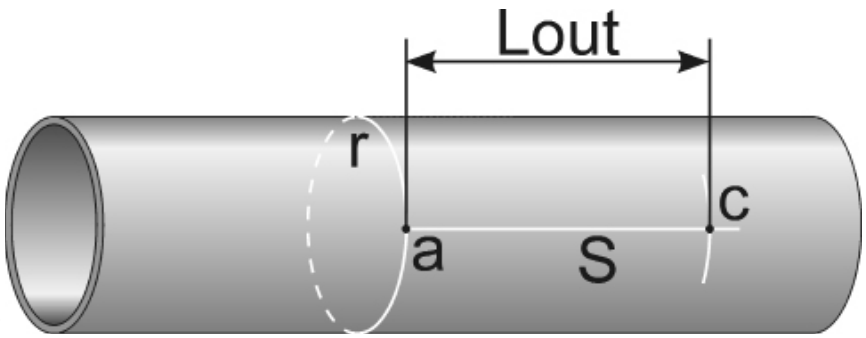


Fig. 16-1

7.4 Pipe surface cleaning

Clean the pipe surface with a manual sander, removing any traces of rust, paint, coating, pipe outer coating or other.
The treated surface area must be extended, according to the transducers model, at least as shown in the following figure:

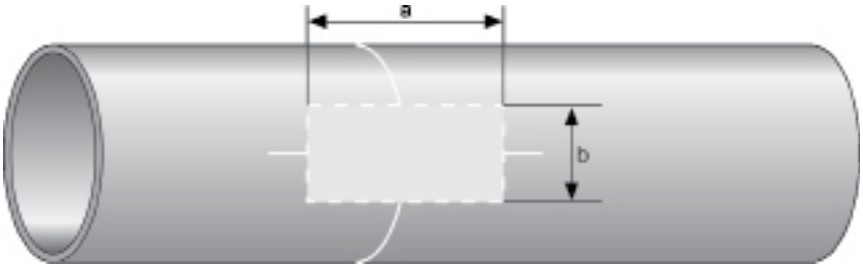


Fig. 16-2

	TS-2C/S1F/ TS2HC	TM-1C/M1F/ TM1HC	TL-1C
a	70mm	90mm	140mm
b	40mm	55mm	80mm

Tab. 16-1

7.5 Clamp-on transducers fixing

1) On the transducer lower surface apply a thick layer of grease acoustic coupling
2) Press the transducer on the pipe surface at the transducer installation point, already cleaned.
3) Securely fasten with a metal fixing clamp, or other, the transducer on the pipe
   WARNING - do not overtighten to avoid damage to the transducer

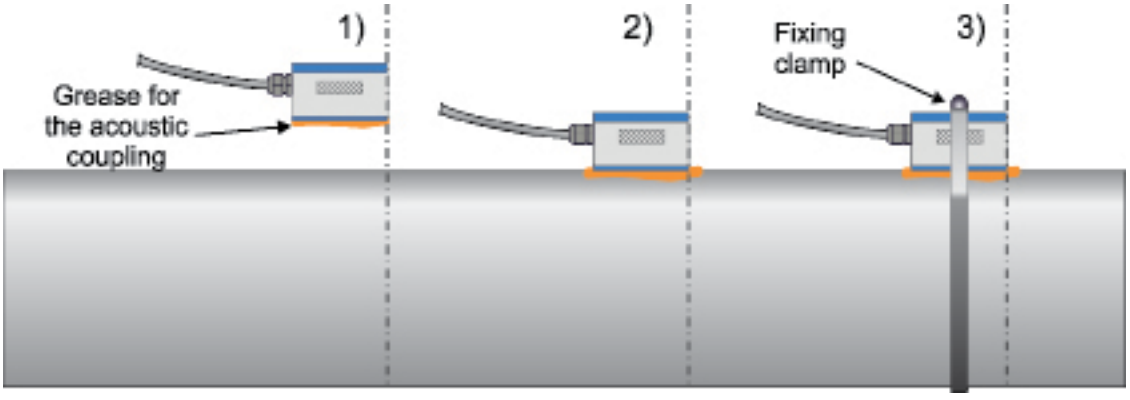
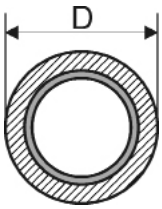
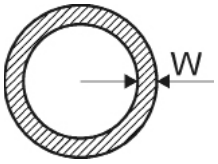
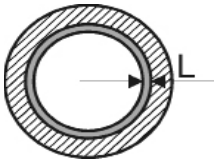
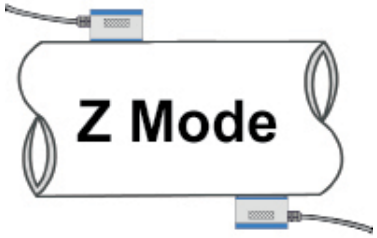
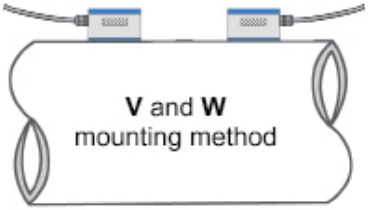
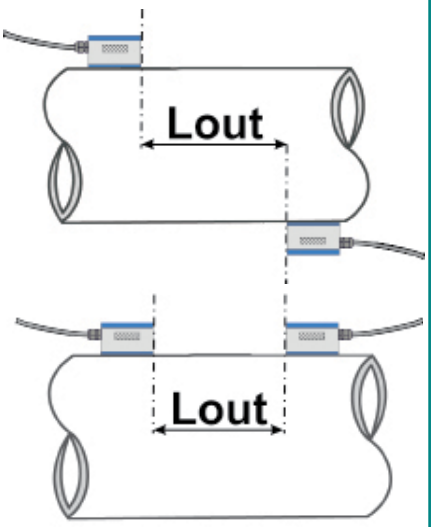
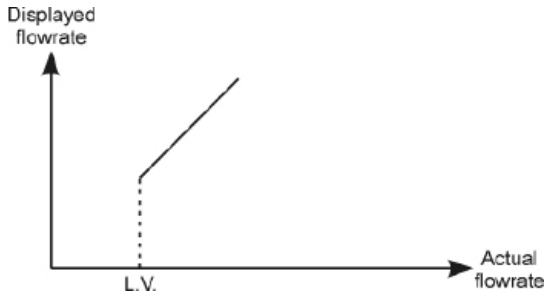
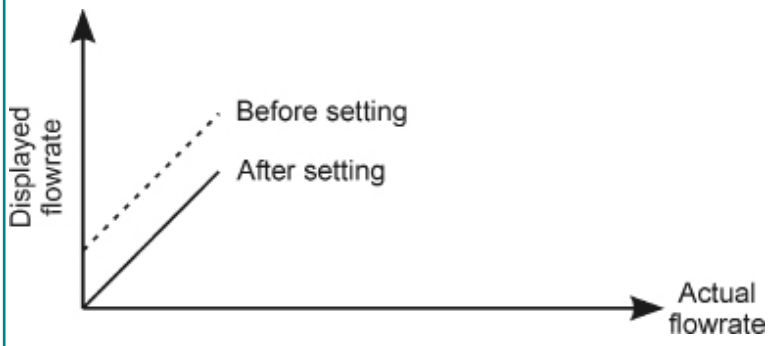
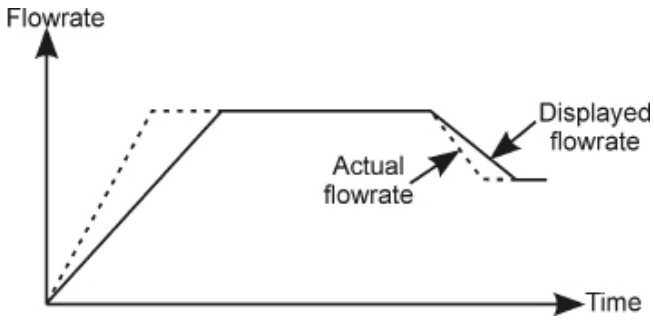


Fig. 16-3

8. MAIN PARAMETERS DESCRIPTION

Name	Displaying	Description	Param.
Pipe Ø	Pipe Outer Diameter	 (Pipe cross section) Pipe Outer diameter	**#02**
Pipe thickness	Pipe Wall Thickness	 (Pipe cross section) Pipe thickness	**#03**
Pipe material	Pipe Material	Carbon Steel; Stainless Steel; Cast Iron; Ductile Iron; Copper; PVC (Plastics in general); Aluminium; Asbestos; Fiberglass-Epoxy Other	**#05**
Inner lining material	Liner Material	None, No Liner; Tar Epoxy; Rubber; Mortar; Polypropylene; Polystyrol; Polystyrene; Polyester; Polyethylene; Ebonite; Teflon; Other	**#07**
Pipe inner lining thickness	Liner Thickness	 (Pipe cross section) Pipe inner lining thickness	**#09**

Name	Displaying	Description	Param.
Transducers mounting method	Transducer Mounting	  The transducers may be mounted on the pipe in 4 different methods: **V**; **Z**; **N**; **W** and **V**. The mounting method choice is in application conditions function. The most frequently used mounting methods are **V** and **Z**.	**#14**
Transducers mounting distance	Transducer Spacing	 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.	**#15**
Instantaneous flow rate measure unit	Flow Rate Unit	Measure units associated with the instantaneous flow rate measurement. m^3/h	**#17**
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)	**#18**

Nome	Visualizzazione display	Descrizione	Param.
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 	**#24**
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	**#25**
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 	**#28**
Correction coefficient	Scale Factor	Coefficient for correcting the measurement accuracy. Range 0.5 ÷ 1.5%	**#29**

9 HOW TO OPERATE

9.1 How to start and stop data record

Press “LEFT” and “ENTER” at the same time, then start to record
Press “LEFT” and “MENU” at the same time, then stop to record

Data record content **Data length,time record interval,record time**

Data record time	Data length	Record interval(S)	Record time(H)
Instantaneous flow rate	~70KB	5	1
Instantaneous velocity	~70KB	10	1
Totalizer flow rate	~35KB	20	1
POS totalizer flow	~18KB	30	1
NET totalizer flow	~12KB	60	1
Up stream signal strength	~6KB	5	8
Down stream signal	~552KB	10	8
Signal quality	~138KB	20	8
Transmiter time ratio	~92KB	30	8
Battery	~46KB	60	8

NB:

before data recording, the SD card is inserted in the right way

please do not put the card out during data recording,or the data would be lost

please do not modify the specification during data recording

during data recording,the specification windown would not available

9.2 How to check flow curve

Press “UP”,
the window would display the flow curve,
the data collect interval time is the same as the recording interval time.
To different data storage time interval corresponds different Curve length.

Curve interval time	Collecting interval time
20minutes	5 seconds
40minutes	10 seconds
1hour and 20minutes	20 seconds
2hours	30 seconds
4hours	60 seconds

9.3 How to check data recording status

Press “DOWN”, data recording status would be displayed, including data name, storage interval, storage begining time, continued storage time.

9.4 How to check SD card memory

Holding down the “RIGHT”, the display will show the available memory capacity. When the “RIGHT” button is released the information disappears

9.5 How to set the measurement systems

9 British (in) or Metric (mm) units system in #16 parameter.

9.6 How to set flow unit
Set totalizer flow unit in M18

9.7 How to use the totalizer multiplier
Use window M19 to select a proper totalizer. Make sure that the totalizer pulse is appropriately speeded.

9.8 How to enable or disable the totalizers
Use M20, M21 and M22 to enable or disable the POS, NEG, or NET totalizer respectively.

9.9 How to reset the totalizers
To reset the totalizers use M23

9.10 How to use the damper
The damper acts as a filter for a stable reading. If “0” is entered in window M28, that means there is no damping. A bigger number brings a more stable effect. Bigger damper numbers will prevent the instrument from acting quickly. Numbers 0 to 15 are commonly used for the damper value.

9.11 How to use the zero-cutoff function
The number displayed in window M24 is called the low-cutoff value. The flow meter will replace these flow rate values that are absolutely less than the low-cutoff value with “0”. This means the flow meter will avoid any invalid accumulation when the actual flow is below the zero-cutoff value.
The low-cutoff value does not affect the flow measurement when the actual flow is absolutely greater than the low-cutoff value.

9.12 How to get a meter factor for calibration
The meter factor is the ratio between the “actual flow rate” and the indicated value by the flow meter.
The meter factor can be determined by calibration with flow calibration equipment. You can set it in M29

9.13 How to chose the menu language
Select menu language in M31

9.14 How to set data record interval time
Set in M32: 5s; 10s; 20s; 30s; 60s.

9.15 How to set date and time
Set date and time in M33.

9.16 How to set graph measurement
Set measure range in M34: 0÷5m3/h, 0÷10m3/h, 0÷20m3/h, 0÷50m3/h, 0÷100m3/h, 0÷200m3/h, 0÷500m3/h, 0÷1000m3/h, 0÷2000m3/h, 0÷5000m3/h.

9.17 Folders and files menu
Meter can read 32 months folder with 64 folder files

9.17.1 Choose folder
When entering the menu, the cursor is in the folder column.

Press “UP”/”DOWN” to select folder, the selected folder would change to blue, then press “LEFT”/”RIGHT” to change the page.

9.17.2 Enter in folder

Press “ENTER” to reach the folder, all the files are displayed, at the same time the folder coulor changes to orange.

9.17.3 File selection

Press “UP”/”DOWN” to select a file, the file name changes to blue.
Press “LEFT”/”RIGHT” to change the page.
Press “ENTER” to open the file and display the flow curve graph.
Press “MENU/CANCEL” to go back.
Press “MAIN” to return to the main window.

9.17.4 Flow curve graph

Press “LEFT”/”RIGHT” to change a page.
Press “UP”/”DOWN” to enlarge and reduce the graph value.
Press “MENU/CANCEL” to go back to the windown, and continue to read and select file and folder.
Press “MAIN” to return to the main window.

Interval time	Time of small form	Time of big form	Time of curve
5s	1m	5m	30m
10s	2m	10m	1h
20s	4m	20m	2h
30s	6m	30m	3h
60s	12m	60m	6h

SGM-200H - 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, repairs 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.

SGM-200H - Factory Test Certificate CE

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

SGM-200H..... part nb. .....

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

Meter Factor: .....

Quality Control Manager: .....

Production and check date: .....

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