PR-2025-009_3

PLIEGO DE PRESCRIPCIONES TECNICAS

QUE HABRÁ DE REGIR LA LICITACIÓN, MEDIANTE PROCEDIMIENTO ABIERTO, DEL CONTRATO DE ***SERVICIO DE INSTALACIÓN DE CAUDALÍMETROS Y SENSORES DE PRESIÓN EN DEBABARRENA Y OTROS SISTEMAS MENORES***, FINANCIADOS CON FONDOS PROCEDENTES DEL MECANISMO PARA LA RECUPERACIÓN Y RESILENCIA – NEXT GENERATION EU EN EL MARCO DEL COMPONENTE 5 “PRESERVACIÓN DEL LITORAL Y RECURSOS HÍDRICOS” INVERSIÓN 3 (C5.I3) DENOMINADA «TRANSICIÓN DIGITAL EN EL SECTOR DEL AGUA»

DOCUMENTOS APLICABLES Y RELACIONADOS

CONTROL DE CAMBIOS

Edición	Fecha	Punto	Cambios respecto a la versión anterior
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1 ANTECEDENTES

1.1 AMBITO

El Consorcio de Aguas de Gipuzkoa a través de Gipuzkoako Urak es el responsable de la explotación y conservación de los sistemas de abastecimiento de Urola Garaia, Goierri y Aia-Iturrieta. A través de estos sistemas de abastecimiento en Alta se realiza el suministro de agua a los siguientes muinicipios:

- Debagoiena: Leintz-Gatzaga, Albitxu y Goiko Benta.
- Debabarrena: Mallabia, Errotabarri, Kilimon y Goikoetxe
- Urola Kosta: Beizama, Aia y Errezil

Este abastecimiento se realiza a través de los siguientes elementos de la red:

- Captaciones: Leintz-Gatzaga, Pol-Pol, Goiko Benta, Irabaneta, Pozos K1 y K3, Mahala, captaciones Deba, captaciones Beizama y Urtzeta.
- Estaciones de Tratamiento de Agua Potable: Leintz-Gatzaga, Albitxu, Errotabarri, Kilimon, Goikoetxe y Aia.
- Redes de distribución: conducciones y elementos de red de Debagoiena, Debabarrena y Urola Kosta incluidos en las captaciones y ETAPs anteriores.
- Depósitos: depósitos de Debagoiena, Debabarrena y Urola Kosta incluidos en las captaciones y ETAPs anteriores.

1.2 OBJETO

El objeto del presente pliego es la contratación de las obras que comprenden el suministro, obras auxiliares, instalación y puesta en marcha de una serie de equipos de medida de caudal. Estos equipos serán colocados en las presas, ETAP´s, en puntos de la red de distribución y en depósitos.

Se establece como objetivo que los caudalímetros existentes y los nuevos a instalar, y que resulten relevantes para el control hídrico, dispongan de comunicación Modbus en tiempo real con los sistemas de Control y Adquisición de Datos, a través de los PLC´s implementados en las diferentes instalaciones. Por ello, se pretende alcanzar el siguiente estándar en todos los sistemas:

- Que todos los caudales de salida de las captaciones estén controlados por caudalímetro o aforador y dispongan de comunicación por Modbus.
- Que todos los caudales de entrada, purgas, lavado de filtros y de salida de la ETAP estén controlados y dispongan de comunicación por Modbus.

- Que todos los caudales de entrada y salida de los depósitos, tanto los de cabecera como los de distribución, estén controlados y dispongan de comunicación por Modbus.
- Instalación de caudalímetros sectoriales que permitan una mejora del control hídrico.

Es por ello, que la contrata tendrá que realizar las siguientes acciones:

- Suministro de nuevos caudalímetros.
- Suministro de cabezales de lectura.
- Trabajos de calderería y fontanería para adaptación en aquellos puntos donde se requiera.
- Cableado del sistema de comunicaciones de los caudalímetros.

En ningún caso, el presente contrato requiere de trabajos de programación en PLC´s o SCADA, sino que el alcance termina en el cableado del caudalímetro hasta el PLC.

2 DESCRIPCION DEL AMBITO y la ACTUACION

2.1 AMBITO

Tal y como se establece en el capítulo de la introducción, los trabajos deberán de ejecutarse en los sistemas de Debagoiena, Debabarrena y Urola Kosta sobre los siguientes subsistemas:

- Debagoiena: subsistemas de Leintz-Gatzaga, Albitxu y Goiko Benta.
- Debabarrena: subsistemas de Mallabia, Errotabarri, Kilimon y Goikoetxe
- Urola Kosta: subsistemas de Beizama, Aia y Errezil

En el ANEXO I. ESQUEMAS DEL SISTEMA DE DISTRIBUCION DE ALTA del presente documento se incluyen los esquemas de los tres sistemas para mejor comprensión de los alcances. En estos esquemas se incluyen dentro de nubes de revisión aquellos elementos que forman parte del presente alcance.

Con el objetivo de establecer claramente los alcances a ejecutar, primeramente, realizaremos una descripción detallada de cada uno de ellos, para a continuación describir los trabajos que será necesario realizar en cada una de las instalaciones.

2.2 DESCRIPCION DE LA ACTUACION

De manera general, ya se ha descrito en el Capítulo 1.2. OBJETO los alcances del trabajo. Para alcanzar esos objetivos, será necesario realizar las siguientes actuaciones:

- Instalación de sistemas de control de caudales en captaciones de Laintz-Gatzaga, Pol-Pol y captaciones Deba.
- Instalación de sistemas para el control de caudales de entrada, salida, aguas de lavado y purgas de fangos en las ETAP´s.
- Sustitución de aquellos caudalímetros que no sean compatibles con la tecnología de comunicación Modbus.
- Instalación de nuevas tarjetas o cabezales de lectura compatibles con la tecnología de comunicación Modbus.
- Cableado de los nuevos equipos.
- En los caudalímetros que anteriormente se comunicaban por señales analógicas, únicamente será necesario conectar la señal analógica. Mediante un alcance adicional se comunicará la señal Modbus con el autómata.

- Los caudalímetros nuevos se deberán dejar conectados a través de la señal analógica. Mediante un alcance adicional se comunicará la señal Modbus con el autómata.
- Obras civiles y calderería necesaria para la instalación de estos equipos.

2.3 LISTADO DE TRABAJOS

Con el objetivo de facilitar los trabajos, descripción y redacción del presupuesto, el presente pliego define los alcances mediante los siguientes trabajos:

- Instalación de control de volúmenes en captaciones.
- Instalación de sistema de control de medida de aguas de lavado en ETAP.
- Instalación de sistema de control de medida de purgas del decantador en ETAP.
- Instalación de caudalímetro a la entrada de depósito de ETAP.
- Instalación de caudalímetro a la salida de depósito de ETAP.
- Instalación de nuevo caudalímetro de entrada o salida de depósito.
- Actualización de caudalímetro de entrada o salida de depósito.
- Instalación de cabezal de lectura y comunicaciones en caudalímetro de entrada o salida de depósito.

En el ANEXO 4. RELACION DETALLADA DE TRABAJOS. se incluye un listado detallado de las acciones a realizar en cada uno de los caudalímetros.

3 ALCANCES

A continuación, se realiza una descripción detallada de cada uno de los trabajos a ejecutar en base a las descripciones del capítulo anterior.

3.1 MEDICION DE CAUDALES POR SONDA DE NIVEL

El trabajo comprende la instalación de nuevos equipos de media de nivel en la captación de Pol-Pol, en la captación de Irabaneta y en la obra de llegada de la ETAP de Kilimon. Se establecen intervenciones diferentes en función del punto de actuación.

- Cueva de Irabaneta: la salida de la captación consiste en una conducción en canal, en la cual actualmente hay instalado un limnígrafo que recoge en continuo la cota del canal. Aprovechando la instalación del limnígrafo, se instalará en el mismo punto una sonda de nivel de precisión no sumergida, la cual comunicará mediante un datalogger al Front-End de la ETAP de Kilimon. Este equipo se alimentará mediante placas solares y la comunicación se realizará por 4G. Los equipos para instalar son los siguientes:
  - Sonda Vegaplus C11.
  - Cuadro de intemperie equipado con autómata Siemens S7-1200 con tarjeta de comunicaciones 4G.
  - Instalación fotovoltaica con sistema de baterías.
- Captación de Pol-Pol: se trata de una captación que recoge el caudal detraído en una arqueta. En esta arqueta se dispondrá de un vertedero de dimensiones adecuadas para medir el caudal detraído. Se instalará en el interior de la arqueta una sonda de nivel de precisión no sumergida, la cual comunicará mediante un datalogger al Front-End de la ETAP de Urkulu. Este equipo se alimentará mediante placas solares y la comunicación se realizará por 4G. Los equipos para instalar son los siguientes:
  - Sonda Vegaplus C11.
  - Cuadro de intemperie equipado con autómata Siemens S7-1200 con tarjeta de comunicaciones 4G.
  - Instalación fotovoltaica con sistema de baterías.
- Obra de llegada ETAP Kilimon: la obra de llegada de la ETAP consiste en una arqueta de la cual se derivan los excedentes al cauce. Esta derivación se realiza por vertedero. Por tanto, para poder medir el caudal derivado se instalará una sonda de nivel no sumergida. Este equipo se cableará directamente al autómata de la planta de Kilimon.

Los equipos instalados deberán comunicar contra el Front-End correspondiente (ETAP Urkulu para Pol-Pol y ETAP Kilimon para Irabaneta y Kilimon). Los trabajos de integración en el SCADA serán realizados por cuenta de Gipuzkoako Urak.

3.2 INSTALACION DE NUEVOS CAUDALIMETROS ELECTROMAGNETICOS

3.2.1 Instalación de nuevo caudalímetro.

Este trabajo comprende el suministro, instalación y cableado de caudalímetro nuevo allí donde no existía ninguno, así como los trabajos de calderería necesarios para su instalación. Estos trabajos de calderería incluirán lo siguiente:

- Corte de la conducción actual.
- Instalación o soldado de piezas de acoplamiento, en función de la tipología de la tubería.

En algunas de las instalaciones será necesario actuar sobre conducciones de fibrocemento, por lo que el contratista deberá solicitar los permisos correspondientes y realizar la gestión de este material conforme a la normativa vigente.

El contratista deberá verificar que los diámetros de los nuevos caudalímetros sean los adecuados para la instalación.

Los caudalímetros serán suministrados en base a los diferentes diámetros incluidos en las mediciones. Los equipos para instalar serán los incluidos en el ANEXO 3. FICHA TECNICA DEL CAUDALIMETRO ELECTROMAGNETICO. Debido a la disponibilidad de repuestos para mantenimiento en los almacenes de Gipuzkoako Urak, se requiere la instalación de los siguientes equipos:

- Sensor: SITRANS FM MAG 5100W
- Convertidor de señal: MAG 6000

Todos los equipos contarán con protocolo de comunicaciones por Modbus. Se cableará la salida analógica hasta el controlador existente en el depósito, por lo que pese a contar con comunicación Modbus únicamente se dejará operativa la señal analógica.

Además de los trabajos de calderería, se consideran los siguientes trabajos:

- Suministro de caudalímetro y convertidor de señal, así como todos los elementos necesarios para su montaje.
- Suministro de carrete de montaje.
- Suministro de cableado para acometida eléctrica y de comunicaciones.

- Instalación de todos los equipos, cableado y conexionado. Señal analógica.
- Configuración inicial y puesta en marcha.

3.2.2 Actualización de caudalímetro de entrada o salida de depósito.

Este trabajo comprende la instalación de un nuevo caudalímetro allí donde ya existe uno, por lo que no se requerirá de trabajos de calderería para la adaptación.

Los caudalímetros serán suministrados en base a los diferentes diámetros incluidos en las mediciones. Los equipos para instalar serán los incluidos en el ANEXO 3. FICHA TECNICA DEL CAUDALIMETRO ELECTROMAGNETICO. Debido a la disponibilidad de repuestos para mantenimiento en los almacenes de Gipuzkoako Urak, se requiere la instalación de los siguientes equipos:

- Sensor: SITRANS FM MAG 5100W
- Convertidor de señal: MAG 6000

Todos los equipos contarán con protocolo de comunicaciones por Modbus. Para el cableado, se seguirá el siguiente criterio:

- Si el equipo existente está comunicado con señal analógica, se comunicará la señal analógica.
- Si el equipo existente está comunicado con Modbus, se comunicará la señal Modbus.

No habrá trabajos de calderería. se consideran los siguientes trabajos:

- Suministro de caudalímetro y convertidor de señal, así como todos los elementos necesarios para su montaje.
- Suministro de nuevo carrete de montaje.
- Suministro de cableado para acometida eléctrica y de comunicaciones.
- Instalación de todos los equipos, cableado y conexionado. Señal analógica.
- Configuración inicial y puesta en marcha.

3.2.3 Instalación de nuevo controlador compatible con el sensor existente

Se trata de instalaciones que disponen de un sensor MAG-3100 o MAG-5100, pero equipados con controladores MAG-5000 o MAG-2500. Estos controladores no permiten la instalación de una tarjeta para comunicación por Modbus, por lo que será necesario cambiar el controlador. Debido a la disponibilidad de repuestos para mantenimiento en los almacenes de Gipuzkoako Urak, así como la compatibilidad entre sensores y controladores, se requiere la instalación de los siguientes equipos:

- Convertidor de señal: MAG 6000

Todos los equipos contarán con protocolo de comunicaciones por Modbus. Para el cableado, se seguirá el siguiente criterio:

- Si el equipo existente está comunicado con señal analógica, se comunicará la señal analógica.
- Si el equipo existente está comunicado con Modbus, se comunicará la señal Modbus.

No habrá trabajos de calderería. se consideran los siguientes trabajos:

- Suministro de convertidor de señal, así como todos los elementos necesarios para su montaje.
- Suministro de cableado para comunicaciones, en caso de ser necesario.
- Instalación del controlador, cableado y conexionado. Señal analógica.
- Configuración inicial y puesta en marcha.

3.2.4 Instalación de tarjeta de comunicaciones en caudalímetro de entrada o salida de depósito.

Estos trabajos se realizarán en aquellos depósitos en los cuales, pese a existir caudalímetro que cumple con las actuales especificaciones, este no está comunicado al no contar con la correspondiente tarjeta de comunicaciones. En ola mayoría de los casos se trata de controladores MAG-6000 (11 unidades) aunque también hay controladores MAG-8000 (5 unidades).

Los equipos para instalar serán los incluidos en el ANEXO 3. FICHA TECNICA DEL CAUDALIMETRO ELECTROMAGNETICO. Debido a la disponibilidad de repuestos para mantenimiento en los almacenes de Gipuzkoako Urak, así como la compatibilidad entre sensores y controladores, se requiere la instalación de los siguientes equipos:

- Tarjeta de comunicaciones: Modulo Modbus RTU acoplable solo a MAG6000 (11 unidades)
- Tarjeta de comunicaciones: Modulo Modbus RTU acoplable solo a MAG8000 (5 unidades)

Todos los equipos contarán con protocolo de comunicaciones por Modbus.

3.3 INSTALACION DE CAUDALIMETROS EN ETAP y LINEAS DE DISTRIBUCION

Dentro de este capítulo, se incluye la instalación y renovación de una amplia gama de caudalímetros, electromagnéticos, que se encargan de medir los caudales a la entrada o salida de las ETAPs así como los consumos internos. Tendremos diferentes tipologías y diámetros, tal y como va a quedar claramente reflejado en este capítulo. Asimismo, en las mediciones del proyecto se detalla claramente que trabajos sería necesario realizar.

Es necesario aclarar que los trabajos de calderería a realizar se describen de manera aproximada, y que allí donde sea necesario, el contratista deberá realizar una evaluación y medida detallada. Sin embargo, en la

mayoría de los casos estos equipos se colocarán en las cámaras de llaves, por lo que la exigencia será la de cortar conducciones e instalar los nuevos equipos, o simplemente sustituir allí donde solo sea necesario sustituir o actualizar.

3.3.1 Instalación de nuevo caudalímetro de salida ETAP Kilimon y Errotabarri.

Dentro de esta tipología se encuentra la instalación de caudalímetros para la medición de las dos salidas de la ETAP Kilimon y la salida de la ETAP Errotabarri. En la ETAP Kilimon tenemos las salidas hacia el bombeo Elgoibar y hacia el bombeo Sasiola.

El bombeo de Elgoibar se encuentra próximo a la ETAP. En el tramo de conducción entre la ETAP y el bombeo, lo más próximo del bombeo, se instalará un caudalímetro tipo clamp-on dentro de una nueva arqueta a ejecutar en el camino, cableando hasta al autómata del bombeo. La ubicación aproximada sería la siguiente:



Figura 1. En círculo rojo, ubicación tentativa del caudalímetro.

El equipo a instalar será un caudalímetro ultrasónico no intrusivo (tipo clamp-on) para tubería DN500, con comunicación mediante protocolo Modbus y unidad de control.

En cuanto a la conducción del bombeo de Sasiola, esta discurre paralela a la conducción de Elgoibar. En la misma zona donde se va a instalar el caudalímetro del bombeo de Elgoibar, se instalará también un caudalímetro para el control del bombeo de Sasiola. Igualmente se ejecutará en una arqueta y se canalizará a la estación de bombeo de Elgoibar.

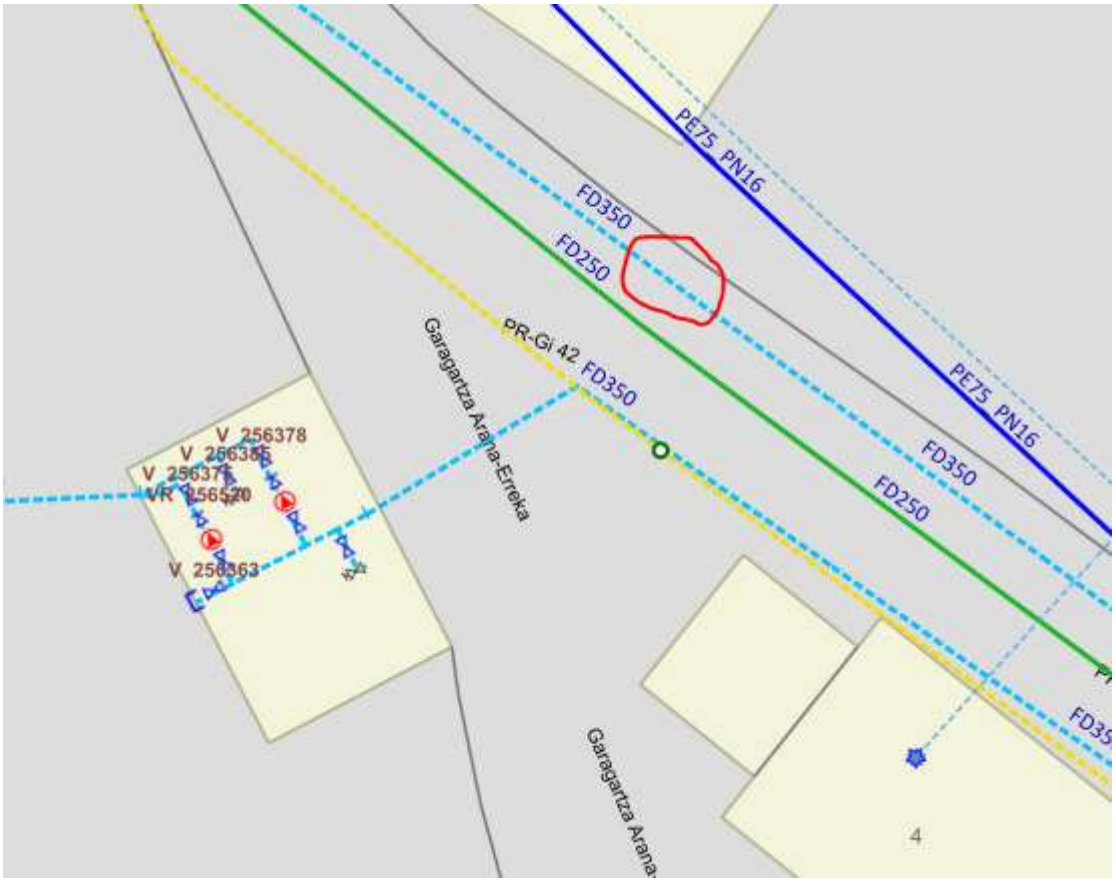


Figura 2. En círculo roja, ubicación tentativa del caudalímetro de la línea de Sasiola.

Por otro lado, en la ETAP de Errotabarri, se deberá instalar otro tipo clam-on en la conducción a la salida de la ETAP. En este caso, se deberá ejecutar una arqueta.

3.3.2 Instalación de caudalímetro para el control de agua de lavado de filtros.

En las ETAPs de Errotabarri, Aia y Kilimon se deberá instalar un caudalímetro para el control de caudal de lavado de filtros. Este será un caudalímetro electromagnético, que deberá interponerse en la línea de lavado, con la mínima intervención posible. Este equipo se cableará hasta el autómata de control de la planta.

3.4 INSTALACION DE SENSORES DE PRESION

Dentro de esta actuación se incluye la instalación de sensores de presión en todas las derivaciones de la conducción de Alta. Estos se instalarán aprovechando los picajes y tomas de agua existentes en estas derivaciones y se cablearán al autómata existente en esa derivación o al depósito mas próximo. Asimismo, en aquellos puntos donde se estime necesario se instalarán antes de las válvulas de entrada a depósitos.

Se instalará un equipo Vegabar 19 o similar, equipado con lectura 4-20 mA sin pantalla de visualziación.

4 CONDICIONES

4.1 APORTACIONES DE GIPUZKOAKO URAK

No será responsabilidad de contratista los siguientes aspectos:

- Suministro de agua potable
- Suministro de energía eléctrica. El contratista podrá conectarse a los circuitos existentes en las plantas y depósitos, pero deberá aportar los alargadores necesarios.
- Configuración de comunicaciones Modbus y Scada.
- Nuevas tarjetas de entrada a los autómatas allí donde no existan entradas libres.

4.2 APORTACIONES DEL CONTRATISTA

El contratista será responsable de suministrar todos los materiales, mano de obra, equipos y medios auxiliares necesarios para la ejecución de los trabajos, incluso aquellos equipos de elevación o transporte para introducir los materiales en el interior de la galería y extraer los residuos.

En particular todos los caudalímetros con las piezas especiales necesarias para el montaje de sensores y unidades de lectura. Todo el cableado necesario para la comunicación modbus y analógica, allí donde sea necesario y su correcto conexionado en el cuadro. El contratista será también el encargado de configurar las señales analógicas de todos aquellos caudalímetros con conexionado analógico.

4.3 MEDIO AMBIENTE

El contratista deberá de cuidar en todo momento el acopio y gestión de los residuos generados durante los trabajos.

Al comenzar los trabajos deberá entregar el Plan de Gestión de Residuos que será validado y aprobado por Gipuzkoako Urak.

4.4 PLAZO DE EJECUCION

Será de DOCE (16) semanas a partir de la firma del acta de replanteo. En este plazo se incluirá el acopio de materiales, su instalación y puesta en marcha.

ANEXO I. ESQUEMAS DEL SISTEMA DE DISTRIBUCION DE ALTA

ABASTECIMIENTO URKULU

AZUD BOLIBAR 2

AZUD BOLIBAR 1

URTEGIA URKULU

DEPÓSITO AINGERUGUARDA ZELAITZUETA
2 Camaras 1.203 m³

DEPÓSITO ANTXOTEGI ELGETA
2 Camaras 500 m³

ARQ. DE AMORTIGUACION
2 Camaras 240 m³

DEPÓSITO ANGIOZAR

DEP. SORALUZE BAGOZKOITIA
2 Camaras 432 m³

DER. SORALUZE

ABASTECIMIENTO

DEPÓSITO BOLIBAR
2 Camaras 932 m³

ARQ. DER. BOLIBAR

BBO. ELGETA ANGIOZAR
B1 13 l/sg.
B2 13 l/sg.

DEPÓSITO AITZA ANTZUOLA
2 Camaras 322 m³

DEPÓSITO TXARA BERGARA
2 Camaras 3422 m³

VACIADO

VACIADO

ENTRADA PLANTA

DEPÓSITO ZALDISPE ARRASATE
2 Camaras 6.900 m³

B1 20 l/sg.
B2 20 l/sg.

BOMBEO ANTZUOLA

DEPÓSITO BOLU

DEPÓSITO ARETXABALETA
2 Camaras 4.000 m³

DER. ARETXABALETA

DER. BOLU

2 Camaras 1.000 m³

E.T.A.P. URKULU

TUNEL ARRASATE

DER. ZUBILLAGA

ARQ. DER. BERGARA

ARQ. DER. OSINTXU

ENTRADA TUNEL

BBO. PRESA
B1 78 l/sg.
B2 37 l/sg.
B3 37 l/sg.

DER. ARRASATE

ARQ. DER. ANTZUOLA

2 Camaras 3.150 m³

DEP. OÑATI URRUTXU
2 Camaras 6.286 m³

DEPÓSITO OSINTXU 1 Camara 500 m³

ABASTECIMIENTO EIBAR (DEBABARRENA KILIMON)

AZUD OLAUN

DEPÓSITO GATZAGAIN
2 Càmaras 97 m³

BOMBEO GATZAGAIN
B1 = 2,7 l/sg.
B2 = 2,7 l/sg.

1 Camara 270 m³

NNAA LEINTZ - GATZAGA
ETAP OLAUN

AZUD POL POL

DEPÓSITO ALBITXU
2 Càmaras 2 x 1100 m³

ETAP ALBITXU
2 Camaras 2.222 m³

Gipuzkoako Ur Kontsortzioa
Gipuzkoako Urak

TELEMANDO

PLANO DE ABASTECIMIENTO

	EGUNA	IZENA	IZENBURU	IT-51.01.002.05 Rev.12		
MARRAZTU	2024/05/15	J.M.A	INSTALAZIOA	URKULU		
EGIAZTATU			Rev.	12	Vº Bº	

ABASTECIMIENTO KILIMON

DEPÓSITO MENDARO
1200 m³
2 Camaras

DEPÓSITO ALTZOLA
250 m³
2 Camaras

DERIVACION ALTZOLA

DEPÓSITO ARRIAGA INDUSTRALDEA
600 m³
1 Camara

DEPÓSITO KAKATZA ELGOIBAR
4000 m³
2 Camaras

BOMBEO ELGOIBAR
2 Bbas. 100 CV.
45 l/sg. c/bba

BBO.MAHALA
2 Bbas. 37 CV.
30 l/sg. c/bba

E.T.A.P. KILIMON

K1
1Bba.
73 CV.
15 l/sg.

CUEVA IRABANETA

K2
1Bba.
32 CV.
8 l/sg.

K3
1Bba.
105 CV.
80 l/sg.

2 Bbas.
28 l/sg. c/bba
BOMBEO SASIOLA

DEPÓSITO SOLOMO
124 m³
1 Camara

DEPÓSITO KALBARIO
2500 m³
2 Camaras
BOMBEO ARNOPE

CASETA de DERV. GABILONDO

DEPÓSITO ISTIÑA
1530 m³
2 Camaras

NNAA GOIKOETXE
2000 m³
1 Camara

BOMBEO GOIKOETXE – ITZIAR
2 Bbas. 90kW
38 l/sg. c/bba

BBO.TANTORTA
2 Bbas.
20/25 l/sg. c/bba

ARQ. UNION TANTORTA-COTAS

DEPÓSITO ITZIAR
1800 m³
2 Camaras

ARQ. UNION COTA 400 ITURRIHAUNDI

ARQ. de REUNION "COTA 300-COTA 400"

ARQ. DERV. AITTOLA

ITURRI HAUNDI

CAPTACION COTA 400

BBo. AITTOLA

DEPÓSITO AITTOLA
200 m³
2 Camaras

CAPTACION COTA 300

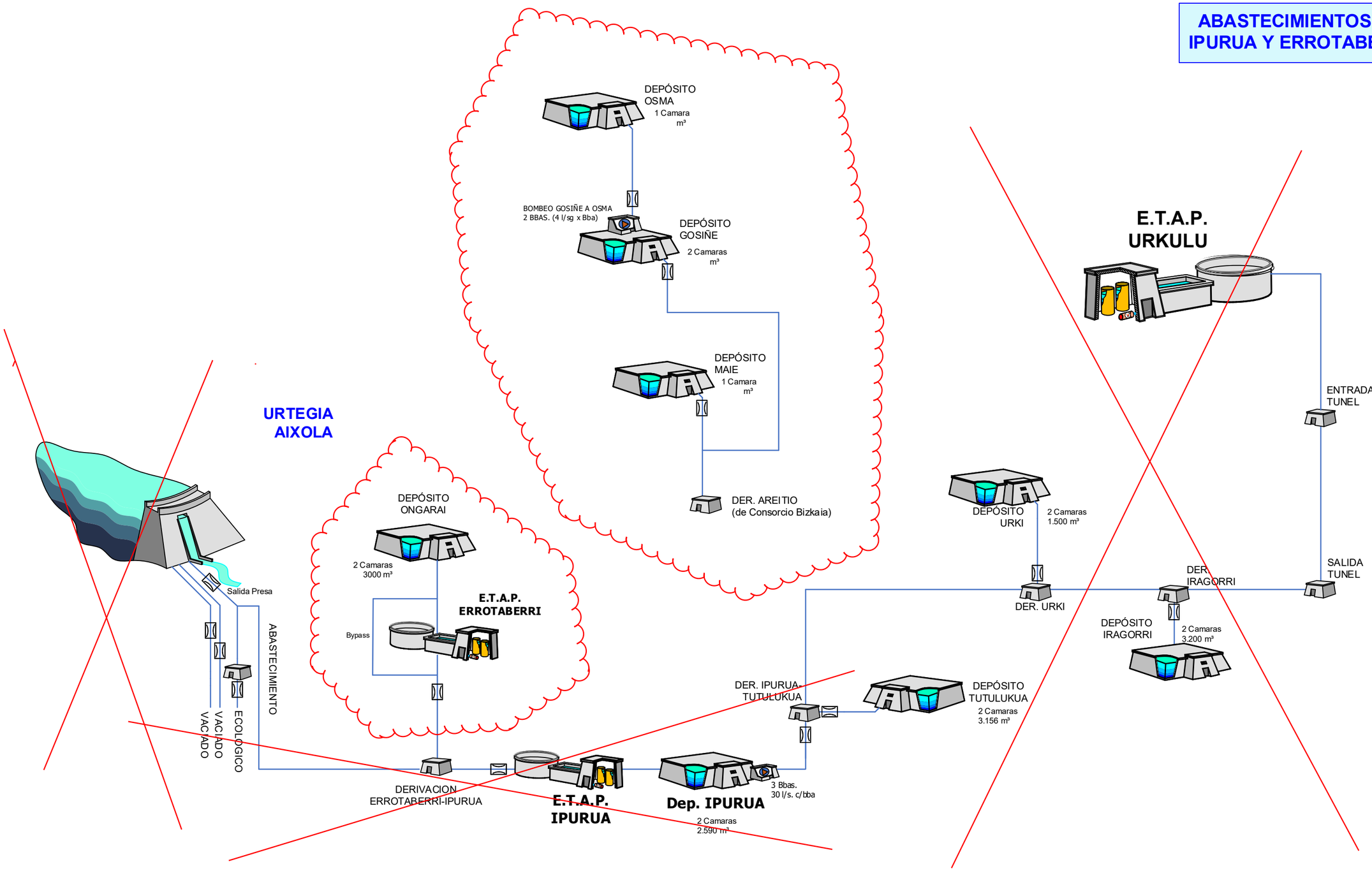
Gipuzkoako Ur Kontsortzioa
Gipuzkoako Urak

TELEMANDO

PLANO DE ABASTECIMIENTO

	EGUNA	IZENA	IZENBURU	IT-51.03.002.05 Rev.11		
MARRAZTU	2024/05/15	J.M.A	INSTALAZIOA	KILIMON TELEMANDO		
EGIAZTATU			Rev.	11	Vº Bº	

ABASTECIMIENTOS DE IPURUA Y ERROTABERRI



Gipuzkoako Ur Kontsortzioa / Gipuzkoako Urak	**TELEMANDO** *PLANO DE ABASTECIMIENTO*		EGUNA	IZENA	IZENBURU	IT-51.03.002.05 Rev.11
		MARRAZTU	2024/05/15	J.M.A	INSTALAZIOA	KILIMON TELEMANDO
		EGIAZTATU			Rev. 11	Vº Bº

ABASTECIMIENTO IBAIEDER

ABASTECIMIENTO BARRENDIOLA

REGATA MANTXINBENTA
REGATA DOMINGO
REGATA BEIZAMA
REGATA AIERTZA
URTEGIA
BOMBEO PRESA / ETAP
2 Bbas. 79 Kw. 350 m³/h.
SALIDA PRESA
ECOLOGICO
VACIADO H.D.
VACIADO H.I.
FILTRACIONES
ENTRADA PLANTA
ABASTECIMIENTO
DERIVACION GALDOS
DEP. BBO. EGURROLA
2 Bbas. 250 Kw. 252 m³/h.
3943 m³
BOMBEO MEKOLETA
3 Bbas. 7,5 Kw. 60 m³/h.
DEP. MEKOLETA
878 m³
DEP. ZESTOA
1854 m³
DEP. ARROA GOIKOA
32 m³
DEP. SANSINENEA
1910 m³
DEP. MENDITXIKI
85 m³
ARQ. DER. ARROA
ARQ. DER. AZKOITIA ALTO Y BAJO nº 818
ARQ. DER. DANONA
DERIVACION ZESTOA
ARQ. DER. IRAETA
DER. AIZARNAZABAL
BBO. MENDITXIKI
2 Bbas. 1,5 Kw. 7,2 m³/h.
CL
DERIVACION OIKINA
BOMBEO AIZARNA
2 Bbas. 30 Kw. 45 m³/h.
DEP. AIZARNA
178 m³
388 m³
DEP. DANONA
1478 m³
DEPÓSITO AIZARNAZABAL
DEP. GETARIA
BBO. GARATE
2 Bbas. 15 Kw. 15-39 m³/h.
667 m³
266 m³
DEP. GARATE
ARQUETA DER. ASKIZU
271 m³
DEP. ASKIZU
DER. BASAKARTE
3885 m³
DEP. ZUMAIA SAN MIGUEL
BBO. ARTADI (Baja)
2 Bbas. 2,2 Kw. 17 m³/h.
492 m³
DEP. ARTADI
ARQ. DER. ARTADI
BBO. ELKANO
2 Bbas. 5,5 Kw. 10 m³/h.
ARQ. DER. ELKANO
45 m³
DEP. ELKANO
1239 m³
DEP. ALEGRE
DERIVACION VISTA-ALEGRE
DEP. UNSAIN
4425 m³
DERIVACION UNSAIN
CAMPING
DERIV. AÑURBE
1016 m³
DEP. AÑURBE
5442 m³
DEP. ORIO KATXINA
BBO. ORIO (Baja)
2 Bbas. 11 Kw. 21 m³/h.
AIA
BBO. AZPEITIA (Bomberos)
3 Bbas. 75 Kw. 279 m³/h.
Antiretorno
DERIVACION AZKOITIA
R
SALIDA AZPEITIA
AZUD GILTZAITURRI
CUEVA BOMBEO
1 Bba. ?? CV. ?? l/sg.
DEP. AGUA BRUTA
AZUD UTSETA
N.N.A.A. AIA
275 m³
ERREZIL DEP. ALBITSU
288 m³
SALIDA AZPEITIA
DEP. BBO. LOKATE
1 Bba..
DEP. BBO ANDATZA (Baja)
2 Bbas.
DEP. BBO. UZKUDUN (Baja)
2 Bbas.
DEP. BBO. MOYBEN (Baja)
2 Bbas.
ECOLOGICO
A proceso
Al rio
E.T.A.P. IBAIEDER
RECUPERACION
CAUDALIMETRO DE LAS BOMBAS AL RIO O A PROCESO
UROLA IBAIA

Gipuzkoako Ur Kontsortzioa Gipuzkoako Urak	**TELEMANDO** ***PLANO DE ABASTECIMIENTO***		**EGUNA**	**IZENA**	**IZENBURU**	**IT-51.5.002.02 Rev.15**
		MARRAZTU	**2025/03/23**	**J.M.A**	**INSTALAZIOA**	**IBAIEDER**
		EGIAZTATU			**Rev.** **15**	**Vº Bº**

ANEXO 2. FICHA TECNICA DEL CAUDALIMETRO CLAMP-ON

SGM-101F

Transit time ultrasonic flowmeter

825B122A

Features

- **Pipe dimension range:** DN20 ÷ DN4000
- **Transmitter protection class:** IP66
- **Transducer protection class:** IP68
- **Display:** backlighted 2x20 alphanumeric digit
- **Keypad:** 4 keys
- **Housing material:** printing aluminium
- **Displayed data:** instantaneous flowrate; flow totalizer
- **Mounting:** wall
- **Analog Output:** Sel. 4÷20mA or 0÷20mA
- **Accuracy:** ±1%
- **Repeatability:** ±0,2%
- **Linearity:** ±0,5%
- **Basic measurement period:** 500ms
- **Serial port:** RS485
- **Communication protocol:** MODBUS RTU or ASCII+ (opt.)
- **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
- **Instrument humidity:** non condensing 85% RH (40°C)
- **Sensors working temperature:**
  TS-2 / TM-1 /TL-1 -30 ÷ +90°C
  TS2H / TM1H -30 ÷ +160°C
  TC-1 / TLC2 -40 ÷ +160°C
- **Sensor cable std. length:** 5m
- **Powers.:** 230Vac or 10÷30Vdc (depending on model)
- **Dimensions:** 200x120x77mm
- **Weight without sensors:** 1Kg



CE

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

Factory Test Certificate

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

SGM-101F..... Production and check date: .....

Serial n. .....

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

Quality Control Manage: .....

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)***
- ***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***
- ***Power supply 85 ÷ 265Vac or 10÷30Vdc***

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-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, as shown in figure 1

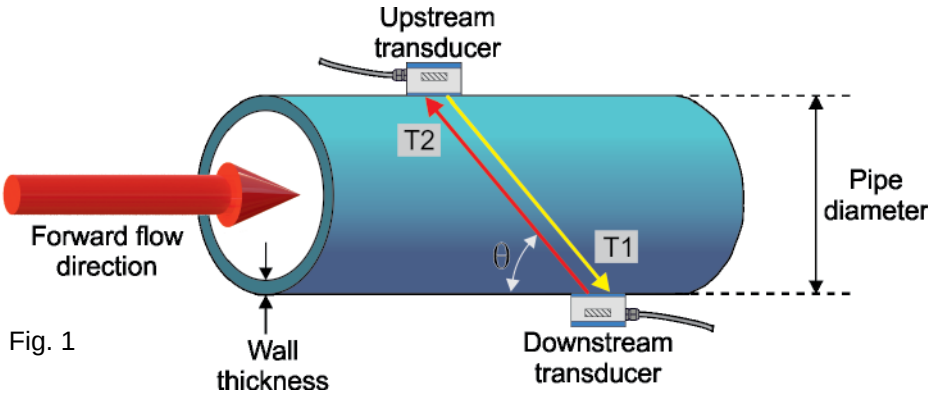


Fig. 1

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

Where:

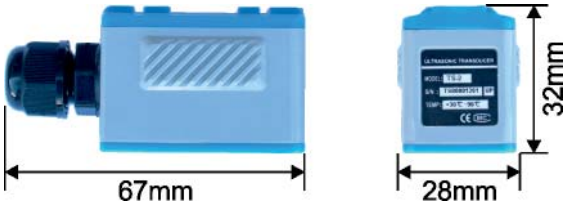
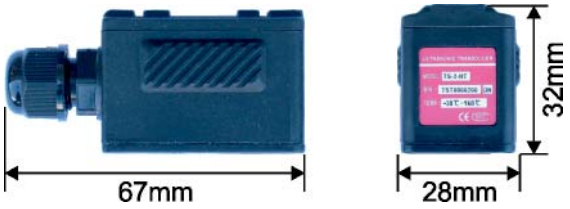
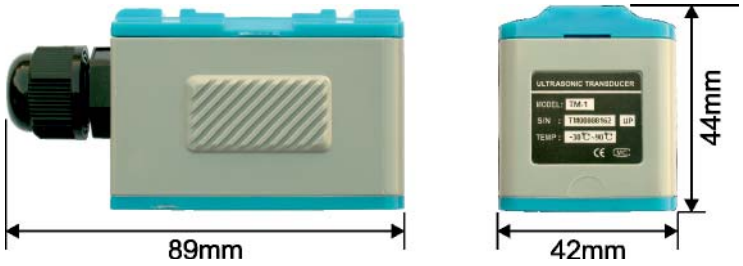
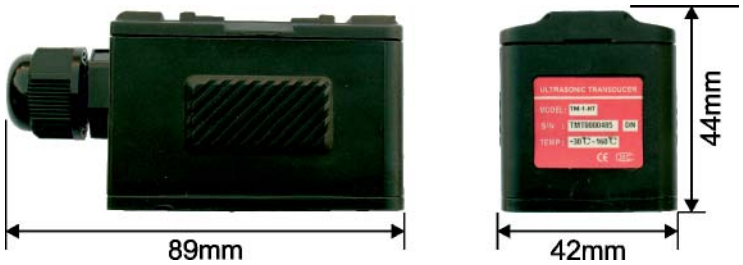
θ	=	sonic section angle
M	=	sonic section length
D	=	pipe internal diameter
T1	=	sound transit time from the upstream transducer to the transducer downstream
T2	=	sound transit time from the downstream transducer to the transducer upstream
ΔT	=	Tup-Tdown

2. FEATURES

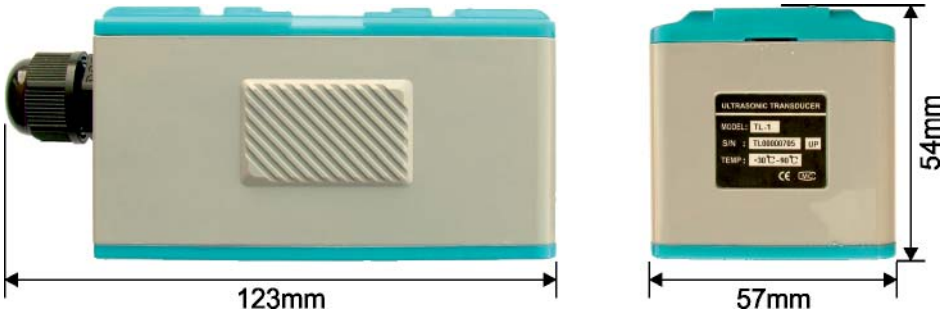
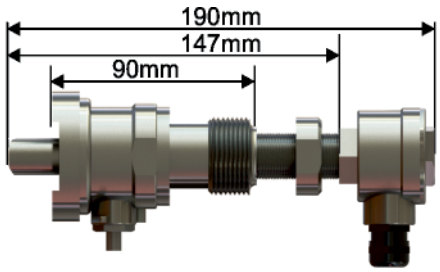
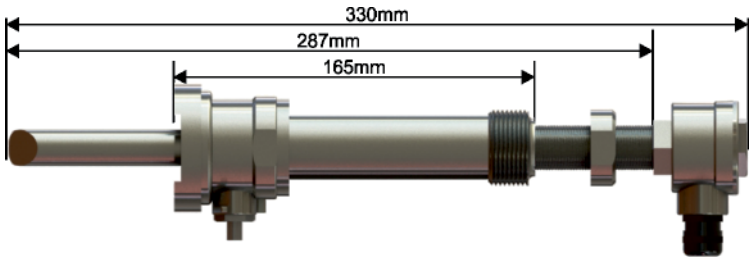
Pipe	***Material***	Carbon Steel; Stainless Steel; Cast Iron; Ductile Iron; Copper; PVC; Aluminium; Asbestos; FiberGlass-Epoxy; Other
	Pipe Ø range	20÷4000mm
	Inner lining	None, No Liner; Tar Epoxy; Rubber; Mortar; Polypropylene; Polystyrol; Polystyrene; Polyester; Polyethylene; Ebonite; Teflon; Other
	Pipe length	Upstream pipe straight section of 10÷40D. Downstream pipe straight section greater than 5D. NB - The pipe straight section, downstream of a pump, must be greater than 20D.
Measured fluids	***Kind***	Water (General); Sea Water; Kerosene; Gasoline; Fuel Oil; Crude Oil; Propane (-45°C); Butane (0°C); Other Fluid; Diesel Oil; Castor Oil; Peanut Oil: Gasoline #90; Gasoline #93; Alcohol; Water (125°C)
	Suspended solids	Homogeneous fluids, even with material in suspension with a concentration less than 20g/l and particle size less than 1mm. NB - Avoid the ice formation inside the pipe at low temperatures
	Temperature	Depending on the used ultrasonic transducer model (see pages 4 and 5)
	Flow velocity	±0,01m/s ÷ ±12m/s
	Direction	Direct and reverse flow rate measurement and separate totalization
Data Converter Unit	***Accuracy***	±1%
	Working conditions	Temperature: -20°÷+85°C; humidity: 85% non-condensing (for applications in conditions different from the standard, specify when ordering)
	Analog output	Opto-isolated with configurable mode: 4÷20mA; 0÷20mA; 0÷20mA Via RS232; 4÷20mA vs Sound; 20÷4÷20mA; 0÷4÷20mA; 20÷0÷20mA; 4÷20mA vs vel. Max. load: 1000ohm
	OCT output	Passive opto-isolated: Vmax: 30Vdc; Imax 100mA Alarm output or pulse output from flow totalizer with settable pulse width in 6÷1000ms range
	Relay output	N.1; Max. 125Vac 1A; 30Vdc 2A Alarm output or pulse output from flow totalizer
	Serial port	RS485. Comunication protocol: MODBUS RTU; MODBUS ASCII
	keyboard	4 keys
	Display	backlighted 2x20 alphanumeric digit LCD
	Display data	Simultaneous display of:: instantaneous flow rate (-99999.99÷+99999.99m^3/h); flow totalizers (-19999999.99÷+19999999.99m^3); total operating time displayable via keyboard command
	Data storage	Flow Totalizer, total operating time and all system configuration parameters. Storage on E^2PROM
	Power supply (depending on model)	230Vac ±15% 50÷60Hz; consumption: 3VA. 10÷30Vdc; consumption: 2W
	Protection	IP66; the transparent protective cover use is recommended (p.n. 546A103N)

Tab. 1

3. TRANSDUCERS

Transducer Type		Caratteristiche
TS-2	***Dimensions***	
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +90°C
	Menu 23	>19. Clamp-On TS-2
TS2H	***Dimensions***	
	Pipe Ø range	20÷100mm (¾" ÷ 4")
	Temperature	-30 ÷ +160°C
	Menu 23	>19. Clamp-On TS-2
TM-1	***Dimensions***	
	Pipe Ø range	50÷700mm (2" ÷ 40")
	Temperature	-30 ÷ +90°C
	Menu 23	>16. Clamp-On TM-1
TM1H	***Dimensions***	
	Pipe Ø range	50÷700mm (2" ÷ 40")
	Temperature	-30 ÷ +160°C
	Menu 23	>16. Clamp-On TM-1

Tab. 2

Transducer Type		Caratteristiche
TL-1	***Dimensions***	
	Pipe Ø range	300÷4000mm (3” ÷ 160”)
	Temperature	-30 ÷ +900°C
	Menu 23	>20. Clamp-On TL-1
TC-1 (standard)	***Dimensions***	
	Pipe Ø range	80÷4000mm (3” ÷ 160”)
	Temperature	-40 ÷ +400°C
	Max pressure	1.6Mpa (16bar)
	Menu 23	>17. Insertion TC-1
TLC2 (for non-metallic pipes)	***Dimensions***	
	Pipe Ø range	80÷4000mm (3” ÷ 160”)
	Temperature	-40 ÷ +400°C
	Max pressure	1.6Mpa (16bar)
	Menu 23	>21. Insertion TLC-2

Tab. 3

4. DIMENSIONS

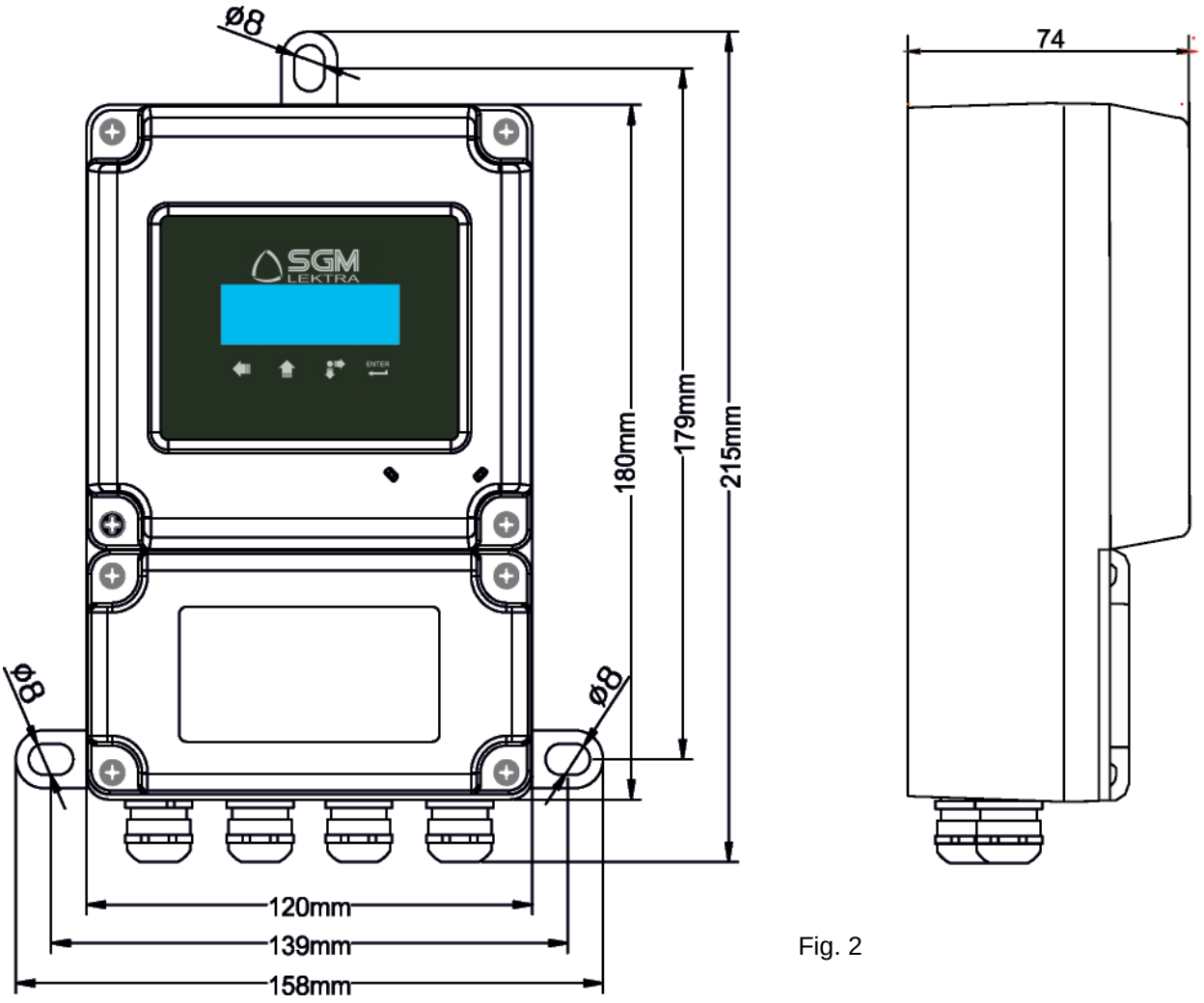


Fig. 2

5. ELECTRICAL CONNECTIONS

5.1 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

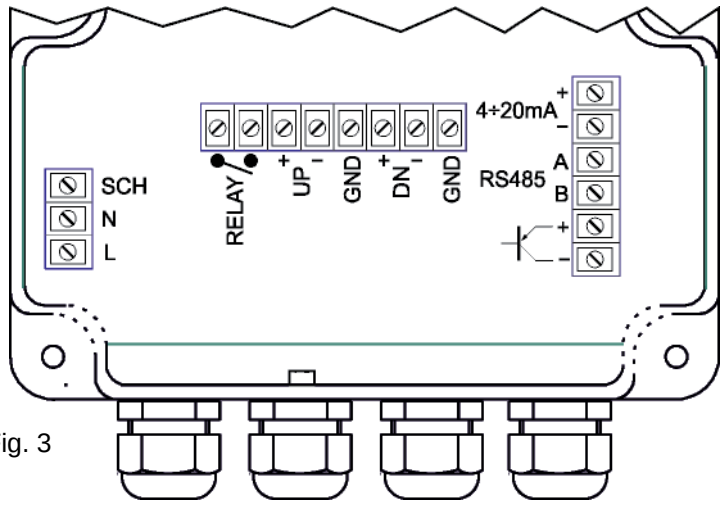


Fig. 3

The immunity to electromagnetic interference is in accordance with CE directives

5.2 Recommendations for external mounting

- or electrical connections, use a cable with a 6÷10mm outer diameter and fully tighten the M18 cable gland
- Securely close the cover
- position the cable so that it forms a downward curve at the M18 output (Fig.4); in this way the condensation and/or rain water will tend to drop from the curve bottom
- place the transparent cover for protection



Transparent cover
(p.n. 546A103N)

Fig. 4

5.3 POWER CONNECTION

5.3.1 Supply voltages in AC

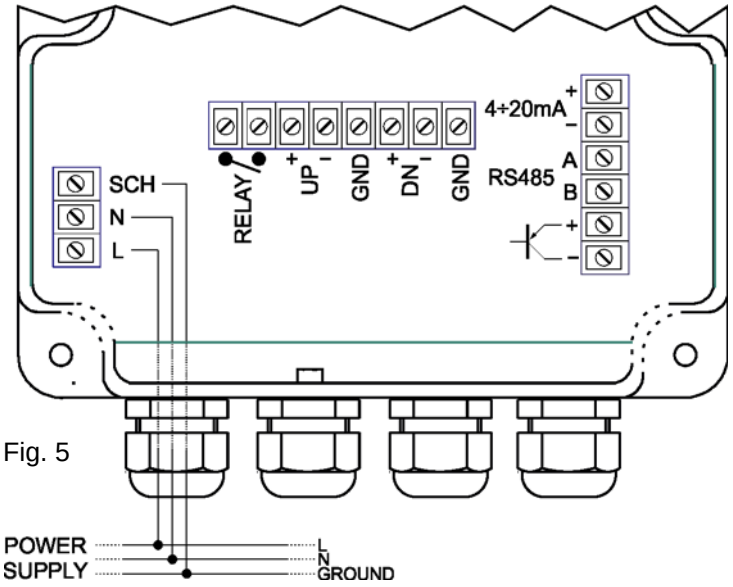


Fig. 5

5.3.2 Supply voltage in 10÷30Vdc

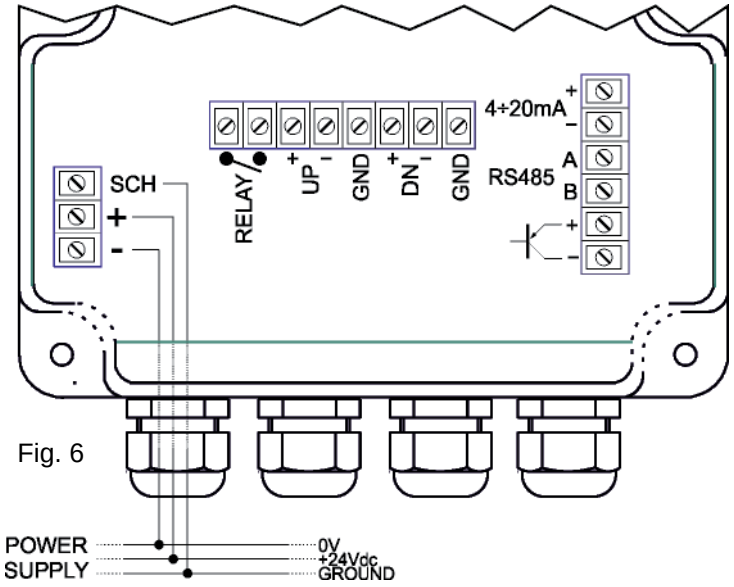


Fig. 6

5.4 TRANSDUCER CONNECTION

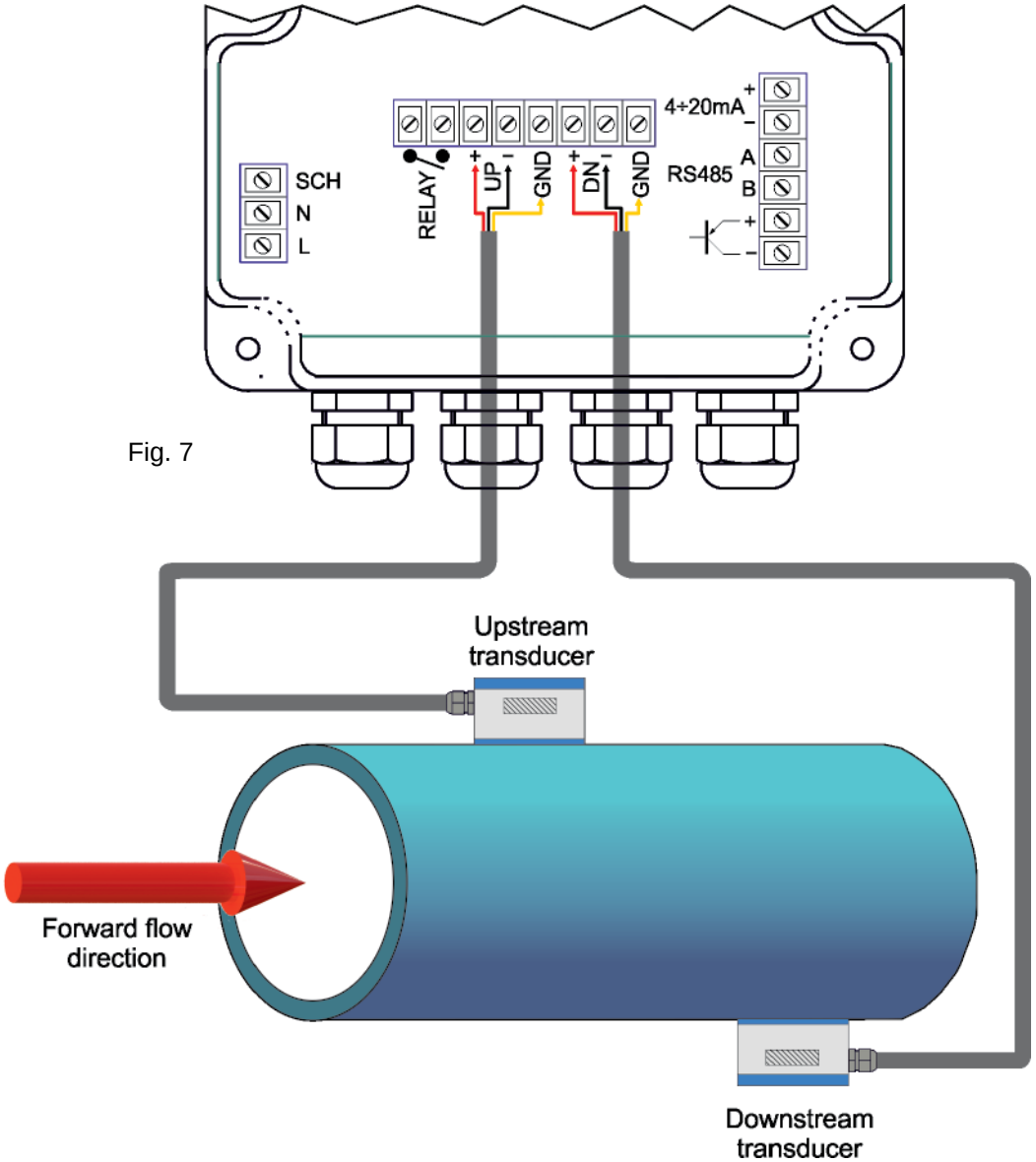


Fig. 7

5.5 OUTPUT SIGNALS CONNECTION

5.5.1 Analog output

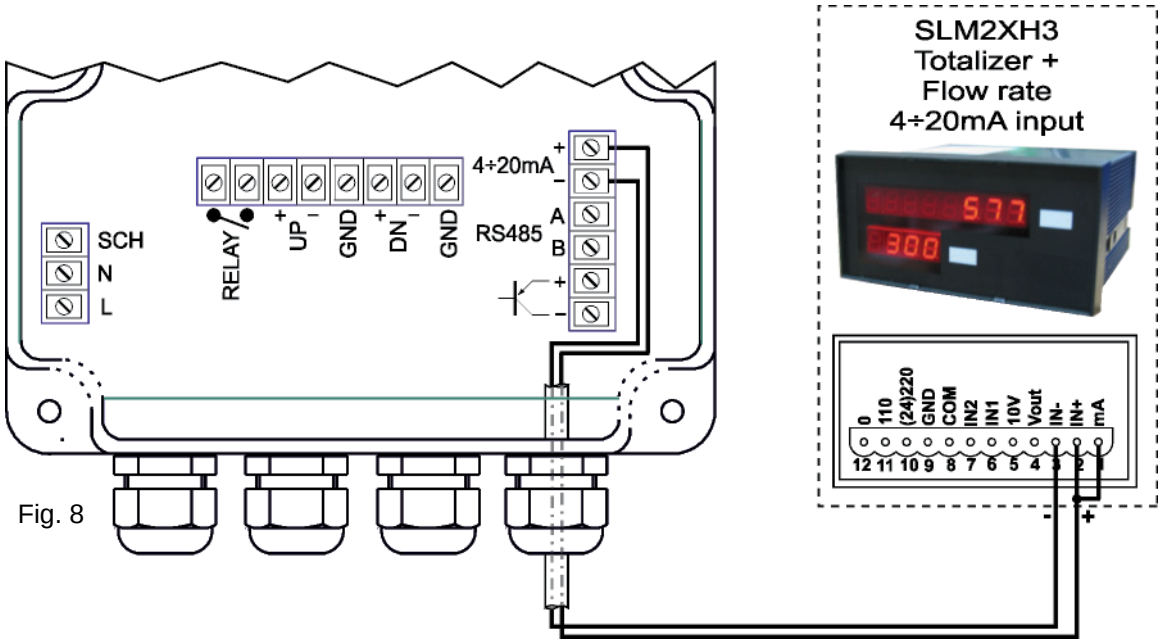


Fig. 8

5.5.2 Pulse output

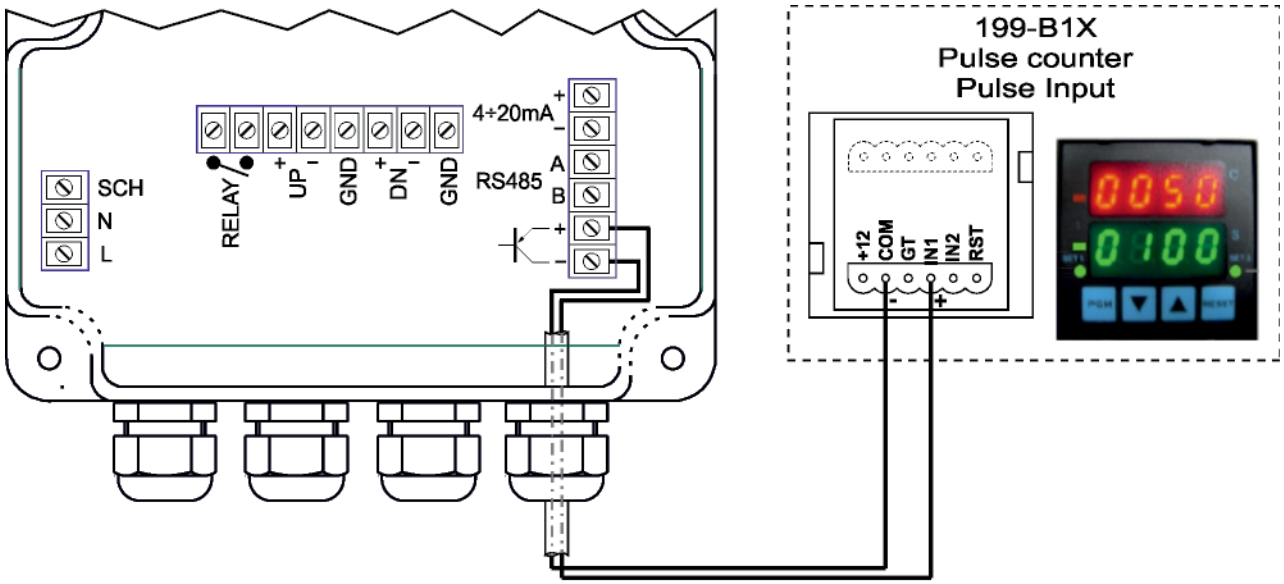
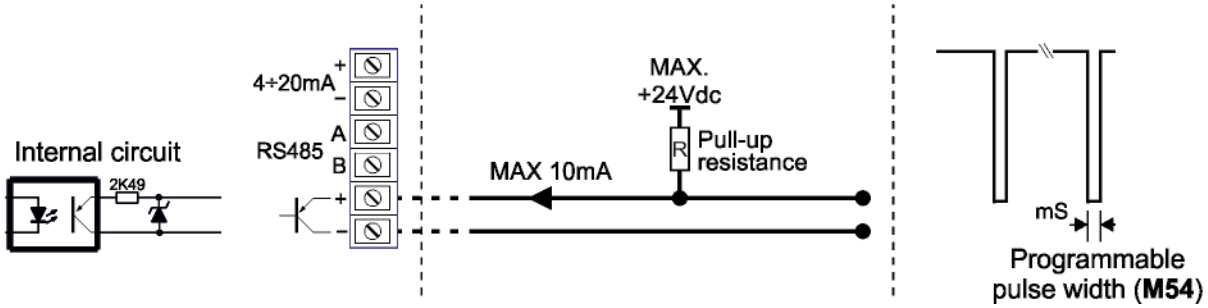


Fig. 9



5.5.3 Relay output

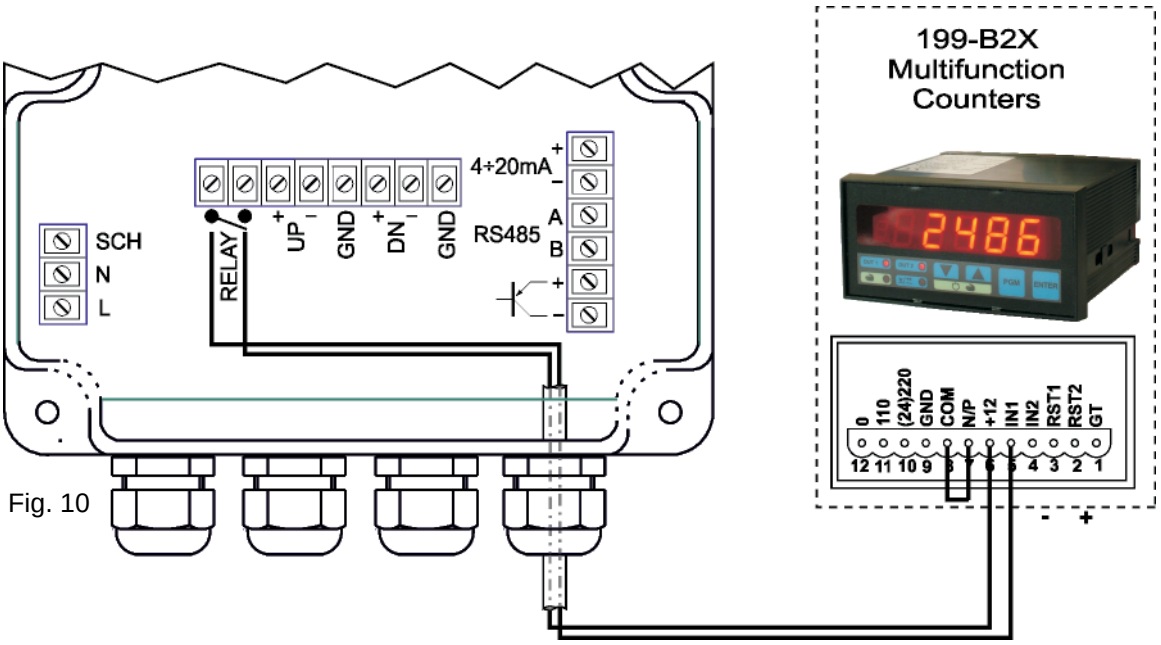


Fig. 10

5.5.3 MODBUS port

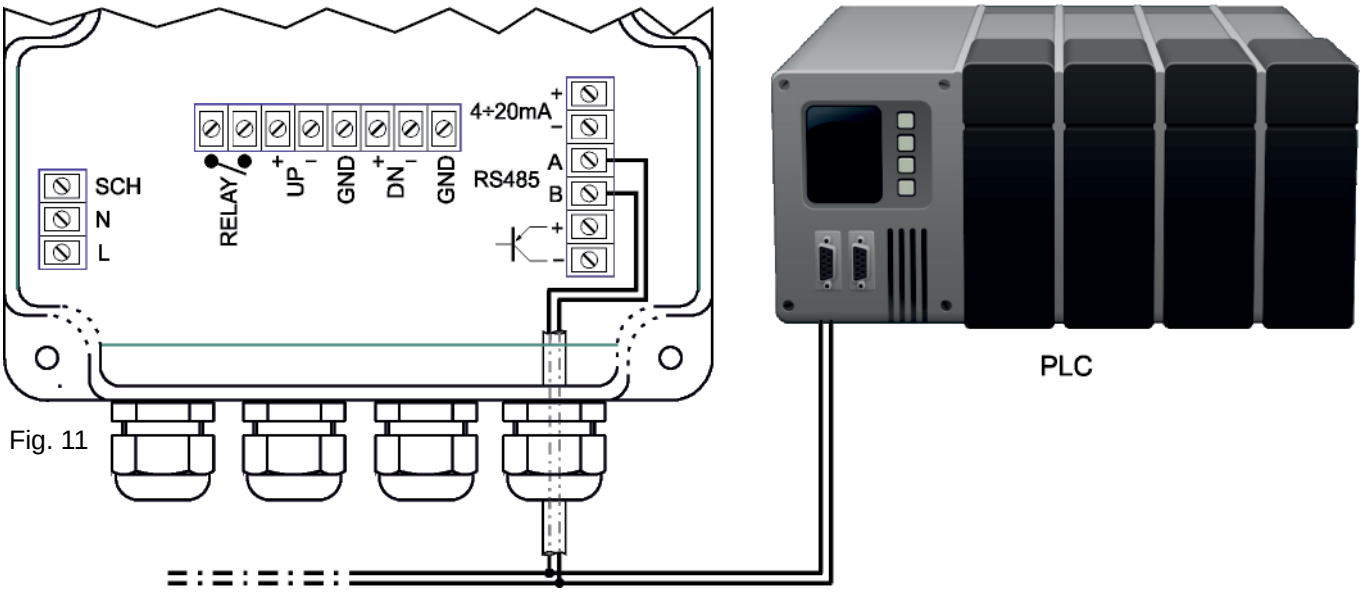


Fig. 11

6. INTRODUCTION

The **SGM-101F** flow measurement system is composed of a digital converter and two ultrasonic transducers.
The instrument uses the fluid transit time, measured inside a pipe of cylindrical section, to calculate the instantaneous flow rate value. The DSP technology, Digital Signal Processing, ensures system low sensitivity to any potential interference factors .

6.1 Turn on the digital converter

The **SGM-101F** system standard power supply is 230Vac or 10÷30Vdc.
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 “**0. Use RAM Settings**”

6.2 keyboard

SGM-101F has 4 buttons:

Press  to activate the programming or displaying menu direct selection

Press  :
- 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  :
- 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 

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

6.3 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  followed by the number of the desired menu. For example, to select **M11** (the pipe outer diameter) press in the order:  (enables the menu direct selection),  (edit the selected digit),  (select the digit to the right),  (edit the selected digit), 

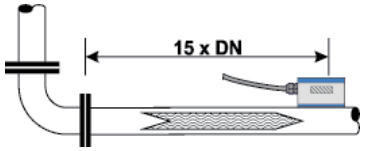
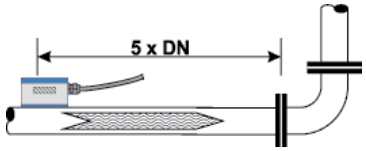
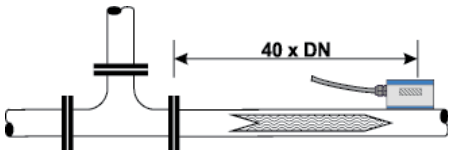
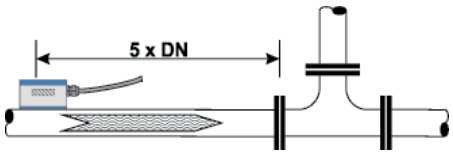
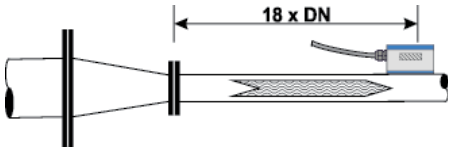
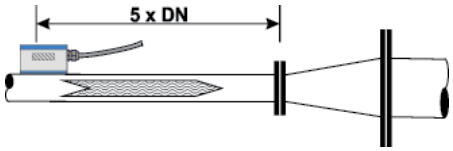
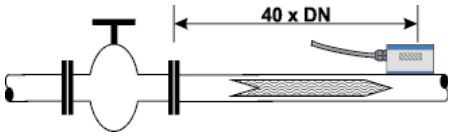
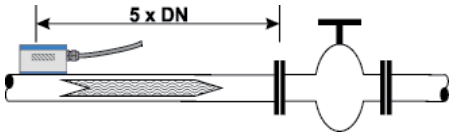
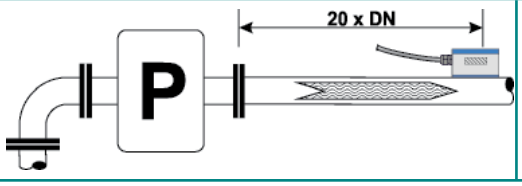
(confirms the entered data)
2) Search using  or  . Each time  is pressed, will access to the previous menu (for example, to switch from M12 to M11), and each time  is pressed, will access to the next menu (for example, to switch from M11 to M12)

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**)

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 Tab. 4

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.12-a);
- vertical pipes with the upward flow (fig.12-b);
- inclined pipes with the upward flow (fig.12-c);
- vertical open drain pipes with a section restriction to avoid sudden pipe emptying during flow measurement (fig.13)

Correct transducers positioning example

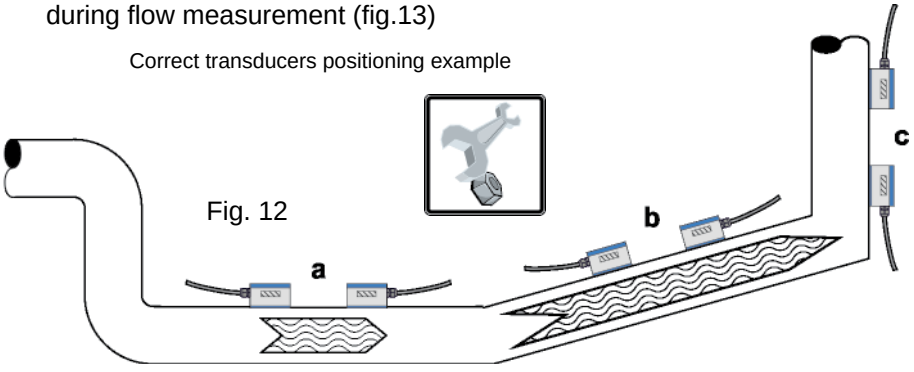


Fig. 12

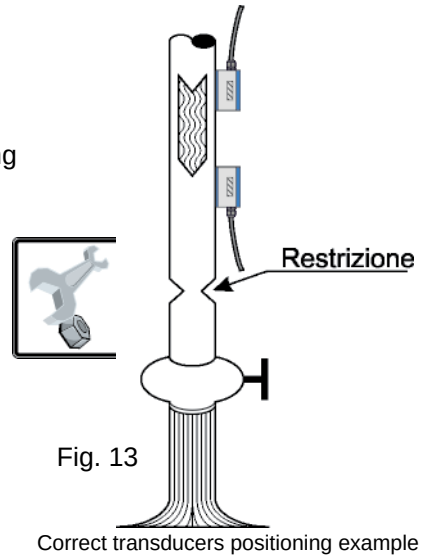


Fig. 13

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

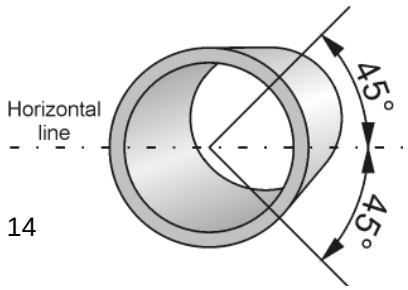


Fig. 14

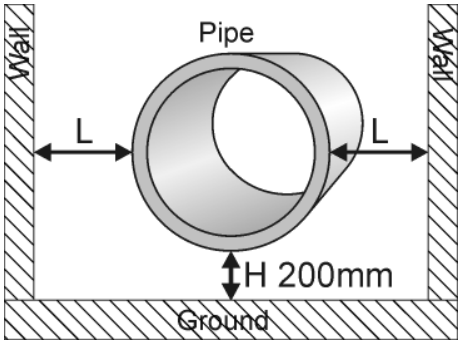


Fig. 15

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 (fig.16)
- inclined pipes with the downward flow, because they may not be completely filled with fluid (fig.16)
- 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 (fig.17)
- vertical open drain pipes without a section restriction to avoid sudden pipe emptying during flow measurement (fig.17)

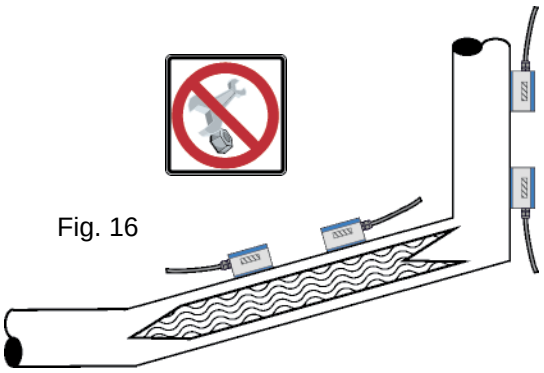


Fig. 16

Positioning to avoid example

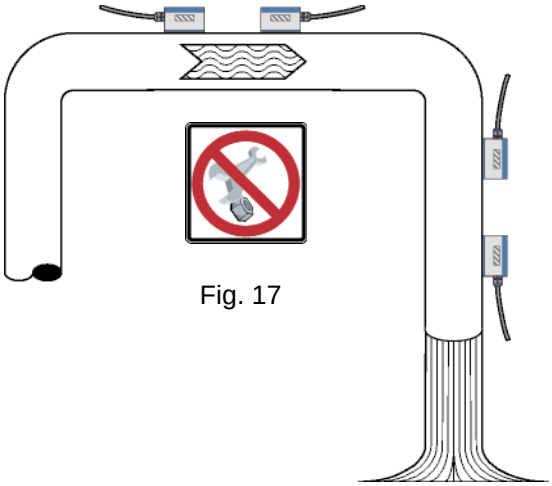


Fig. 17

Positioning to avoid example

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

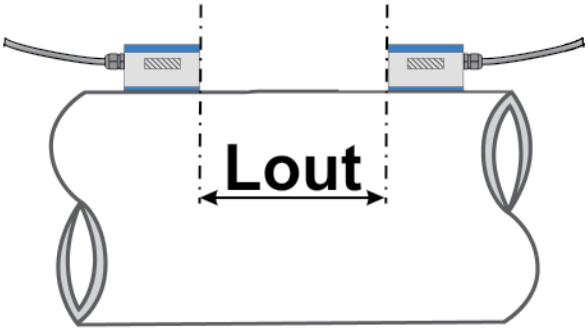


Fig. 18

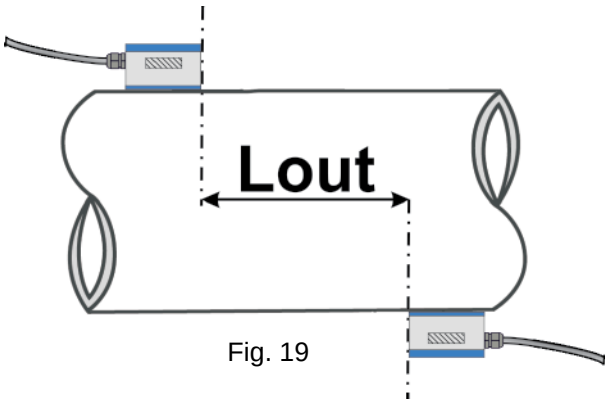


Fig. 19

7.3 V installing

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

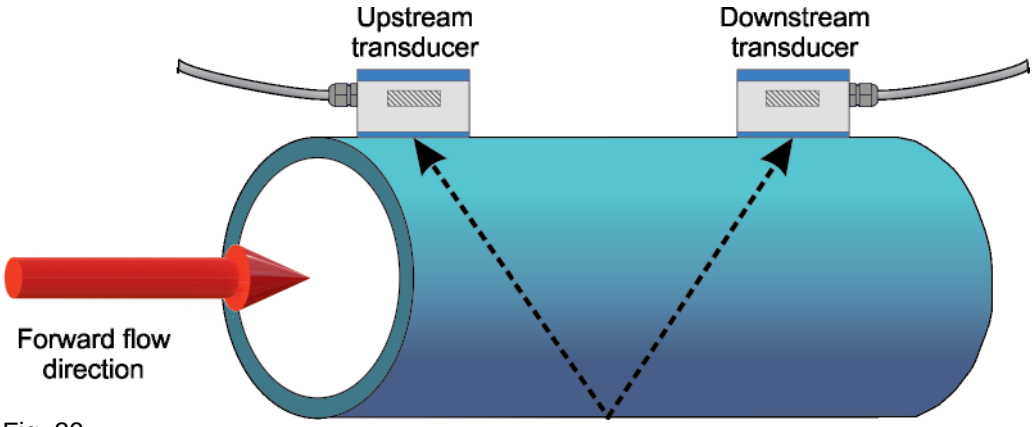


Fig. 20

7.4 Z installing

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

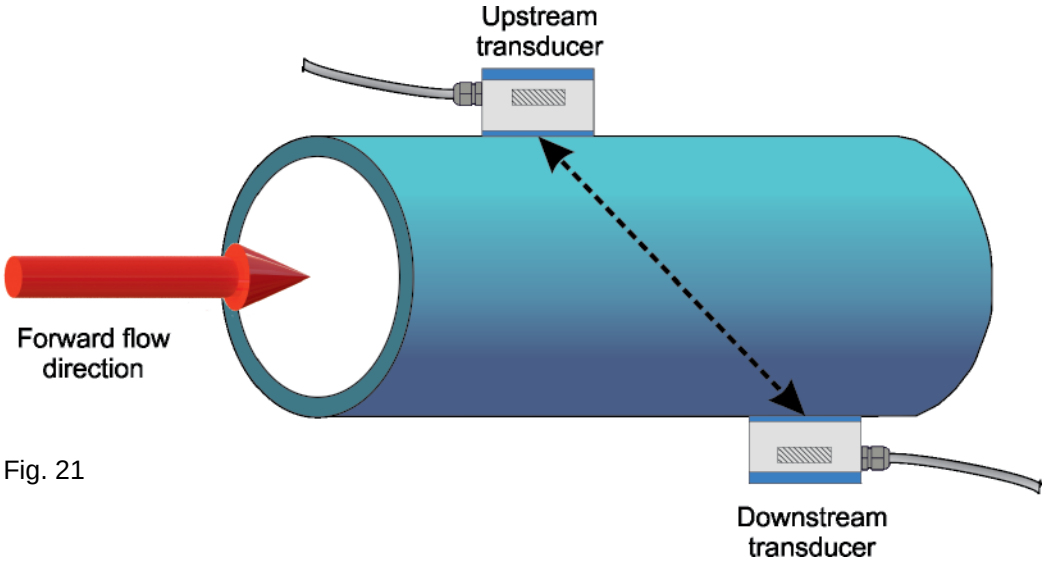


Fig. 21

7.5 W installing

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

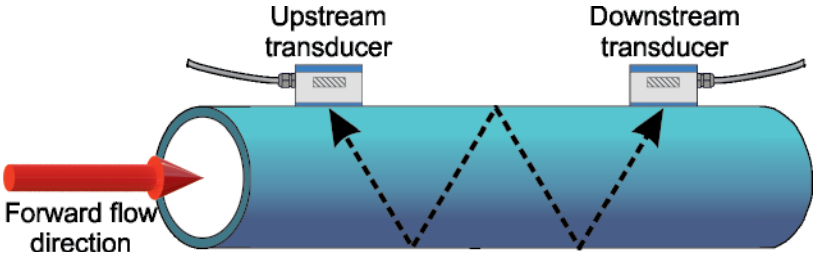


Fig. 22

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 (fig.23)

2 - with encased pipe, check that the free section length of the pipe is the minimum required (fig.24)

Fig. 23

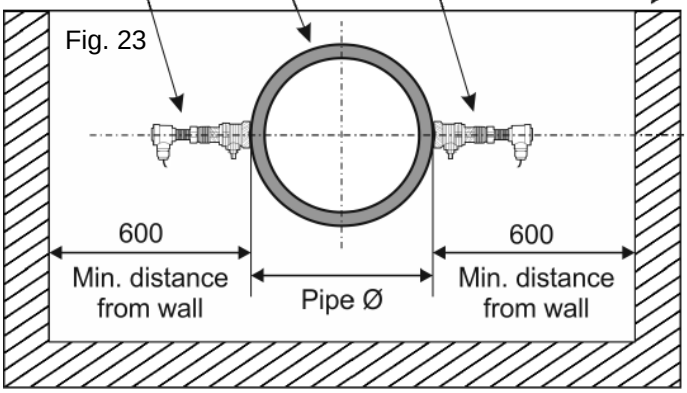
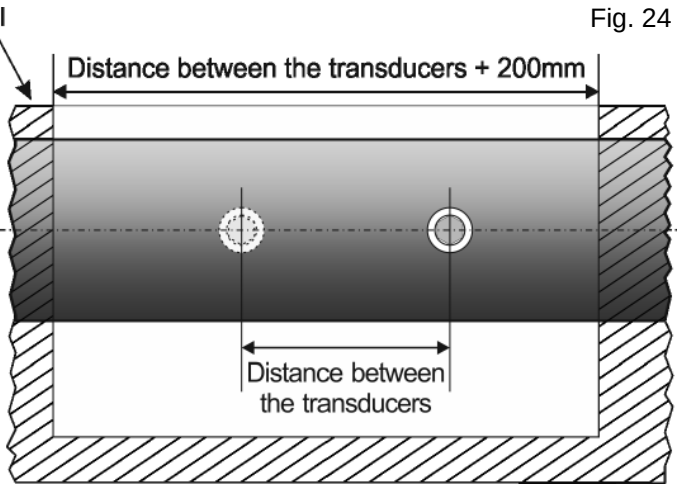


Fig. 24



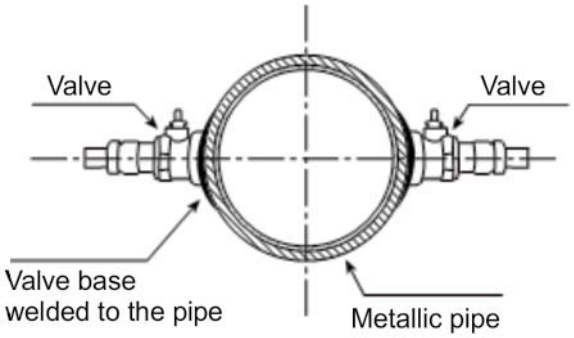
3 - Procuring the necessary equipment for drilling the pressure pipes

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

Fig. 25



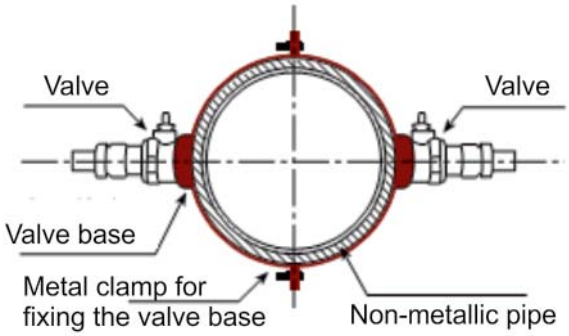


Fig. 26

7.6.1 - Base valve Fixing

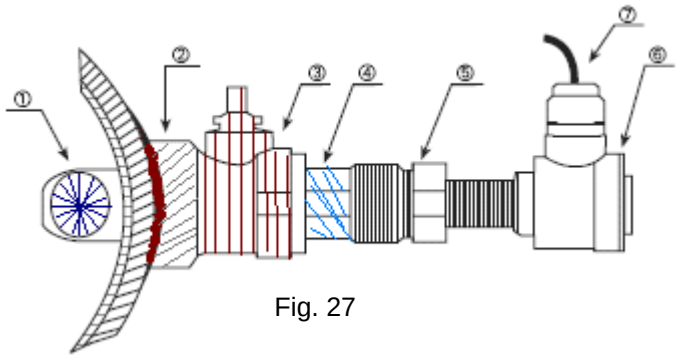


Fig. 27

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

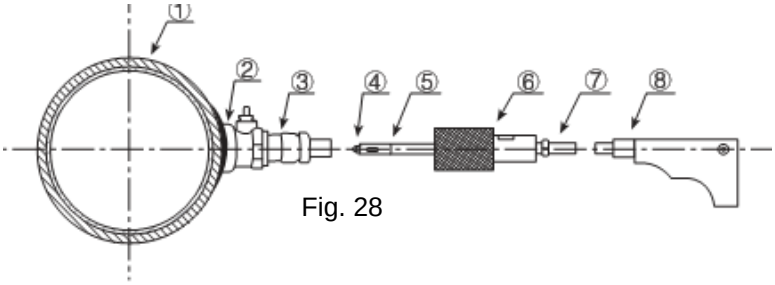


Fig. 28

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 in figure 27).
2) Screw the ball valve (3 in figure 27) 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 (6 in figure 28) on the male threads (4 in figure 27),so that there is no leakage. Fasten the power drill to rod (7 in figure 28).
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.
6) 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 (in figure 29) will be equal to 0 (zero), ie when L=A-B

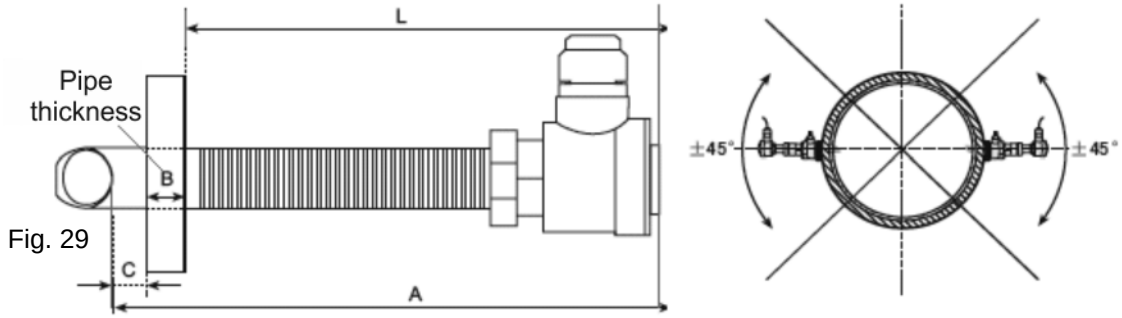


Fig. 29

To check the transducers ultrasonic signal emitting orientation (1 in figure 27), check that: :
1) the outputs cables of both transducers are oriented orthogonally to the pipe axis

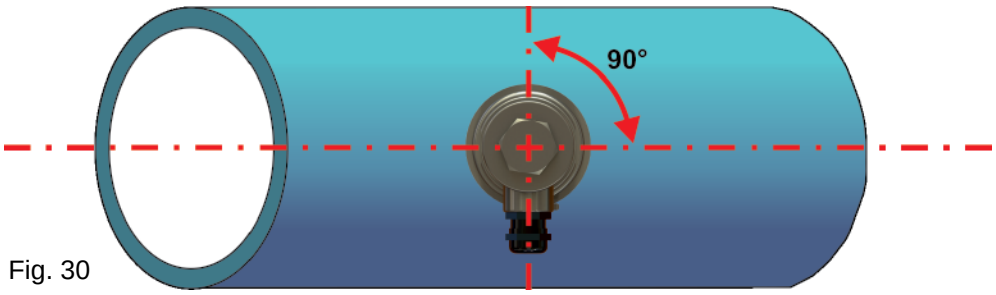
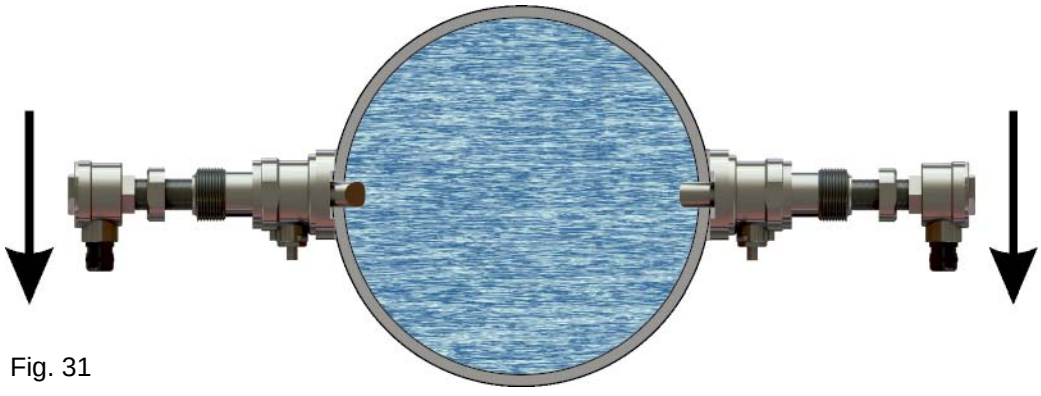


Fig. 30

2) the outputs cable on the transducers have the same direction


Fig. 31

3) the inclined surfaces of the ultrasonic transducer signal emitter (1 in figura 27) should be directed towards each other

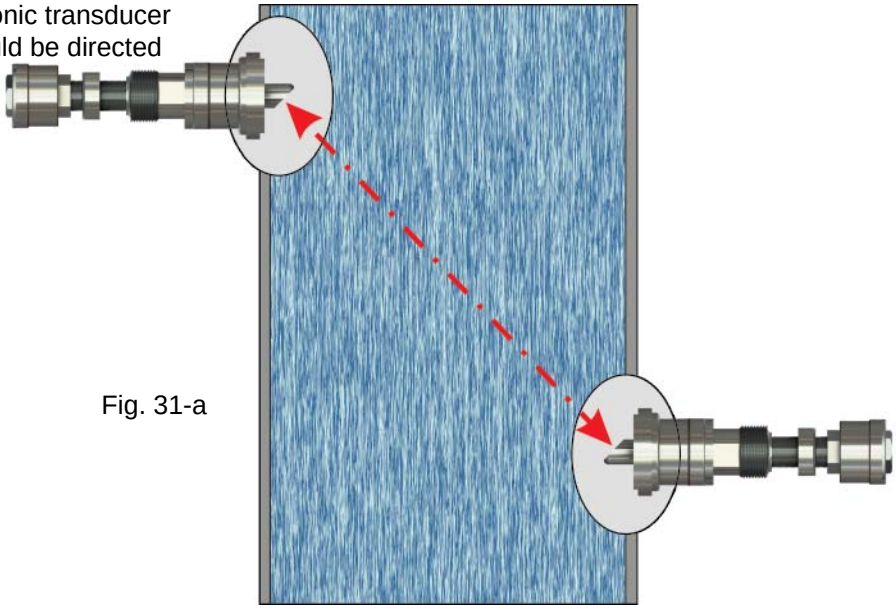


Fig. 31-a

4) Proceed to the electrical connection

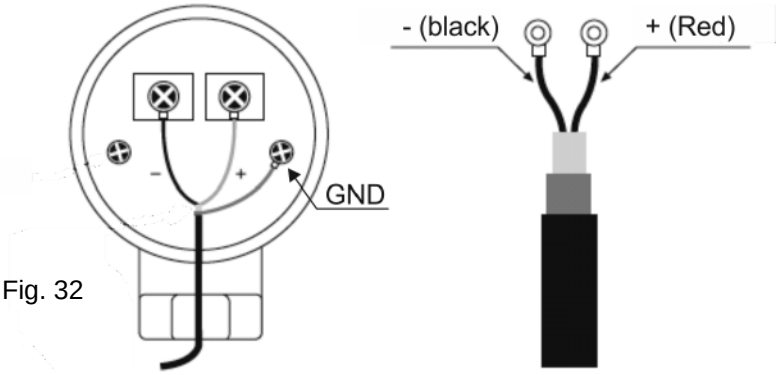


Fig. 32

7.7 Installation check-up

The signal reception 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.

7.7.1 - Signal reception power - M90

The signal reception 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 coupler grease.
(3) Move the transducers both vertically and horizontally while 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**)

7.7.2 - 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 ube (clean the pipe or add more coupler grease)
(3) The mounting position on the pipe

7.7.3 - 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.

7.7.4 - 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.

8. PIPE SPECIFICATIONS

8.1 Outside pipe diameter

In the event that an appropriate instrument to measure the pipe outside diameter of the 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

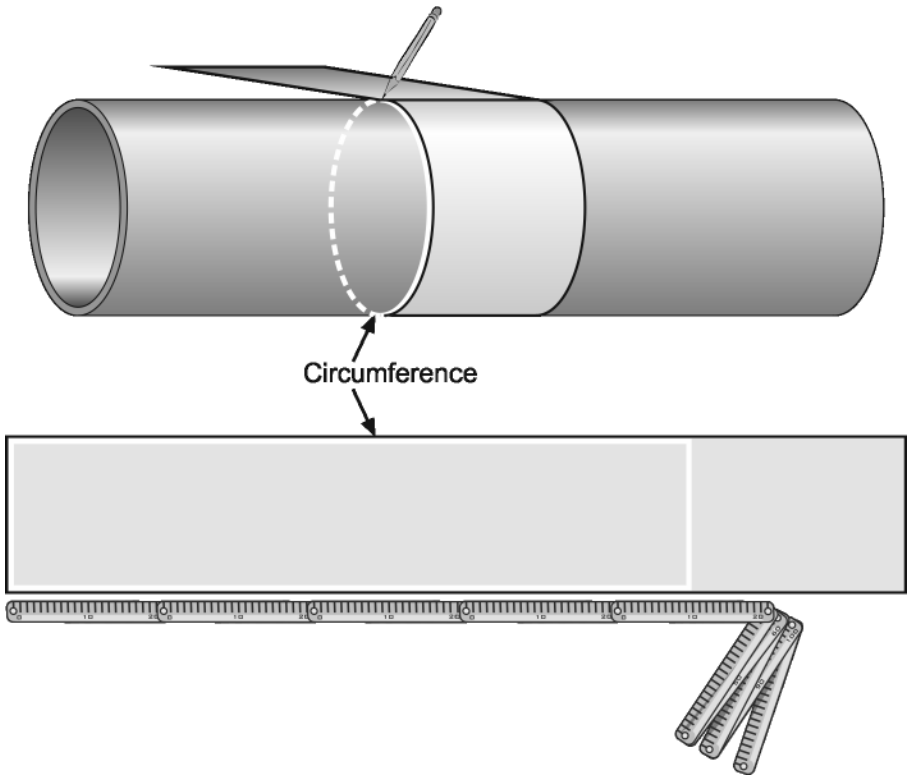


Fig. 33

8.2 Pipe thickness

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

8.3 Pipe material

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

8.4 Materiale del rivestimento interno del tubo

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

8.5 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 **M16**).

9. TRANSDUCERS POSITIONING

9.1 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 - recommended installation: **W (small pipe)**
DN50÷250 - recommended installation: **V**
DN250÷4000 - recommended installation: **Z**

9.2 Marking positioning

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

9.3 Marking tools

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

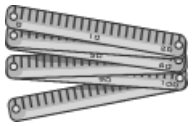
- a paper roll piece (like that calculators) with a width greater than the pipe circumference, or a piece of continuous form for printer according to the pipe diameter.
- a pencil or a thin tip pen
- a meter



Pencil



Thin tip pen



Meter

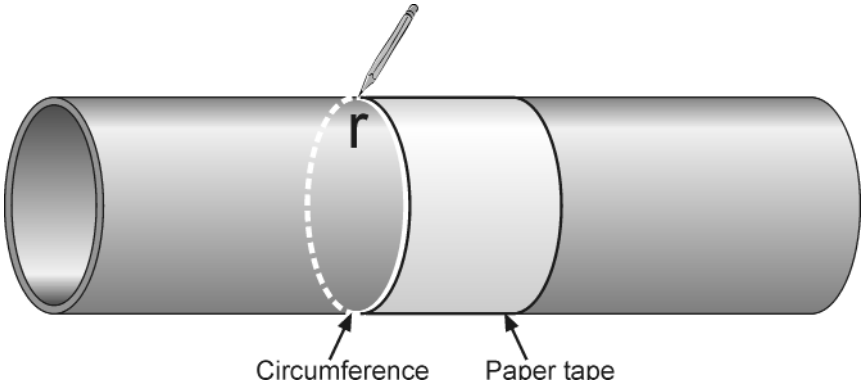


paper roll for calculators



Continuous form for printer

Fig. 34



9.3 Marking modes

9.3.1 - 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.

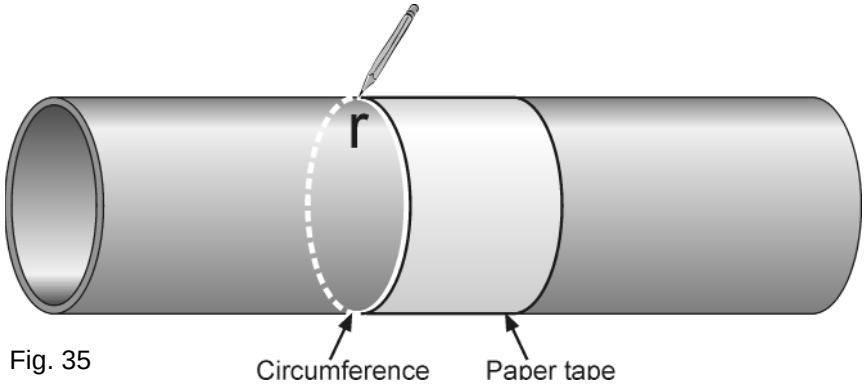


Fig. 35

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.

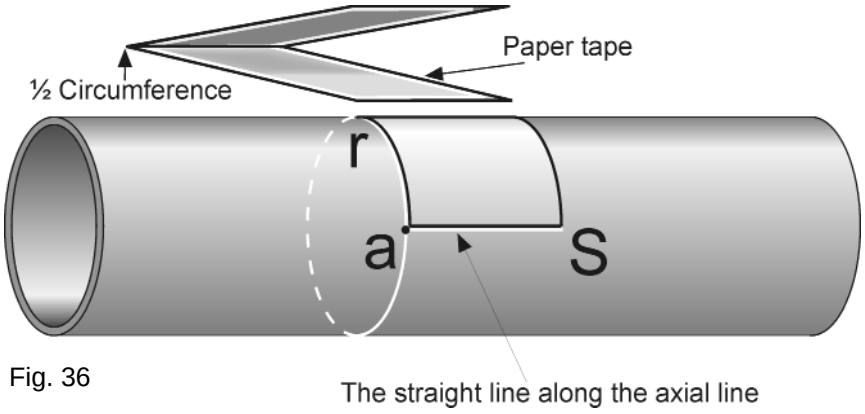


Fig. 36

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**".

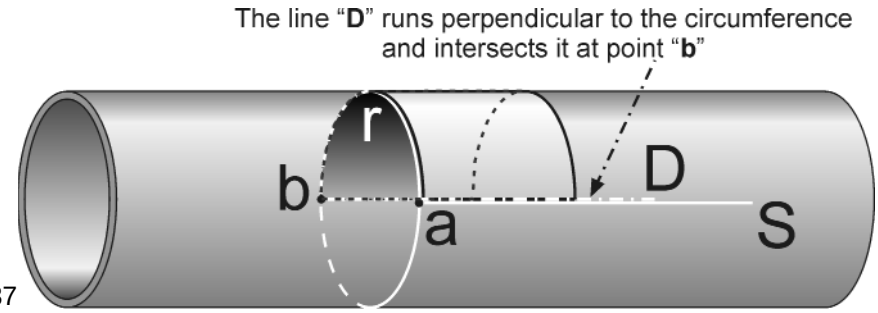


Fig. 37

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 **M25**. Now the mounting positions of both transducers are known:
- point marked with the letter "**a**"
- point marked with the letter "**c**"

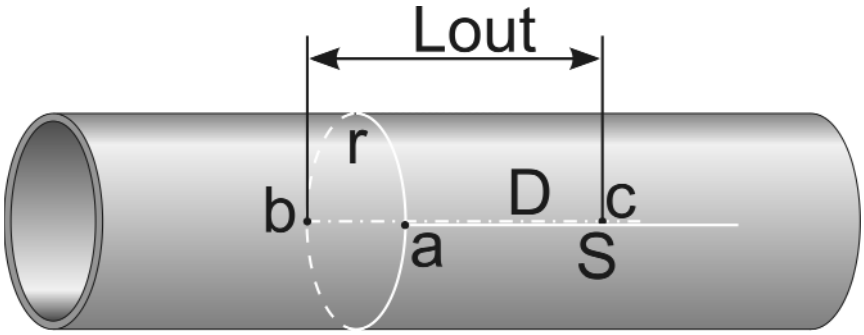


Fig. 38

9.3.1 - 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 **M25**. Now the mounting positions of both transducers are known:
   - point marked with the letter "**a**"
   - point marked with the letter "**c**"

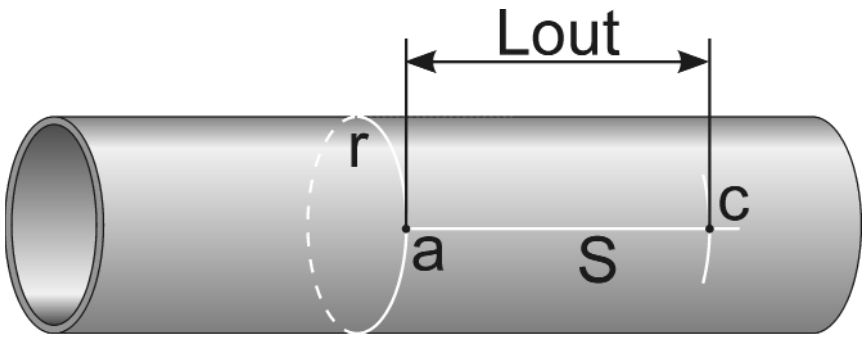


Fig. 39

9.4 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:

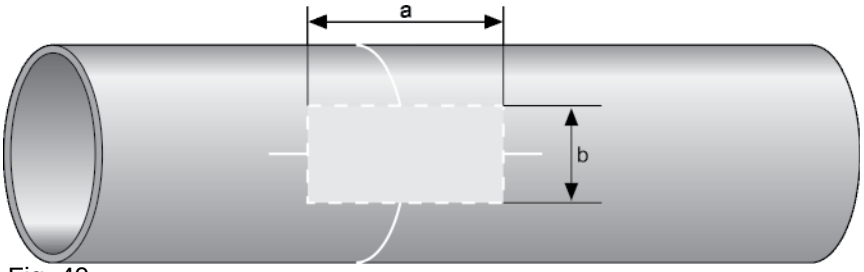


Fig. 40

	TS-2	TM-1	TL-1
a	70mm	90mm	140mm
b	40mm	55mm	80mm

Tab. 5

9.5 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

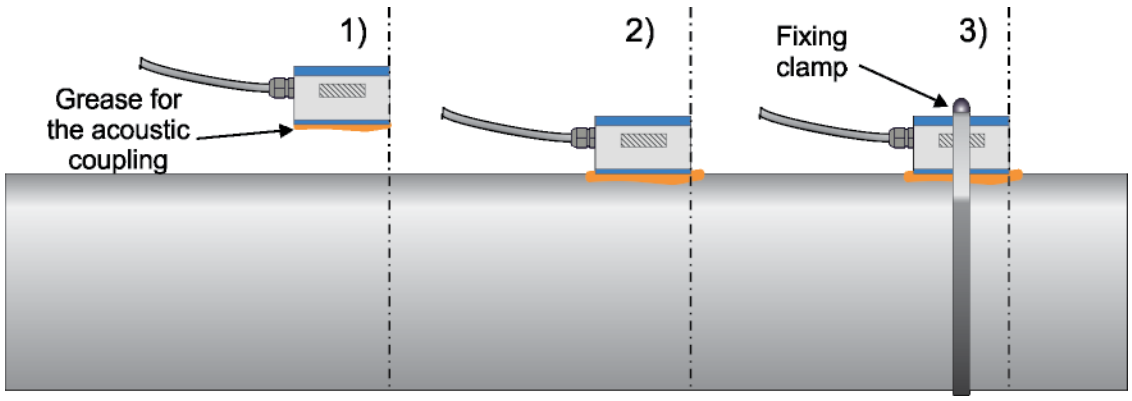


Fig. 41

10. CONFIGURATION

10.1 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		

Tab. 6

10.2.2 - tab. 6 legend:

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

10.2 Quick Setup Guide

10.2.1 - 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 '**H**' letter is displayed, it means no signal. If the '**H**' letter is displayed, it means that instrument hardware is not working properly (refer to troubleshooting chapter).

10.2.2 - 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

10.2.3 - 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

10.2.4 - 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.

10.2.5 - How to reset the totalizers

Use the **M37** menu.

10.2.6 - 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

10.2.7 - 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.

10.2.8 - How to calibrate the zero flow rate

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

10.2.9 - 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**.

10.2.10 - 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.

10.2.11 - 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

10.2.12 - 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

10.2.13 - 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.

10.2.14 - 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**.

10.2.15 - How to use acoustic alarms (Buzzer)
The Integrated Buzzer is user settable. Can be used as an alarm. **M77** for setting.

10.2.16 - How to use the OCT output (Open Collector)
The OCT output is user settable via **M78**.
Make sure that the frequency or pulse output supports the OCT.

10.2.17 - How to change the internal calendar
If it is necessary to change the calendar, use **M60**.

10.2.18 - How to adjust the LCD contrast
Use **M71**. The change will be saved in EEPROM.

10.2.19 - How to set the RS485 serial interface
Use **M62** for setting.

10.2.20 - How to display the partial totalizers
Use **M82** to display the partial totalizer (daily, monthly or yearly).

10.2.21 - How to use the manual totalizer
Use **M38**, then press 

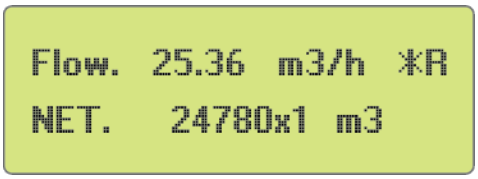
to start and stop the totalizer.

10.2.22 - 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**).

11. PROGRAMMING MENU

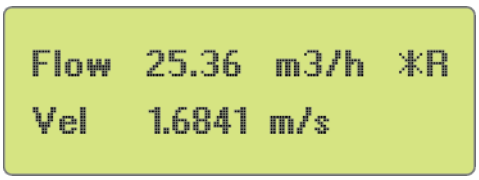
11.00 M00 - Instantaneous flow rate and total net displaying

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 .



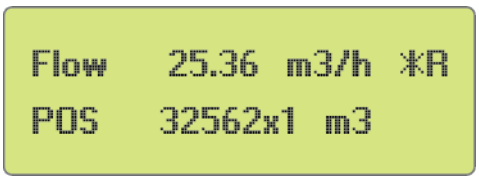
11.01 M01 - Instantaneous flow rate and velocity displaying

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



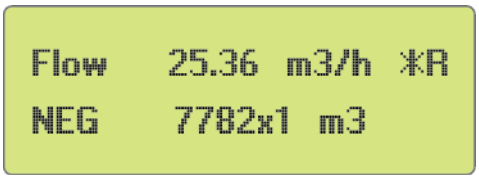
11.02 M02 - Instantaneous flow rate and forward tot. displaying

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



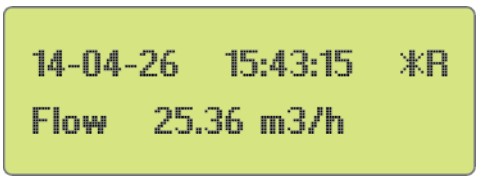
11.03 M03 - Instantaneous flow rate and reverse tot. displaying

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



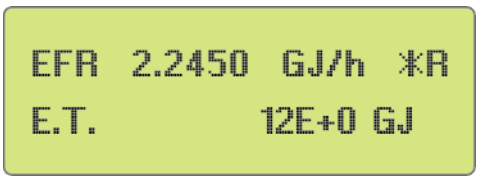
11.04 M04 - Instantaneous flow rate with date and time displaying

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



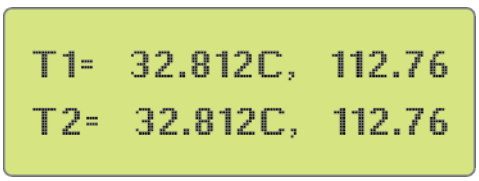
11.05 M05-Heat meter totalizer displaying (for specific version only)

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



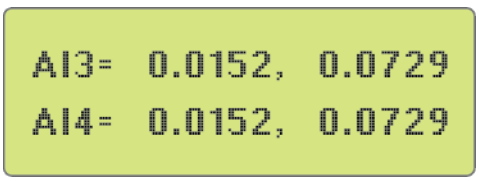
11.06 M06 - T1 and T2 displaying (Heat meter only)

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



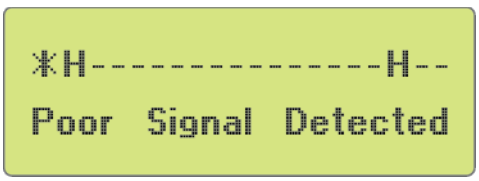
11.07 M07 - AL3 and AL4 analog input displaying

Displaying only. The display shows the AL3 and AL4 analog input.



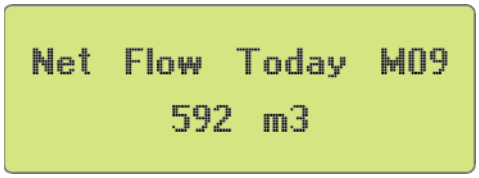
11.08 M08 - Measurement status and error codes displaying

Displaying only. The display shows the system codes and messages.
A summary codes table is on page 48.



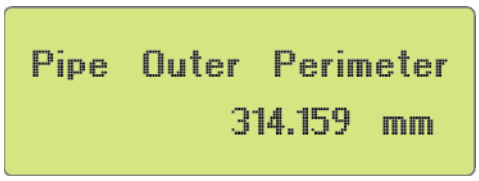
11.09 M09 - Daily totalizer displaying

Displaying only. The display shows the daily flow totalizer.



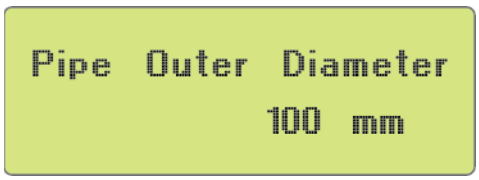
11.10 M10 - Pipe outer circumference programming

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



11.11 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**)



11.12 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**)



11.13 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**)



11.14 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)



11.15 M15 - Pipe material sound velocity programming (*)

The display shows the previously set value.
(*) Available only with **9** option selected in **M15**.



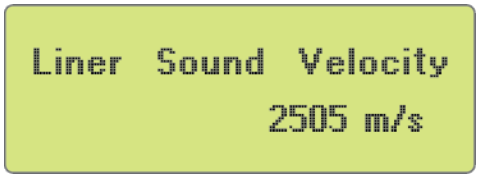
11.16 M16 - Pipe inner lining material programming



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)

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



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

11.18 M18 - Pipe inner lining thickness programming



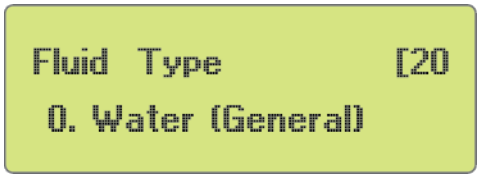
The display shows the previously set value.

11.19 M19 - Inner ABS thickness programming



The display shows the previously set value.

11.20 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)

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

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



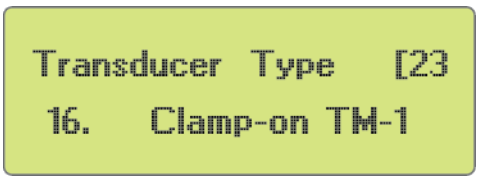
11.22 M22 - Fluid viscosity programming (***)

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



11.23 M23 - Transducers type programming

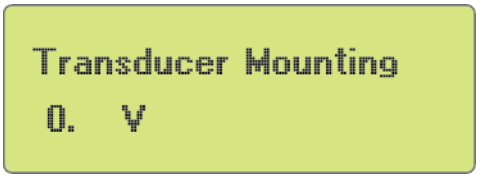
The display shows the previous setting.
The available models are (catalog models highlighted in **bold**):



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 4)
17. **Insertion TC-1** (see features on page 5)
18. Clamp-on TS-1
19. **Clamp-on TS-2** (see features on page 4)
20. **Clamp-on TL-1** (see features on page 5)
21. **Insertion TLC2** (see features on page 4)
22. Clamp-on M2
23. Clamp-on L2

11.24 M24 - Transducers mounting method programming

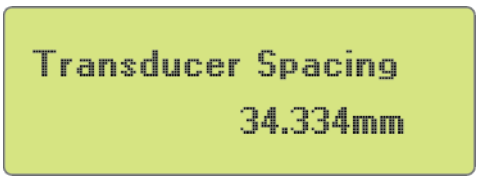
The display shows the previous setting.
The available mounting methods are:



0. V
1. Z
2. N (small pipe)
3. W (small pipe)

11.25 M25 - Transducers mounting distance displaying

The display shows the automatically calculated transducers mounting distance.



11.26 M26 - Data storage mode programming

The display shows the previous setting.
Available settings:

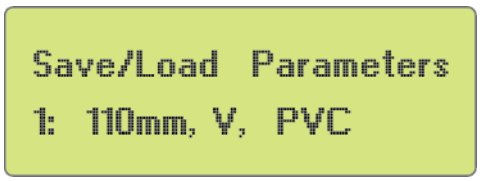
0. **Use RAM Settings** (recommended); all the latest programming changes are automatically stored in the EEPROM

1. SALVA PAR. IMPOSTAZIONI; to store in the EEPROM the latest changes to any menu, must go back to **M26** and press ENTER



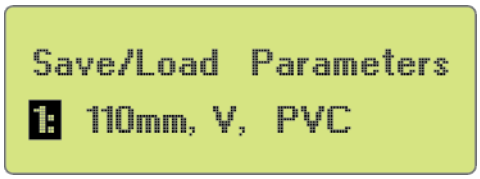
11.27 M27 - Default settings library

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.

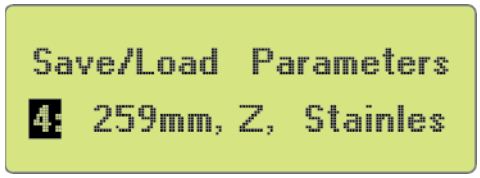


11.27.1 - Default setting loading

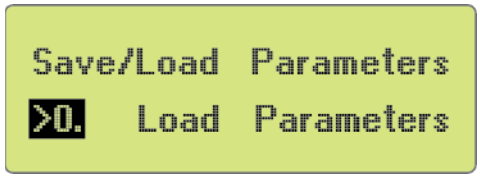
To load a default setting, proceed as follows:
press ENTER



Select the default setting to be loaded with ↑ or ↓ and press ENTER

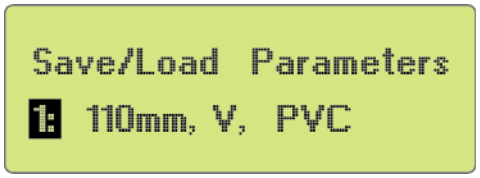


Confirm the selection by pressing ENTER. The system automatically displays **M23**

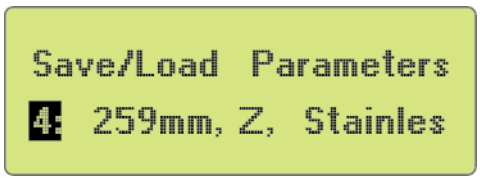


11.27.1 - Storing default setting

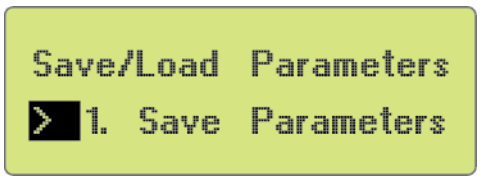
To store a new default setting, proceed as follows:
press ENTER



Select with ↑ or ↓ to replace the default setting and press ENTER

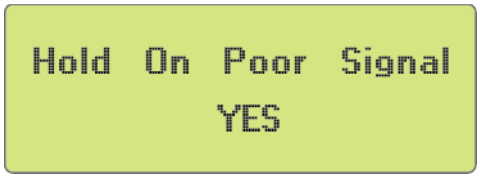


To select the "**1.**" option, press ↑ or ↓ and confirm by pressing ENTER.
The system automatically displays **M23**



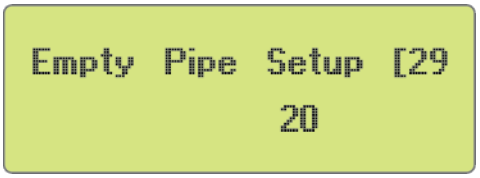
11.28 M28 - HOLD mode programming

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



11.29 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



11.30 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**"

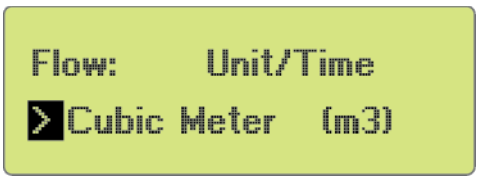


11.31 M31 - Instantaneous flow rate unit programming

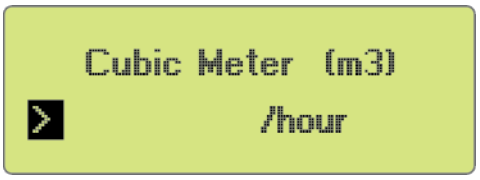
The display shows the previous setting.
To set the instantaneous flow rate measurement unit proceed as follows:
press ENTER



Press ↑ or ↓ 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)

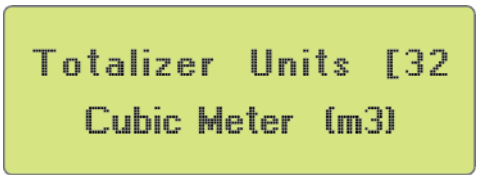


Press ↑ or ↓ to select the time measure unit and press ENTER to confirm.
Available settings: /hour (/h); /min (/m); /sec. (/s); /day (/d)
NB - On the top line displays the volume measure unit previously set

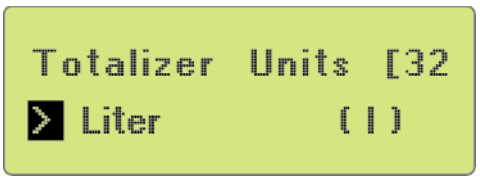


11.32 M32 - Totalizers unit programming

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



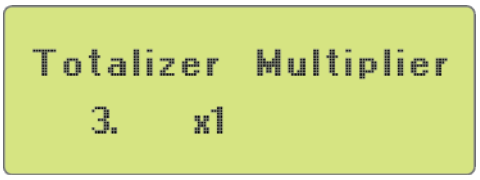
Press ↑ or ↓ to select the volume measure unit and press ENTER to confirm.
Available settings: Cubic Meter (m3); Liter (l); US Gallon (Gal); UK Gallon (IGL); Million US Gallon; Cubic Feet (CF); US Oil Barrel (OB); UK Oil Barrel (IB)



11.33 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)



11.34 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



11.35 M35 - Forward totalizer activation programming

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



11.36 M36 - Reverse totalizer activation programming

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

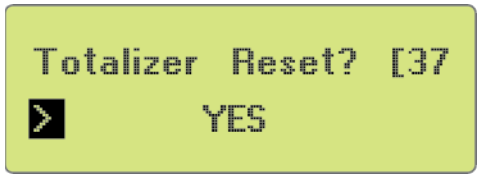


11.37 M37 - Totalizers reset

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



Select with ↑ or ↓ “**YES**” and press ENTER
Selecting “**NO**” the reset procedure is canceled .
Default value: NO



Select with ↑ or ↓ the required option and press ENTER , the confirmation message will appear after the reset. Selecting “**NONE**” the reset procedure is canceled. Default value: NESSUNO
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



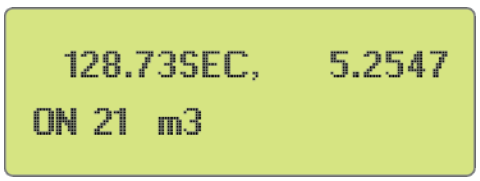


11.38 M38 - Partial totalizer

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 ↑ or ↓ to exit.



11.39 M39 - Language menu programming

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



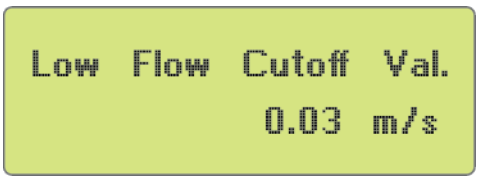
11.40 M40 - Damping programming

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



11.41 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.



11.42 M42 - Zero flow automatic calibration

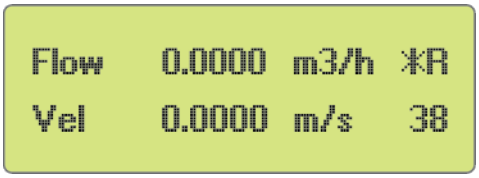
In this menu it's possible to do the zero flow automatic calibration. This calibration is used to compensate the possible measurement errors at zero. Under normal conditions not need to do this calibration.

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.

NB- 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

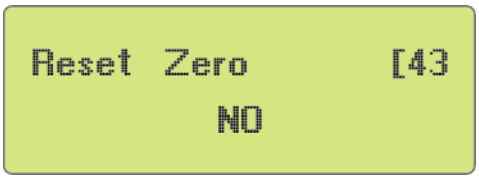
WARNING - *The fluid inside the pipe must be stopped during the automatic calibration procedure.*





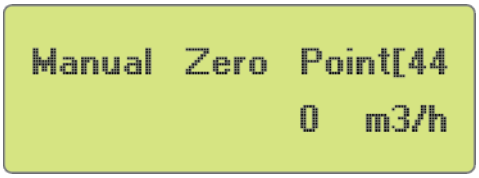
11.43 M43 - Zero flow calibration reset

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.



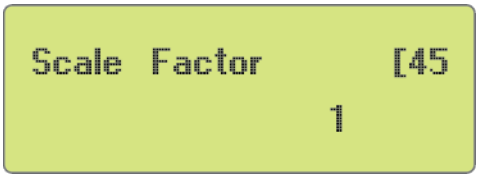
11.44 M44 - Zero flow manual calibration

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



11.45 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



11.46 M46 - MODBUS network address programming

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



11.47 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 ↑ and move the cursor to the right with →, max. value: 99999
press ENTER to store the new password and protect the system by blocking the changes to the programming



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

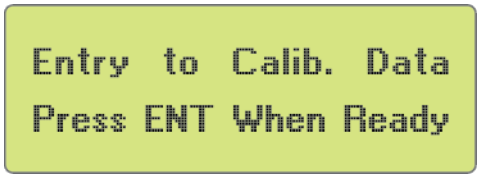


Enter the previously stored password, modifying the digit with ↑ and moving the cursor to the right with →.
Press ENTER to confirm and unlock the programming changes.



11.48 M48 - Calibration data programming

Only for headquarters use.



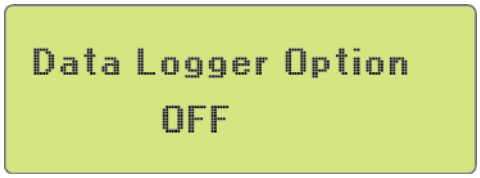
11.49 M49 - MODBUS serial port test

Only for headquarters use



11.50 M50 - Data logger programming

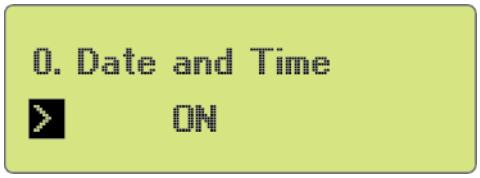
In this menu it's possible to enable the data logger with via MODBUS data transmission. To enable the data logger, proceed as follows:
press ENTER



Select "**ON**" with ↑ and press ENTER.



Pressing ↑ 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



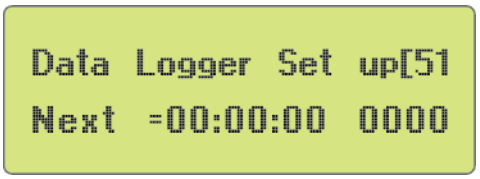
See the table below for the available data

0	Date and Time	**4**	Flow Rate	**8**	NEG Totalizer
1	System Status	**5**	Velocity	**9**	Energy Flow Rate
2	Current Windows	**6**	NET Totalizer	**10**	Energy NET Totalizer
3	Signal Strength	**7**	POS Totalizer	**11**	Energy POS Totalizer

12	Energy NEG Totalizer	**16**	Analog Input 3	**20**	Flow Today
13	Fluid Velocity	**17**	Analog Input 4	**21**	Serial Number
14	RTD T1	**18**	Analog Input 5		
15	RTD T2	**19**	Working Timer		

11.51 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 ↑ and move the cursor to the right with →.
Press ENTER to store the start time.



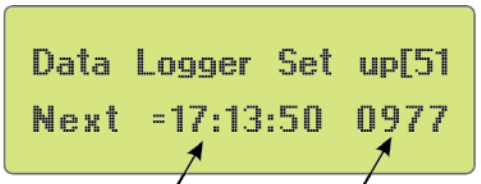
Set the data logger interval time between a recording and the other.
Change the digit with ↑ and move the cursor to the right with →.
Press ENTER to store the data logger interval time.



Set the data logger recordings number to be made.
Change the digit with ↑ and move the cursor to the right with →.
Press ENTER to store the storage number.



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



Next data storage time

Remaining recordings number

11.52 M52 - Data transmission programming

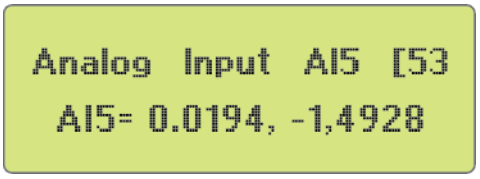
In this menu it's possible to set the data transmission mode.
Default mode: 1. INVIA CON RS-485
Available settings:

1. **Send To RS-485**
2. Internal SerBus (data sending to SD card)



11.53 M53 - AL5 analog input displaying

In this menu it's possible to display the AL5 analog input.



11.54 M54 - OCT output pulse width programming

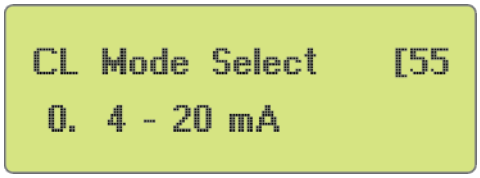
In this menu it's possible to set the OCT output pulse width.
Range: 1÷500mS



11.55 M55 - Analog output mode programming

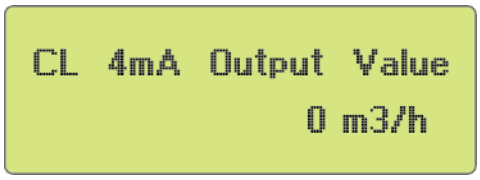
In this menu it's possible to set the analog output mode.
Default value: 0. 4-20mA
Available settings:

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



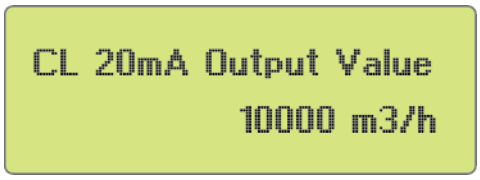
11.56 M56 - 4mA (or 0mA) output programming

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**.



11.57 M57 - 20mA output programming

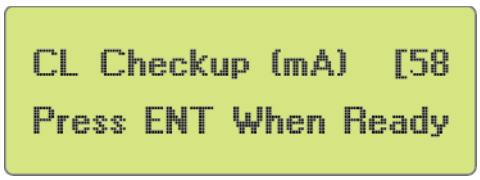
In this menu it's possible to set the analog output full scale.
The measure unit is in **M55** programming function, per es: with **M55** set to "**0. 4-20mA**", the measure unit is **m3/h**; with **M55** set to "**3. 4-20mA vs.Vel.**" the measure unit is **m/s**.

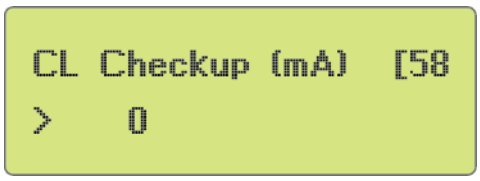


11.58 M58 - Analog output simulation

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 ▲ or ▼ the desired option
Available settings:

0 segnale in uscita 0mA
4 segnale in uscita 4mA
8 segnale in uscita 8mA
12 segnale in uscita 12mA
16 segnale in uscita 16mA
20 segnale in uscita 20mA





11.59 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.



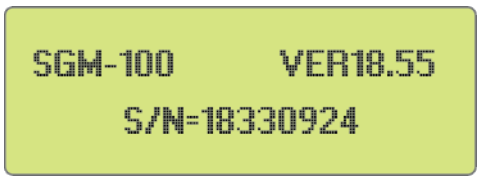
11.60 M60 - System date and time programming

In this menu it's possible to impostare la data e l'ora del sistema



11.61 M61 - SGM101-F info displaying

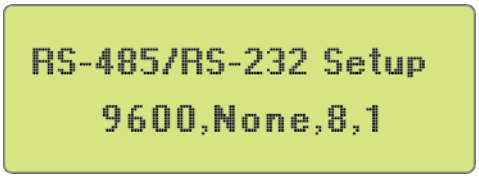
In this menu, the **SGM-101F** unit details are available.



11.62 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



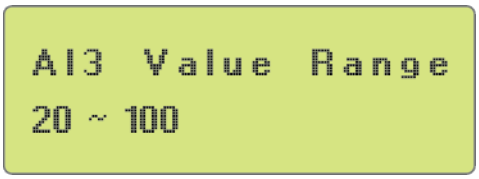
11.63 M63 - Communication protocol programming

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



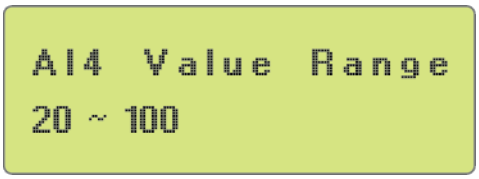
11.64 M64 - AL3 analog input programming

In this menu it's possible to set the AL3 analog input beginning and full scale.



11.65 M65 - AL4 analog input programming

In this menu it's possible to set the AL4 analog input beginning and full scale.



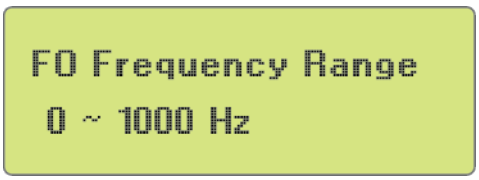
11.66 M66 - AL5 analog input programming

In this menu it's possible to set the AL5 analog input beginning and full scale.



11.67 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.



11.68 M68 - Frequency output low flow rate programming

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



11.69 M69 - Frequency output high flow rate programming

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



11.70 M70 - Backlight interval programming

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



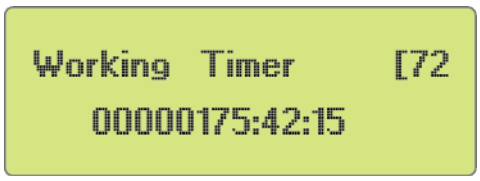
11.71 M71 - LCD contrast programming

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

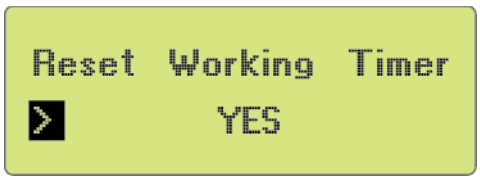


11.71 M72 - Operation time displaying

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:

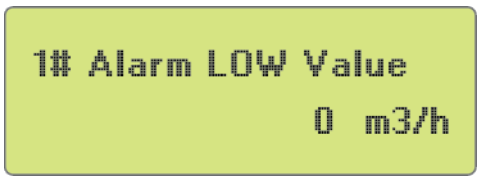


Press ENTER 2 times to enter, then select "**YES**" with ↑ and press ENTER to confirm the reset.



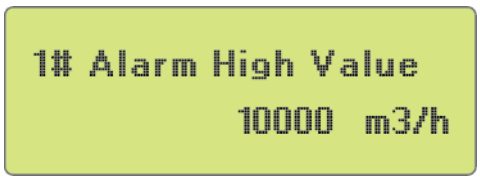
11.73 M73 - #1 Q min. alarm programming

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



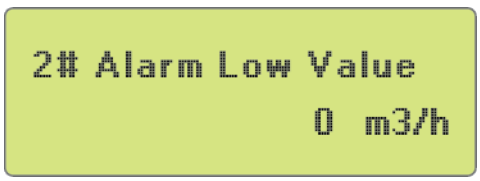
11.74 M74 - #1 Q max. alarm programming

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



11.75 M75 - #2 Q min. alarm programming

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



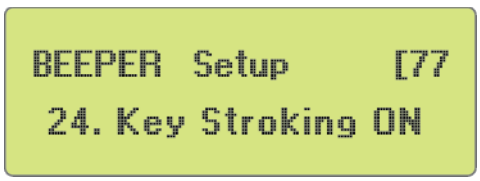
11.76 M76 - #2 Q max. alarm programming

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



11.77 M77 - Buzzer operation programming

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



0. No Signal
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. Key Stroking ON
25. Disable BEEPER

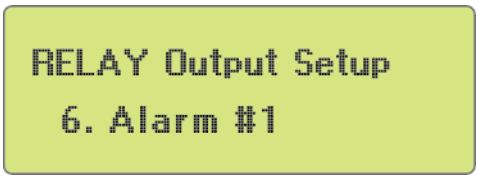
11.78 M78 - OCT output programming



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

0. No Signal
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 OCT

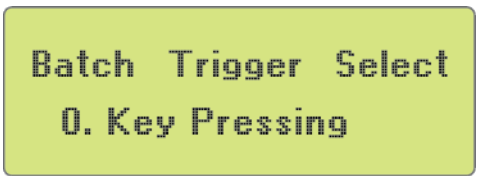
11.79 M79 - Relay output programming



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

11.80 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. AI3 Rising Edge
3. AI3 Falling Edge
4. AI4 Rising Edge
5. AI4 Falling Edge
6. AI5 Rising Edge
7. AI5 Falling Edge
8. Timer-Periodical
9. Time-daily

11.81 M81 - Batch volume programming

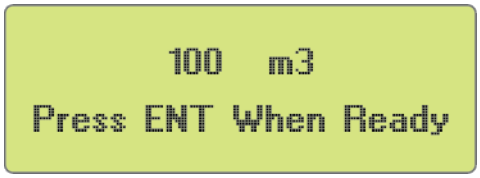
In this menu it's possible to preset the batch volume value.
To preset the batch volume proceed as follows:
press ENTER



Set the predetermined volume. Change the digit with ↑ and move the cursor to the right with →.
Press ENTER to store.

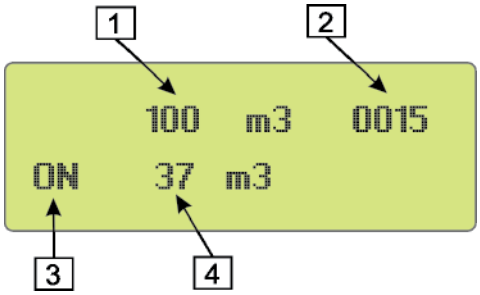


With **M80** set to "0. Key Pressing", the display will show the message "Press ENT When Ready"; pressing ENTER starts the batch cycle.



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.

11.82 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

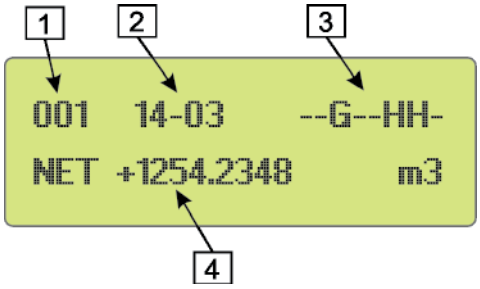


Select the events display mode with ↑ or →.
Available settings:
0. Browse by Day; 1. Browse by Month; 2. Browse by Year
Press ENTER to confirm.



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 ↑ or → to select events in succession. Press ENTER to exit

11.83 M83 - Totalizers automatic correction Enabling

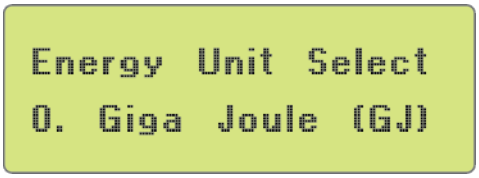
In this menu it's possible to enable the flow totalizers automatic correction during the period in which the unit SGM-101F is turned off.
An average flow rate value is calculated using the measured flow rate before shutdown and the flow rate measured after the system restarts.
This calculated average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



11.84 M84 - Heat meter unit programming

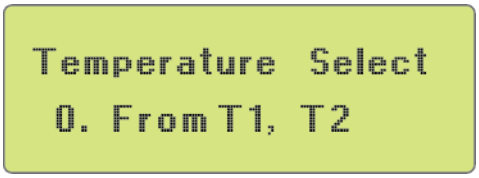
The display shows the previous setting.
Available settings:

0. Giga Joule (GJ)
1. Kilocalorie (Kc)
2. KWh
3. BTU



11.85 M85 - Temperature sensor input programming

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



11.86 M86 - Specific heat programming

The display shows the previous setting.
Available settings:

0. GB
1. Fix Specific Heat



11.87 M87 - Heat meter totalizer programming

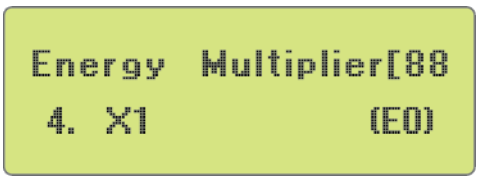
In this menu it's possible to enable the heat meter totalizer.



11.88 M88 - Heat meter totalizer multiplier programming

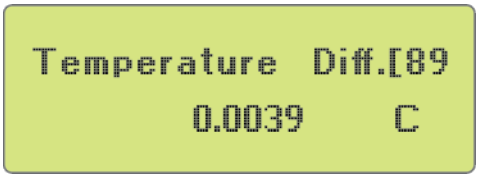
The display shows the previous setting. Default value: x1
Available settings:

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)



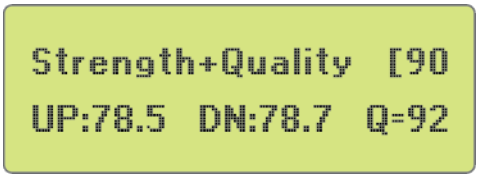
11.89 M89 - Temperature differential displaying

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



11.90 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.



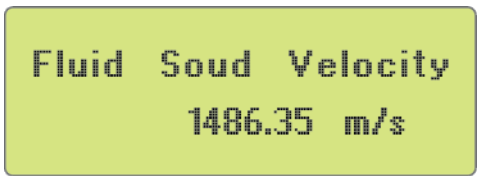
11.91 M91 - TOM/TOS % displaying

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.



11.92 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.



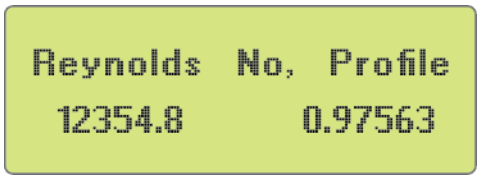
11.93 M93 - Flight time and delta T.

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



11.94 M94 - Reynolds number displaying

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

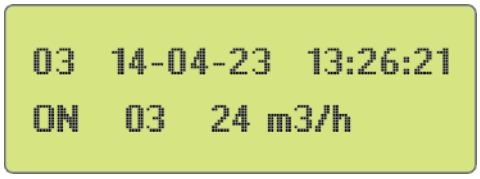


11.95 M+0 - Date/time/flow displaying when the unit was power off

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

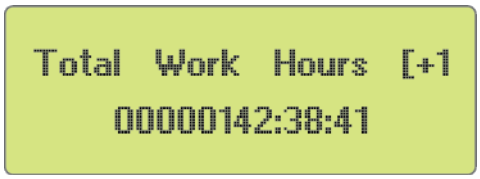


Up to 64 events are recorded, in the range 00÷63.
Select the event with ↑ or ↓.
Press ENTER to exit.



11.96 M+1 - Total operating time displaying

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

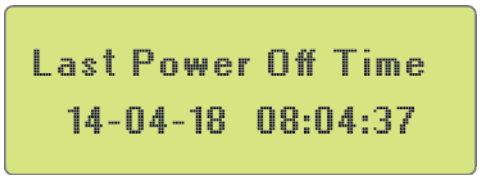


Pressing ENTER can be displayed the instantaneous negative flow rate measurement total time.
Press ENTER to exit.



11.97 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**.



11.98 M+3 - Last measured flow rate displaying

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



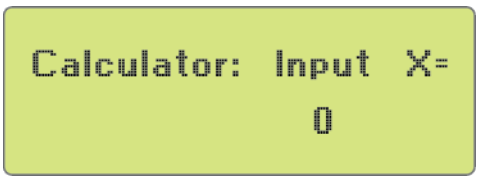
11.99 M+4 - SGM-101F on/off times number displaying

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

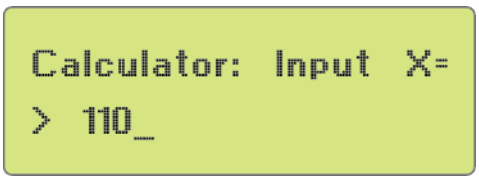


11.100 M+5 - Calculator and Converter

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



Enter number: with ↑ to change the digit and → to move the cursor to the right (max. 13 digits). Press ENTER to confirm



Select the operation with ↑ or → 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



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



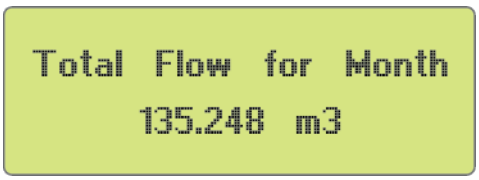
11.101 M+6 - Velocity threshold programming

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



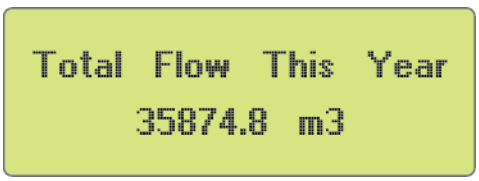
11.102 M+7 - Monthly totalizer displaying

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



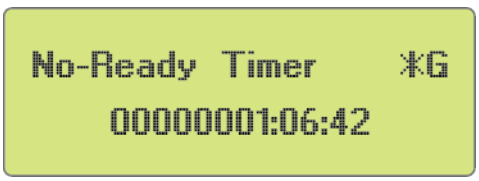
11.103 M+8 - Annual totalizer displaying

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

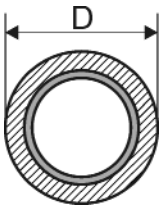
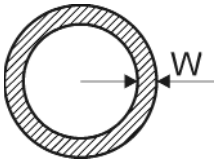
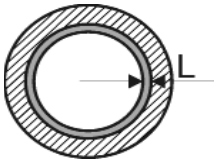


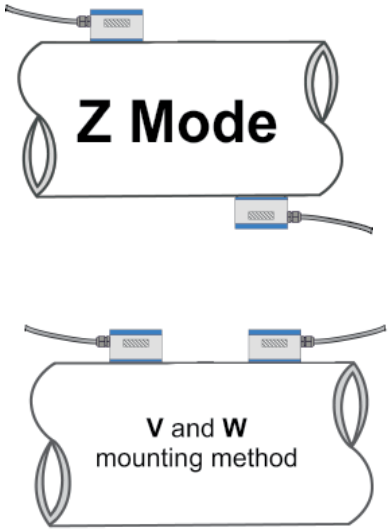
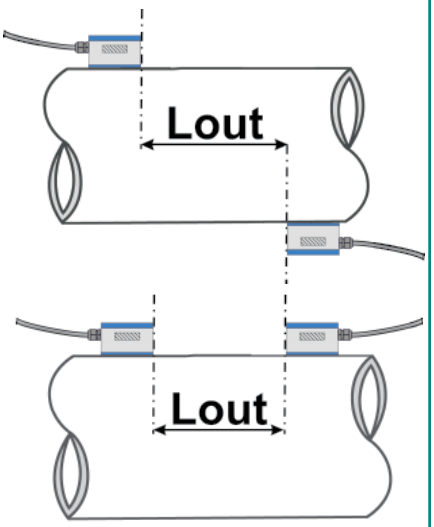
11.103 M+9 - Echo absence error total time displaying (*H)

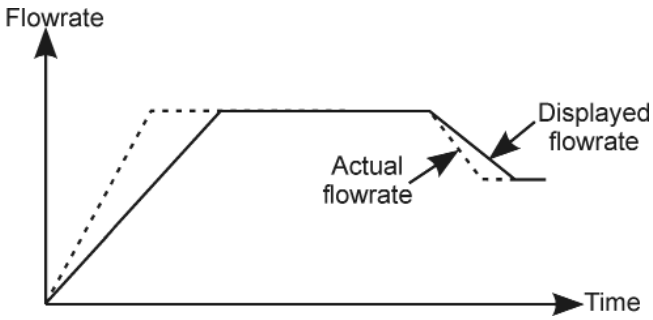
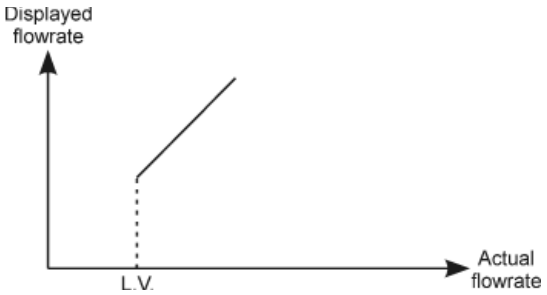
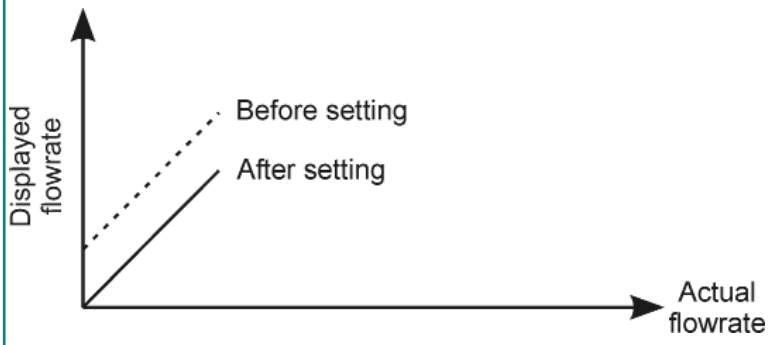
In this menu it's possible to display the echo absence error condition total time.



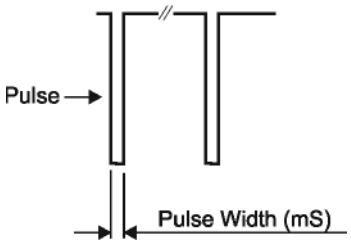
12. MAIN PARAMETERS DESCRIPTION

Name	Displaying	Description	Menu
Pipe Ø	Pipe Outer Diameter	 (Pipe cross section) Pipe Outer diameter	**M11**
Pipe thickness	Pipe Wall Thickness	 (Pipe cross section) Pipe thickness	**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 cross section) Pipe inner lining thickness	**M18**

Name	Displaying	Description	Menu
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**.	**M24**
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.	**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**

Tab. 10

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**
OCT output pulse width	OCT Pulse Width	Is possible toset the digital pulse width during the counting. Range:0.01÷500ms 	**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	Is the instantaneous flow rate value, expressed in the above selected measure unit, which is associated with the analog output scale beginning (4 or 0mA)	**M56**
4÷20mA output full scale	VALORE RIF. A 20 mA	Is the instantaneous flow rate value, expressed in the above selected measure unit, which is associated with the analog output full scale (20mA)	**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**

Tab. 11

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	Soluzione
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 e orologio**
No display	Bad wiring connection	**Verificare le connessioni elettriche**
Stroke key - No response	Keypad locked	**Enter the password to unlocking**

Tab. 12

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**

Tab. 13

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

13.1 General

The **SGM-100F** has a **RS485** standard communication interface and a complete set of **MODBUS** communication protocol.

13.2 The protocol

The Protocol isa composed by a set of basic commands (string in ASCII format) ending with a carriage return (CR) and line feed (LF). Commonly used commands are listed below:

Command	**Function**	**Data Format**
DQD(CR)	Return flow rate per day	±d.dddddE±dd(CR) LF *
DQH(CR)	Return flow rate per hour	±d.dddddE±dd(CR) LF
DQM(CR)	Return flow rate per minute	±d.dddddE±dd(CR) LF
DQS(CR)	Return flow rate per second	±d.dddddE±dd(CR) LF
DV(CR)	Return flow velocity	±d.dddddE±dd(CR) LF
DI+(CR)	Return POS totalizer	±ddddddE±d(CR) LF **
DI-(CR)	Return NEG totalizer	±ddddddE±d(CR) LF
DIN(CR)	Return NET totalizer	±ddddddE±d(CR) LF
DID(CR)	Return Identification Number	ddddd(CR) LF
DL(CR)	Return signal strength and quality	S=ddd,ddd Q=dd (CR)(LF)
DT(CR)	Return date and time	yy-mm-dd hh:mm:ss(CR)(LF)
M@(CR)***	Send a key value as if a key is pressed	
LCD(CR)	Return the current window display	
FOdddd(CR)	Force the FO output with a frequency in dddd Hz	
ESN(CR)	Return the ESN for the instrument	Ddddddd(CR)(LF)
RING(CR)	Handshaking Request by a MODEM	
OK(CR)	Response from a MODEM	No action
GA	Command for GSM messaging	Please contact factory for detail
GB	Command for GSM messaging	
GC	Command for GSM messaging	
DUMP(CR)	Return the buffer content	In ASCII string format
DUMP0(CR)	Clear the whole buffer	In ASCII string format
DUMP1(CR)	Return the whole buffer content	In ASCII string Format, 24KB in length
W	Prefix before an Identification Number in a network environment. The IDN is a word, ranging 0-65534.	
N	Prefix before an Identification Number in a network environment. The IDN is a single byte value, ranging 00-255.	
P	Prefix before any command	
&	Command connector to make a longer command by combining up to 6 commands	

Notes ***** **CR = Carriage Return e LF= Line Feed.**
****** **'d' = digit numerico 0-9**
***** @ stands for the key value, e.g., 30H for the '0' key.**

13.3 Prefixes using

13.3.1 - P prefix

The prefix P can be added before any command in the above table to have the returning data followed with two bytes of CRC check sum, which is the adding sum of the original character string.
Take the DI+(CR) command as an example. Assume that DI+(CR) would return +1234567E+0m3(CR)(LF)(the string in hexadecimal is 2BH, 31H, 32H, 33H, 34H, 35H, 36H, 37H, 45H, 2BH, 30H, 6DH, 33H, 20H, 0DH, 0AH) , then PDI(CR) would return +1234567E+0m3!F7(CR)(LF). '!' acts as the starter of check sum which is yielded by adding up the string 2BH, 31H, 32H, 33H, 34H, 35H, 36H, 37H, 45H, 2BH, 30H, 6DH, 33H, 20H.
Please note that there will be SPACES (20H) before '!'.

13.3.2 - W prefix

The prefix W should be used in the network environment. The usage format is W + digit string which stands for the IDN + basic command.
The digit string should have a value between 0 and 65534 except 13(0DH), 10 (0AH), 42(2AH,*), 38(26H, &).
For example, if the IDN=12345 instrument is addressed and returning the velocity of that instrument is requested, the command will be W12345DV(CR).

13.3.3 - N prefix

The prefix N is a single byte IDN network prefix, not recommended in a new design. It is reserved only for the purpose of the compatibility with the former versions
Command Connector &
The & command connector can connect up to 6 basic commands to form a longer command so that it will make the programming much easier.
For example, assume that the measurement of an instrument with IDN=4321 are going to be returned, and (then) all the following 3 values— (1) flow rate (2) velocity (3)POS totalizer—will be returned simultaneously. The combined command would be W4321DQD&DV&DI+(CR), and the result would be:
+1.234567E+12m3/d(CR)
+3.1235926E+00m/s(CR)
+1234567E+0m3(CR)

13.4 Codes for keypad

The codes for the keypad should be used when the instrument is connected with other terminals that operate the instrument by transmitting the 'M' command along with the keypad code. By this function, remote operation of this instrument can be realized, even via Internet.

Key	Hexadeci-mal	1Decimal k2ey code3	ASCII code	Key	Hexadeci-mal	Decimal key code	ASCII code
0	30H	48	0	8	38H	56	8
1	31H	49	1	9	39H	57	9
2	32H	50	2	.	3AH	58	:
3	33H	51	3		3BH,0BH	59	;
4	34H	52	4	MENU	3CH,0CH	60	<
5	35H	53	5		3DH,0DH	62	=
6	36H	54	6		3EH	62	>
7	37H	550	7		3FH	63	?

Tab. 14

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Documentation subject to technical change with no prior warning

ANEXO 3. FICHA TECNICA DEL CAUDALIMETRO ELECTROMAGNETICO

SIEMENS

HOJA TÉCNICA CAUDALIMETRO ELECTROMAGNETICO SIEMENS. **<u>MODELO SENSOR:</u>** **-MAG 5100W** **<u>MODELO ELECTRONICA</u>:** **-MAG 6000 (PRECISIÓN +/-0,2%)**

HOJA TECNICA	

ESTA HOJA DE CARACTERISTICAS GENERICA APLICA A LOS CAUDALIMETROS ELECTROMAGNETICOS MODELO MAG5100W / MAG6000

Tubo electromagnético especialmente diseñado para la medida de caudal de agua potable, industrial, residual y lodos, por el procedimiento magnético-inductivo, modelo Sitrans FM, tipo Magflo MAG 5100 W Nuevo, en ejecución con bridas, con electrodo de puesta a tierra incorporado, para conectar a un amplificador de medida de los tipos MAG 5000, 6000 y 6000 I, **provisto de sistema inteligente de identificación Sensorprom, con: Electrodo de puesta a tierra: Incorporado. Material del electrodo de puesta a tierra: Hastelloy C276**. Material del tubo de medida: Acero inoxidable AISI 304. Material de las bridas y la carcasa: Acero al carbono ASTM 105 con recubrimiento de Epoxy.
Protección ambiental: IP 67 estándar, ampliable a IP 68 en la versión de amplificador separado del tubo.
Diámetro nominal: DN XXX. Conexión al proceso: Bridas EN 1092-1. Presión nominal: PN 16.
Revestimiento del tubo y de las bridas: EPDM (para agua potable) ó NBR (para agua residual).
Temperatura del medio: -10 a +70 ºC.
Material de los electrodos de medida: Hastelloy C-276.
Convertidor de medida: No incluido, (puede pedirse separadamente para montaje fuera del tubo).
Comunicación: No incluida.
Entrada de cables: Pasacables con rosca M20 x 1,5.
(-Z=+N02) SISTEMA PARA USO REMOTO

Convertidor para la medida de caudal, magnético-inductivo, modelo Sitrans FM, tipo Magflo MAG 6000, con autodiagnóstico, apto para servicio de recetas, para conectar a los tubos de medida con campo magnético de corriente continua chopeada, modelos MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 W y MAG 5100 W, en Formato: IP67 para montaje en compacto, separado pared-barandilla o IP20 formato de 19", para montaje en rack o en caja para pared. Precisión de medida: Mejor del 0,25 % del caudal. Ajuste del cero: Automático. Identificación de tubo vacío: Incluida, automática. Salida analógica: 1 de 0/4 a 20 mA. Salida digital: 1 de frecuencia de 0 a 10 kHz. Salida de pulsos: 1 activa y 1 pasiva para conectar a totalizadores externos o entradas de PLC. Salida de relé: 1 de contacto conmutado para señalización de valor límite o estados de funcionamiento. Entrada digital: 1, por ejemplo para arranque o puesta a cero de los totalizadores internos. Comunicación: Posible, adicional, Hart, Profibus PA o DP, Modbus RTU/RS485, CANopen y DeviceNet. Indicador local: Incluido, retroiluminado, alfanumérico, con 3 líneas de 20 caracteres en 11 idiomas seleccionables. Totalizadores: Incluidos 2, con 8 dígitos, para flujo, reflujo y neto. Protección ambiental: IP 20. Material de la carcasa: Aluminio. Alimentación eléctrica: 115 - 230 V.c.a, 50/60 Hz ó 11-30V DC/11-24V AC 50/60 Hz.

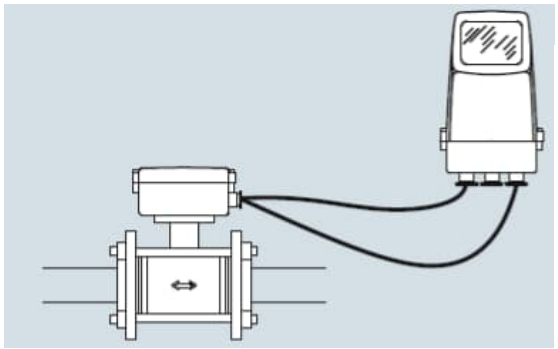
Accesorios para montaje en separado pared / barandilla. Cable para conexión sensor-electrónica.



Productos SITRANS F M



EJECUCIÓN COMPACTA





EJECUCIÓN SEPARADA

CARACTERÍSTICAS:

- Marca: SIEMENS
- Modelo:
  - *SENSOR --SITRANS FM **MAG 5100W**
  - * ELECTRONICA --SITRANS FM **MAG 6000 (2 formatos diferentes en función del montaje requerido)**
- Principio de medida: --Electromagnético para tubería llena.

Sensor de medida:

- Modelos: -- MAG 5100W
- Montaje: --En tubería mediante brida de conexión.
- Tamaño: --Diámetros según oferta.
- Presión nominal: -- PN16
- Materiales:
  - * Tubo de medida EXTERIOR: --Acero inoxidable 304
  - * Recubrimiento INTERNO EN CONTACTO CON EL FLUIDO: -- EPDM (Homologado para agua consumo humano) ó NBR para aguas residuales.
  - * Electrodos: --HASTELLOY-C276
  - * Bridas: -- Sobre norma EN 1092-1: Bridas PN16.
- Electrodos de igualación de potencial-puesta a tierra --Incluidos en HASTELLOY-C276
- Límite temperatura de proceso: -10 a +70 ºC.
- *Conforme a la directiva Europea de Presión 97/237EC(de obligado cumplimiento).*
- Protección: --IP 67 estandar ampliable a IP68

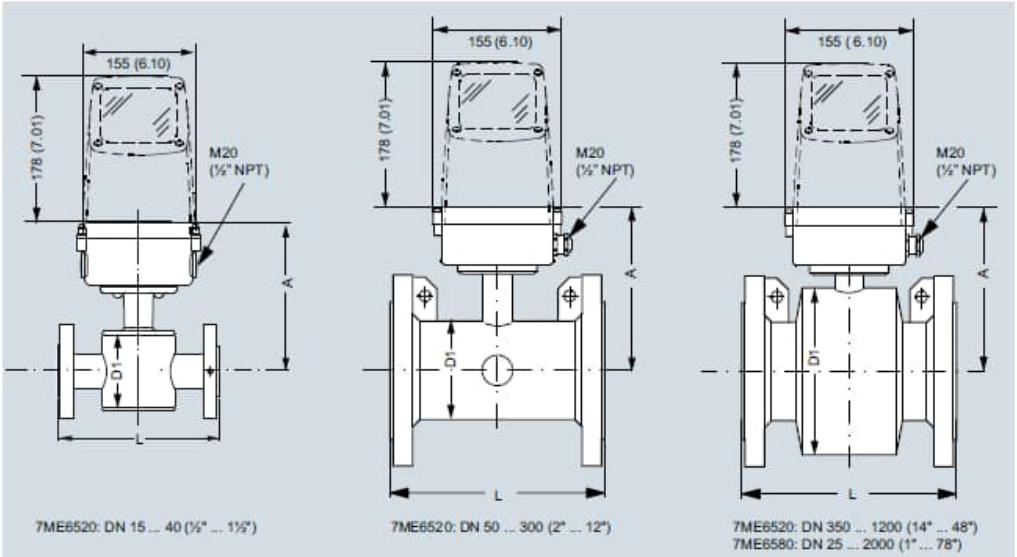
Convertidor de Señal (electrónica):

- Modelo: --MAG 6000
- Precisión (error): --MAG 6000 :+/- 0,2% del caudal real.
- Alimentación: -- 115 - 230 V.c.a, 50/60 Hz ó 11- 30V DC/11-24V AC 50/60 Hz.
- Salida analógica: --0/4-20 mA proporcional al caudal instantáneo.
- Communicable: --Opcional: Profibus PA, Hart, Device net, Bus, Can Open.

- Salida de pulsos: --ajustables para totalizar.
- Impedancia: --Menor de 1 Mohm
- Diferentes unidades de medida.
- Display: alfanumérico de 3x20 caracteres con indicación de caudal, volumen, ajustes y fallos

- Programación: con teclado. Microprocesador.
- Ajuste de cero automático.
- Todas las entradas y salidas están aisladas galvánica mente.
- Alarmas configurables por alto o bajo caudal (detección de fugas)
- Relé de conmutación para indicar la dirección o fallos de caudal.
- Dos contadores internos de 8 dígitos para caudal directo y para caudal inverso,
-Dos totalizadores (visible y oculto)
- Protección: IP 67.
- Montaje ofertado: separado mural
-Unidad: composición en Poliamida reforzada con fibra de Vidrio.
- Acceso directo al display
- Tiempo de respuesta: ajustable de 0,1 a 30 seg.
- **Certificado calibración: estándar (2 PUNTOS con repetibilidad**)

Croquis acotados



7ME6520: DN 15 ... 40 (½" ... 1½")

7ME6520: DN 50 ... 300 (2" ... 12")

7ME6520: DN 350 ... 1200 (14" ... 48")
7ME6580: DN 25 ... 2000 (1" ... 78")

Tamaño nominal		7ME6520 Revestimiento de NBR o EPDM A		D1		7ME6580 Revestimiento de ebonita A		D1		L[1]	
[mm]	[pulgadas]	[mm]	[pulgadas]	[mm]	[pulgadas]	[mm]	[pulgadas]	[mm]	[pulgadas]	[mm]	[pulgadas]
15	½	177	7.0	77	3.0	-	-	-	-	200	7.9
25	1	187	7.4	96	3.8	187	7.4	104	4.09	200	7.9
40	1½	202	8.0	127	5.0	197	7.8	124	4.88	200	7.9
50	2	188	7.4	76	3.0	205	8.1	139	5.47	200	7.9
65	2½	194	7.6	89	3.5	212	8.3	154	6.06	200	7.9
80	3	200	7.9	102	4.0	222	8.7	174	6.85	200	7.9
100	4	207	8.1	114	4.5	242	9.5	214	8.43	250	9.8
125	5	217	8.5	140	5.5	255	10.0	239	9.41	250	9.8
150	6	232	9.1	168	6.6	276	10.9	282	11.1	300	11.8
200	8	257	10.1	219	8.6	304	12.0	338	13.31	350	13.8
250	10	284	11.2	273	10.8	332	13.1	393	15.47	450	17.7
300	12	310	12.2	324	12.8	357	14.1	444	17.48	500	19.7
350	14	382	15.0	451	17.8	362	14.3	451	17.76	550	21.7
400	16	407	16.0	502	19.8	387	15.2	502	19.76	600	23.6
450	18	438	17.2	563	22.2	418	16.5	563	22.16	600	23.6
500	20	463	18.2	614	24.2	443	17.4	614	24.17	600	23.6
600	24	514	20.2	715	28.2	494	19.4	715	28.15	600	23.6
700	28	564	22.2	816	32.1	544	21.4	816	32.13	700	27.6
750	30	591	23.3	869	34.2	571	22.5	869	34.21	750	29.5
800	32	616	24.3	927	36.5	606	23.9	927	36.5	800	31.5
900	36	663	26.1	1032	40.6	653	25.7	1032	40.63	900	35.4
1000	40	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4
	42	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4
	44	765	30.1	1238	48.7	755	29.7	1238	48.74	1100	43.3
1200	48	820	32.3	1348	53.1	810	31.9	1348	53.07	1200	47.2
1400	54	-	-	-	-	925	36.4	1574	65.94	1400	55.1
1500	60	-	-	-	-	972	38.2	1672	65.83	1500	59.1
1600	66	-	-	-	-	1025	40.4	1774	75.39	1600	63
1800	72	-	-	-	-	1123	44.2	1974	77.72	1800	70.9
2000	78	-	-	-	-	1223	48.1	2174	85.59	2000	78.7

[1] Tolerancias de longitud en estado montado:
DN 15 a DN 200 (½" a 8"): +0/-3 mm (+0/-0.12"), DN 250 a DN 400 (10" a 16"): +0/-5 mm (+0/-0.20"),
DN 450 a DN 600 (18" a 24"): +5/-5 mm (+0.20/-0.20"), DN 700 a DN 2000 (28" a 78"): +10/-10 mm (+0.39/-0.39")

- No disponible

ANEXO 4. RELACION DETALLADA DE TRABAJOS.

SISTEMA Columna1	INFRAESTRUCTURA Se refiere a si nos encontramos en una Presa, ETAP o Depósito	NOMBRE Nombre asignado a la infraestructura	POSICION Posición exacta: entrada, salida, etc	CODIGO Código del abonado	DIAMETRO (2) Corresponde con el diámetro del caudalímetro electromagnético	EXISTE CAUDALIMETRO Indicamos si actualmente hay un caudalímetro	SENSOR Marca y modelo del sensor actual	CONTROLADOR Marca y modelo del controlador actual	CALDERERIA Indicamos si es necesario realizar trabajos de calderería	SENSOR2 Indicamos si es necesario instalar sensor nuevo MAG 5100W	ELECTRONICA Indicamos si es necesario instalar controlador MAG6000	TARJETA COM. Si es necesario tarjeta nueva. Los MAG6000 nuevos ya vienen con la tarjeta incorporada	CABLEADO Indicamos si es necesario cableado nuevo	COMUNICAR ANALOGICO Indicamos si es necesario conexionar la señal analógica	COMUNICAR MODBUS Indicamos si es necesario conexionar la señal Modbus	TIPOLOGIA INTERVENCION Tipología según los capítulos de la memoria
DEBAGOIENA	ETAP	GATZAGA	Entrada ETAP		DN80	SI	MAG-3100	MAG-2500	NO	SI	SI	NO	NO	NO	SI	3.2.2
DEBAGOIENA	ETAP	GATZAGA	Salida ETAP		DN50	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBAGOIENA	DEPOSITO	GATZAGAIN	Entrada depósito		DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBAGOIENA	DEPOSITO	GATZAGAIN	Salida depósito		DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBAGOIENA	CAPTACION	POL-POL	Salida captación		N/A	NO				DEFINIR						3.1
DEBAGOIENA	ETAP	ALBITXU	Derivación Ubera		DN200	NO			NO	SI	SI	NO	SI	NO	SI	3.2.1
DEBAGOIENA	DEPOSITO	ALBITXU	Salida Larramendi		DN63	NO			SI	S	SI	NO	SI	NO	SI	3.2.1
DEBAGOIENA	CAPTACION	GOIKO-BENTA	Alivio previo depósito		DN150	SI	Mecánico		NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBAGOIENA	DEPOSITO	GOIKO-BENTA	Salida depósito		DN80	SI	Octave		NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBABARRENA	CAPTACION	POZO K1	Bombeo pozo		DN150	SI	FP_10DX3311A	FP_10DX3311A	NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBABARRENA	CAPTACION	POZO K3	Bombeo pozo		DN200	SI	FP_10DX3311A	FP_10DX3311A	NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBABARRENA	CAPTACION	IRABANETA	Salida captación		N/A	NO										3.1
DEBABARRENA	CAPTACION	MAHALA	Bombeo captación		DN200	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	ETAP	KILIMON	Entrada		DN250	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	ETAP	KILIMON	Ecológico		N/A	NO										3.1
DEBABARRENA	ETAP	KILIMON	Purga de fangos		N/A	NO										3.3.3
DEBABARRENA	ETAP	KILIMON	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBABARRENA	ETAP	KILIMON	Salida Elgoibar		N/A	NO										3.3.1
DEBABARRENA	ETAP	KILIMON	Salida Sasiola		N/A	NO										3.3.1
DEBABARRENA	DEPOSITO	MENDARO	Entrada depósito	98000008	DN150	SI	RITTMEYER_D 10 D 1465 G	RITTMEYER_-	NO	SI	SI	NO	NO	NO	SI	3.2.2
DEBABARRENA	DEPOSITO	MENDARO	Salida depósito	7011444	DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	ALTZOLA	Entrada depósito	98000005	DN150	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	ALTZOLA	Salida depósito	31010065	DN65	SI	MAG-8000	MAG-8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	ARRIAGA	Entrada depósito	98000007	DN100	SI	FP_10D 1465 G	FP_10D 1465 G	NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBABARRENA	DEPOSITO	ARRIAGA	Salida depósito	31010066	DN125	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	KAKATZA	Entrada depósito	98000006	DN200	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	KAKATZA	Salida depósito	31010075	DN250	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	BOMBEO	SASIOLA	Salida Kalbario	98000009	DN250	SI	MAG-3100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	BOMBEO	SASIOLA	Salida Deba		DN100	NO										3.2.1
DEBABARRENA	DEPOSITO	SOLOMO	Entrada depósito	N/A	DN80	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	DEPOSITO	SOLOMO	Salida Urasandi	21004317	DN80	SI	ELSTER_C40324	ELSTER_-	NO	SI	SI	NO	SI	SI	SI	3.2.2
DEBABARRENA	DEPOSITO	SOLOMO	Salida Astigarribia	21004318	DN80	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	KALBARIO	Entrada depósito	N/A	DN250	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	DEPOSITO	KALBARIO	Salida Arnope	21004289	DN50	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	KALBARIO	Salida Gabilondo	21004285	DN150	SI	MAG-8000	MAG-8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	KALBARIO	Salida Laranga	21004290	DN80	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	DERIVACION	GABILONDO	Entrada derivación		DN200	NO										3.2.1
DEBABARRENA	DERIVACION	GABILONDO	Salida Erbitxo	21004308	DN150	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	DERIVACION	GABILONDO	Salida Linea 3	21004288	DN150	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	DERIVACION	GABILONDO	Salida Linea 0.8	21004307	DN150	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3

DEBABARRENA	DERIVACION	GABILONDO	Salida Linea 10	21004287	DN150	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	DEPOSITO	ISTIÑA	Entrada Sasiola	98000004	DN200	SI	Fischer Porter		NO	SI	SI	NO	NO	NO	SI	3.2.2
DEBABARRENA	DEPOSITO	ISTIÑA	Entrada Goikoetxe	98000132	DN200	SI	FP_10D1465G	FP_10D1465G	NO	SI	SI	NO	SI	NO	SI	3.2.2
DEBABARRENA	DEPOSITO	ISTIÑA	Salida depósito	2012437	DN200	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	CAPTACION	TANTORTA	Bombeo pozo		DN200	SI	MAG-3100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	CAPTACION	COTAS 300-400	Arqueta Xoxote		DN200	SI	Caudalimetro mecanico	Caudalimetro mecanico	NO	SI	SI	NO	SI	SI	SI	3.2.2
DEBABARRENA	DEPOSITO	AITTOLA	Entrada depósito	98000183	DN80	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	DEPOSITO	AITTOLA	Salida depósito	2012501	DN125	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	ETAP	GOIKOETXE	Entrada ETAP		DN150	SI	MAG-3100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	ETAP	GOIKOETXE	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBABARRENA	ETAP	GOIKOETXE	Salida Istiña		DN100	SI	MAG-3100	MAG-2500	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	ETAP	GOIKOETXE	Salida Itziar		DN150	NO										3.2.1
DEBABARRENA	ETAP	GOIKOETXE	Salida barrio Goikoetxe	2012503	DN63	SI	Caudalimetro mecanico	Caudalimetro mecanico	NO	SI	SI	NO	SI	SI	SI	3.2.2
DEBABARRENA	DEPOSITO	ITZIAR	Entrada depósito	98000010	DN150	SI	MAG-3100	MAG-5000	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	DEPOSITO	ITZIAR	Salida Itziar	2012428	DN100	SI	MAG-8000	MAG_8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	ITZIAR	Salida polígono	2012427	DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	ETAP	ERROTABARRI	Entrada ETAP	98000185	DN250	SI	MAG-3100	MAG-2500	NO	NO	SI	NO	NO	NO	SI	3.2.3
DEBABARRENA	ETAP	ERROTABARRI	Salida ETAP		N/A	NO										3.3.1
DEBABARRENA	ETAP	ERROTABARRI	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBABARRENA	ETAP	ERROTABARRI	Purga de fangos		N/A	NO										3.3.3
DEBABARRENA	DEPOSITO	ONGARAI	Entrada depósito		DN150	NO										3.2.1
DEBABARRENA	DEPOSITO	ONGARAI	Salida depósito	98000186 - 50008247	DN300	SI	MAG-5100	MAG-5000	NO	NO	SI	NO	NO	SI	SI	3.2.3
DEBABARRENA	DERIVACION	MALLABIA	Entrada consorcio	56000758	DN80	SI	MAG-8000	MAG_8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DERIVACION	MALLABIA	Salida Areitio	56000807	DN125	SI	MAG-8000	MAG_8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DERIVACION	MALLABIA	Salida Mallabia	56000808	DN80	SI	MAG-8000	MAG_8000	NO	NO	NO	SI	NO	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	MALLE	Entrada depósito	56000853	DN80	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	MALLE	Salida pueblo	56000760	DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	MALLE	Salida Urtiaga	56000761	DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	GOSIÑE	Entrada depósito	56000759	DN150	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	GOSIÑE	Salida pueblo	56000763	DN100	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	GOSIÑE	Salida Goitondo	56000762	DN150	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	GOSIÑE	Salida Osma	56000852	DN65	SI	MAG-5100	MAG-6000	NO	NO	NO	SI	SI	NO	SI	3.2.4
DEBABARRENA	DEPOSITO	OSMA	Entrada depósito		DN50	NO										3.2.1
DEBABARRENA	DEPOSITO	OSMA	Salida depósito		DN50	NO										3.2.1
UROLA KOSTA	ETAP	AIA	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBABARRENA	CAPTACION	GATZAGA	Salida captación		N/A	NO										3.1
UROLA KOSTA	CAPTACION	GILTZAITURRI	Salida captación		N/A	NO										3.1
DEBAGOIENA	ETAP	LEINTZ GATZAGA	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBAGOIENA	ETAP	ALBITXU	Lavado de filtros		N/D	NO			SI	SI	SI	NO	SI	NO	SI	3.3.2
DEBAGOIENA	ETAP	ALBITXU	Purga de fangos		N/A	NO										3.3.3
DEBABARRENA	ETAP	KILIMON	Agua Tratada		N/A	NO										3.1

NOTAS

(2) Los diámetros deberán ser confirmados por el postor previo a la compra de los equipos