bürkert
FLUID CONTROL SYSTEMS

Typ SE58 S

Transmitter

Operating Instructions

MAN 1000495946 EN Version: B Status: RL (released | freigegeben) printed: 01.04.2022

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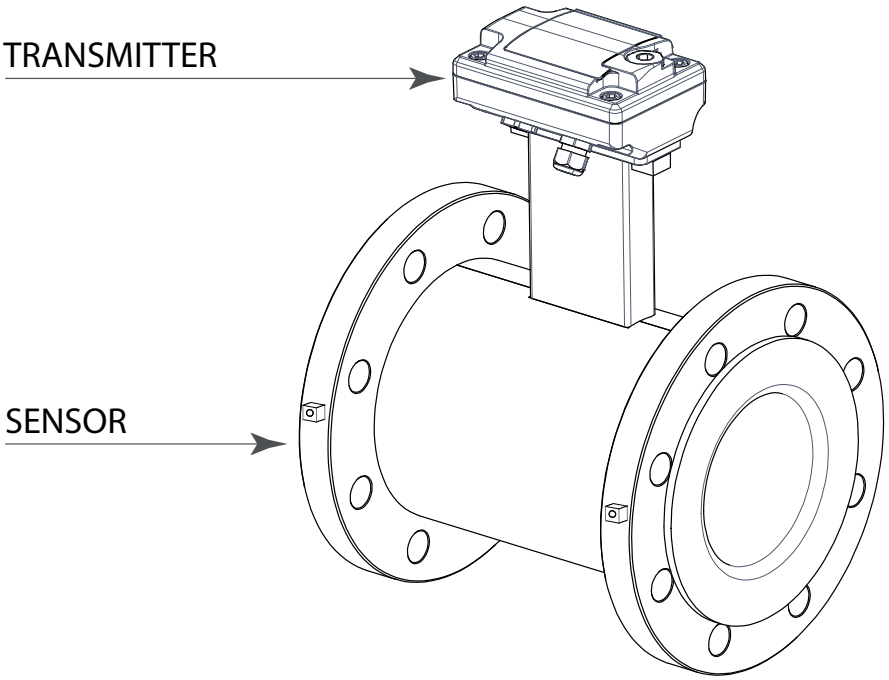
(*) Any changes using MCP are not recommended, unless:
- after receiving corresponding training by Burkert,
- done by professional,
- agreed by the end user, and done inline with the MCP manual

INTRODUCTION

- These operating instructions and the description of device functions are provided as part of the scope of supply.
- They could be modified without prior notice. The improper use, possible tampering of the device or parts of it and substitutions of any components not original, renders the warranty automatically void.
- The flow meter realizes a measure with liquids of conductivity greater than 20µS/cm in closed conduits, and is composed of a transmitter (described in this manual) and a sensor (refer to the specific manual).
- The transmitter could be coupled directly on the sensor (compact version).



SAFETY INFORMATION

Any other use than the one described in this manual affects the protection provided by the manufacturer and compromises the safety of people and the entire measuring system and is, therefore, not permitted.
The manufacturer is not liable for damaged caused by improper or non-designated use.

Transport the measuring device to the measuring point in the original packaging. In case of carton packaging it is possible to place one above the other but no more than three cartons. In case of wooden packaging don't place one above the other.
Disposal of this product or parts of it must be carried out according to the local public or private waste collection service regulations.
The electromagnetic flow meter must only be installed, connected and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in these Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).

The specialists must have read and understood these Operating Instructions and must follow the instructions it contains. If something isn't clear to you in these Operating Instructions, you must call the Bürkert service. The Operating Instructions provide detailed information about the device.

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- The flow meter should only be installed after having verified technical data provided in this operating instructions and on the data plate.
- Specialists must take care during installation and use personal protective equipment as provided by any related security plan about risk assessment.
- Never mount or wire SE58 S while it is connected to the power supply and avoid any liquid contact with the device's internal components.
- Before connecting the power supply check the safety equipment.
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- For the cleaning of the device use only a damp cloth, and for the maintenance/repairs contact the service center.

Before starting up the equipment please verify the following:

- Power supply voltage must correspond to that specified on the data plate
- Electric connections must be completed as described
- Ground (earth) connections must be completed as specified

Verify periodically (every 3-4 months):

- The power supply cables integrity, wiring and other connected electrical parts
- The housing integrity
- The suitable tightness of the sealing elements
- The front panel integrity (display and keyboard)
- The mechanical fixing of the transmitter to the pipe or wall stand

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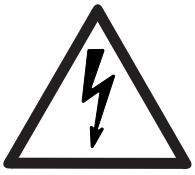
SAFETY CONVENTION



DANGER ELECTRIC SHOCK

WARNING

PRECAUTIONS

ATTENTION

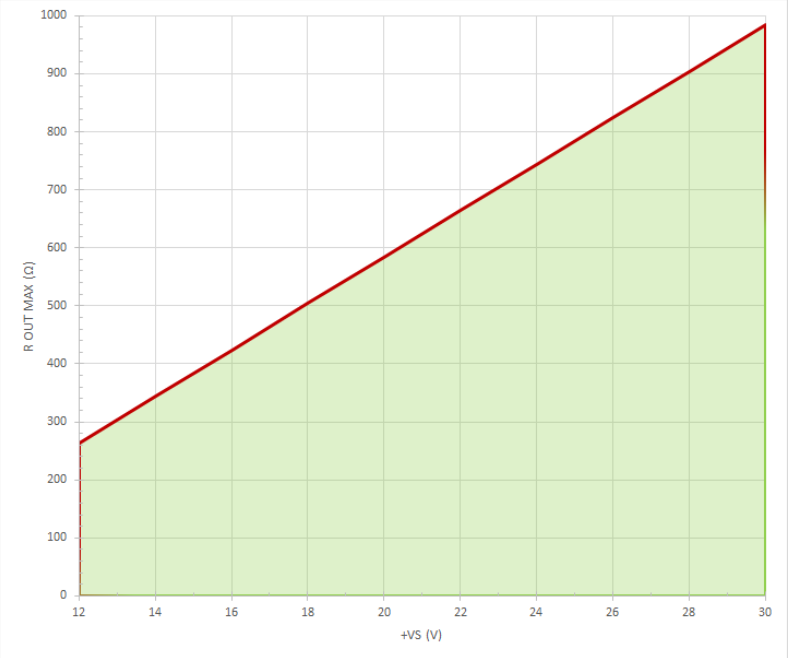
TECHNICAL CHARACTERISTICS

Electrical Characteristic

Device classification: class I, IP67/IP68 installation category II, rated pollution degree 2.

Power supply voltage	Power Max
min10 / max30 V DC	1W

- Voltage variations must not exceed ±10% of the nominal one.
- Digital input/outputs are insulated up to 500V.
- 4-20mA max load: see graph here below; not insulated from power supply.



Environmental Use Conditions

- The device can be installed inside or outside buildings
- Altitude: from –200m to 2000m (from -656 to 5602 feet)
- Humidity range: 0-100% (IP 67)

ENVIRONMENTAL TEMPERATURE			LIQUID TEMPERATURE		
	Min *	Max		Min*	Max
°C	-20**	60	°C	-10	100
°F	- 4**	140	°F	14	212

[*] For discontinuous use, a thermostat heat source installation may be necessary
[**] -10 °C, 14 °F if no analog output used

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Data Plate

On the data plate there is some technical information

Transmitter data	**Transmitter**				*Transmitter data*
Transmitter model	Type	**SE58 S (B0B1A0A)**			
Transmitter serial number	S/N	**AAZ000004**			
Identification code	ID	**XXXXXX**			
	Power	**18-30 V DC 1W**			Min-Max supply voltage range-supply voltage type-max. power consumption
Protection grade	IP	**67**	MaxTa	**60°C**	Maximum ambient operation temperature
Sensor data	**Sensor**				*Sensor data*
Sensor model	Type	**SO56 (T10-3B1A)**			
Sensor serial number	S/N	**09Y006468**			
Identification code	ID	**XXXXXX**			
Nominal Diameter	DN	**10**	PN	**1600 kPa**	Maximum nominal pressure
Lining material	Liner	**PTFE**	Conn.	**ISO 2852**	Process connection
Electrodes number and type	Electr.	**2-AISI316L**			
Protection grade	IP	**67**	MaxTm	**130 °C**	Maximum supported medium temperature
Coefficent of calibration	KA	**-2.4682**			

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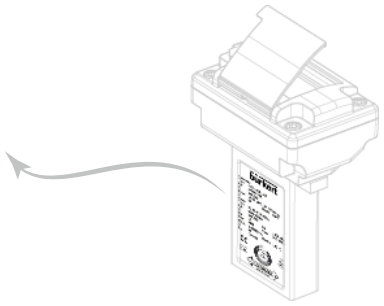
FLOW DIRECTION

MADE IN ITALY



Maintenance

ATTENTION

In case of the maintenance involving the change of SE58 transmitter or sensor, an additional measurement deviation can occur.
To ensure the original accuracy announced in the datasheet, a flow calibration of the full instrument must be performed by Burkert.

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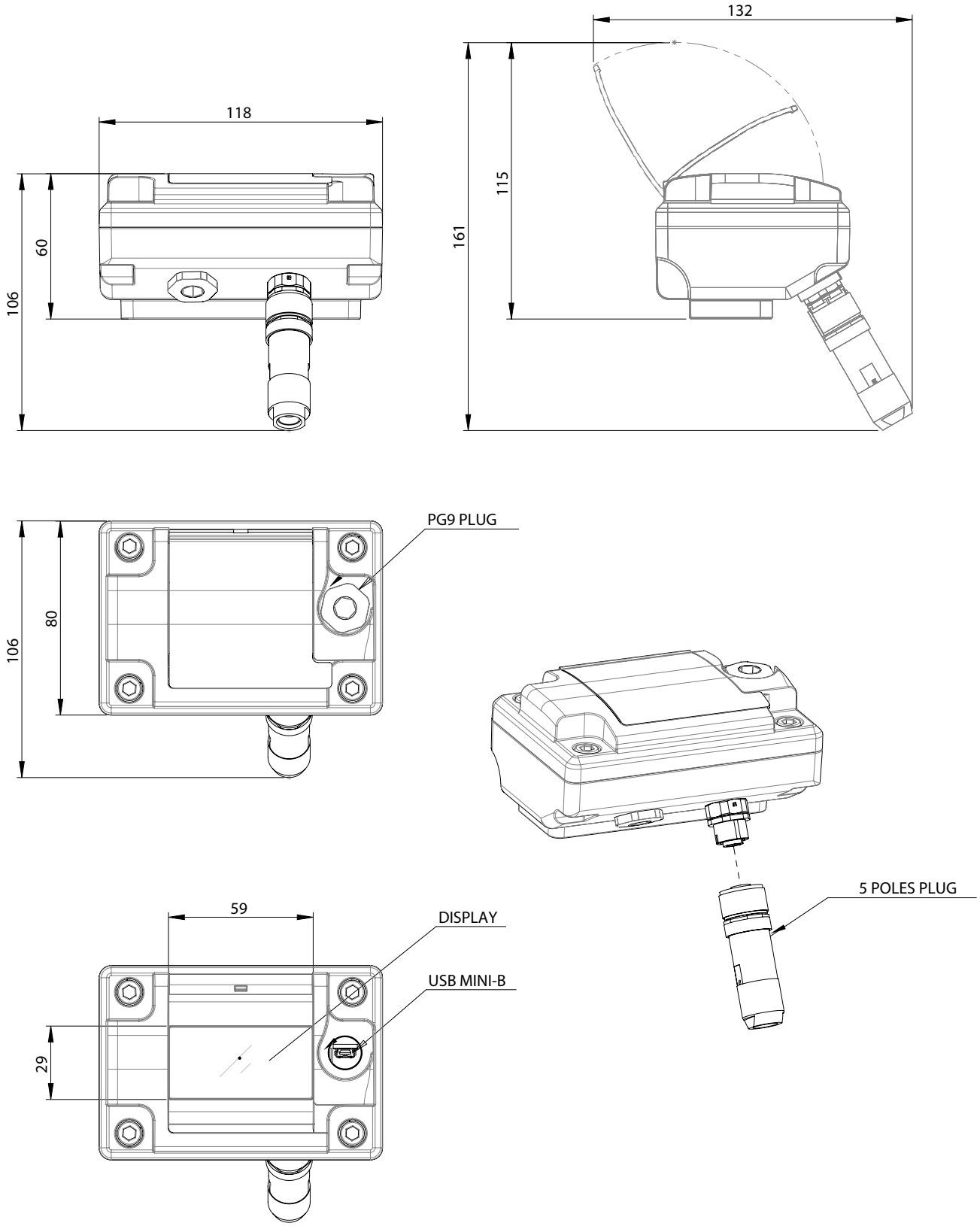
OVERALL DIMENSIONS WITH CONNECTOR



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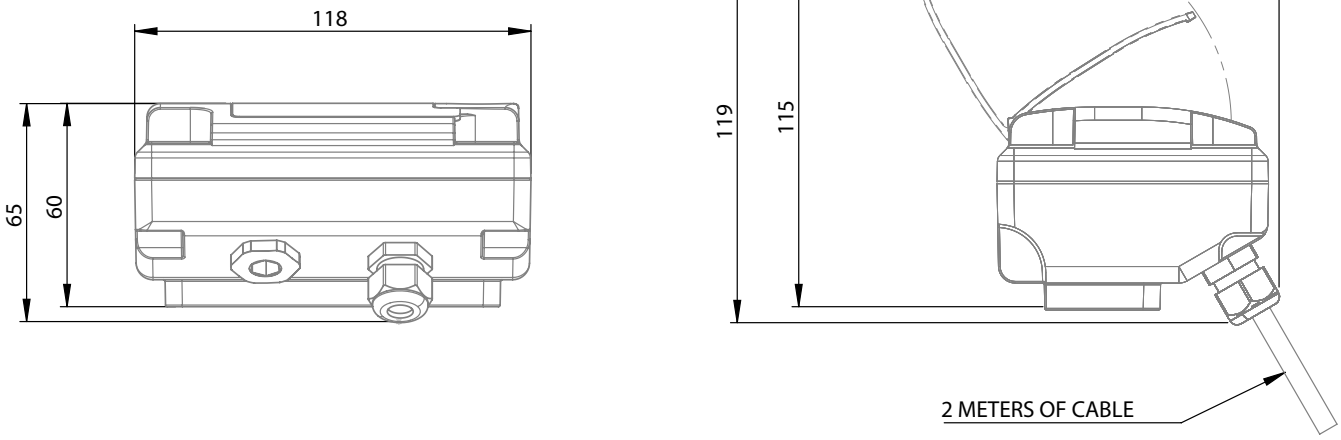
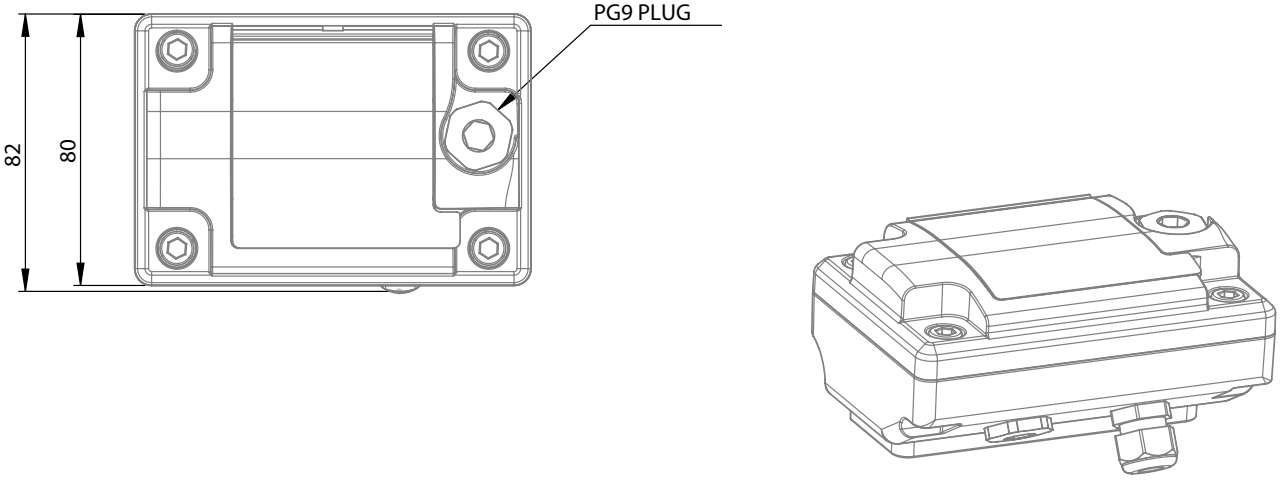
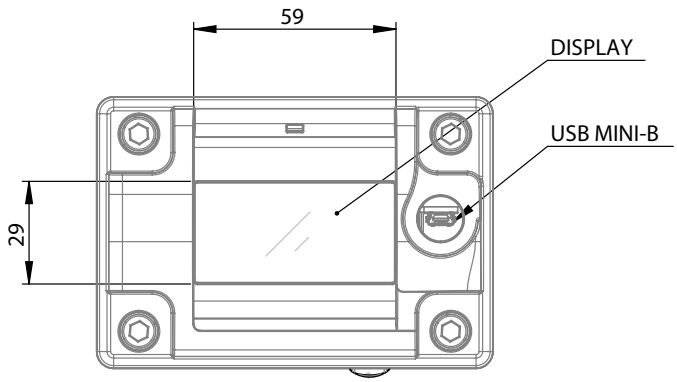
OVERALL DIMENSIONS WITH CABLE GLAND







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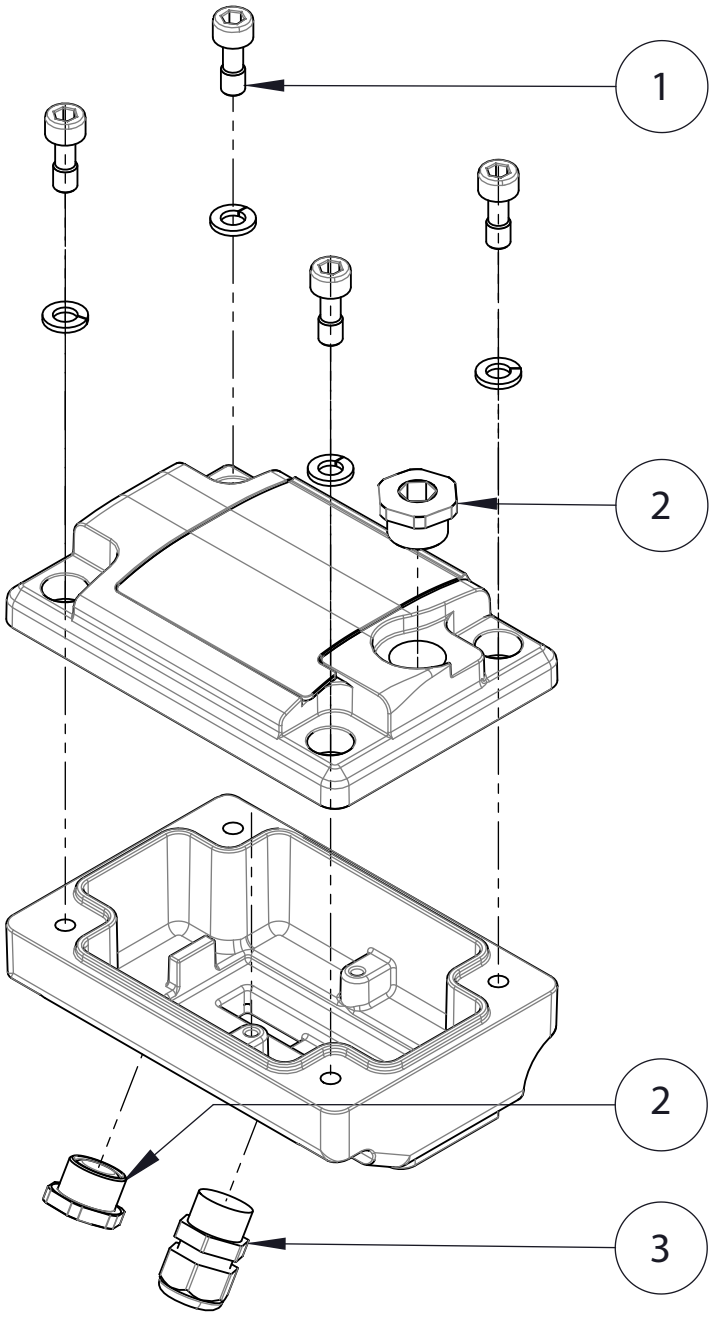
TORQUES

POS.	DESCRIPTION	TIGHTENING TORQUE Nm
1	SCREW M6x16	3.5
2	PG9 PLUG	4
3	CABLE GLAND PG11	4



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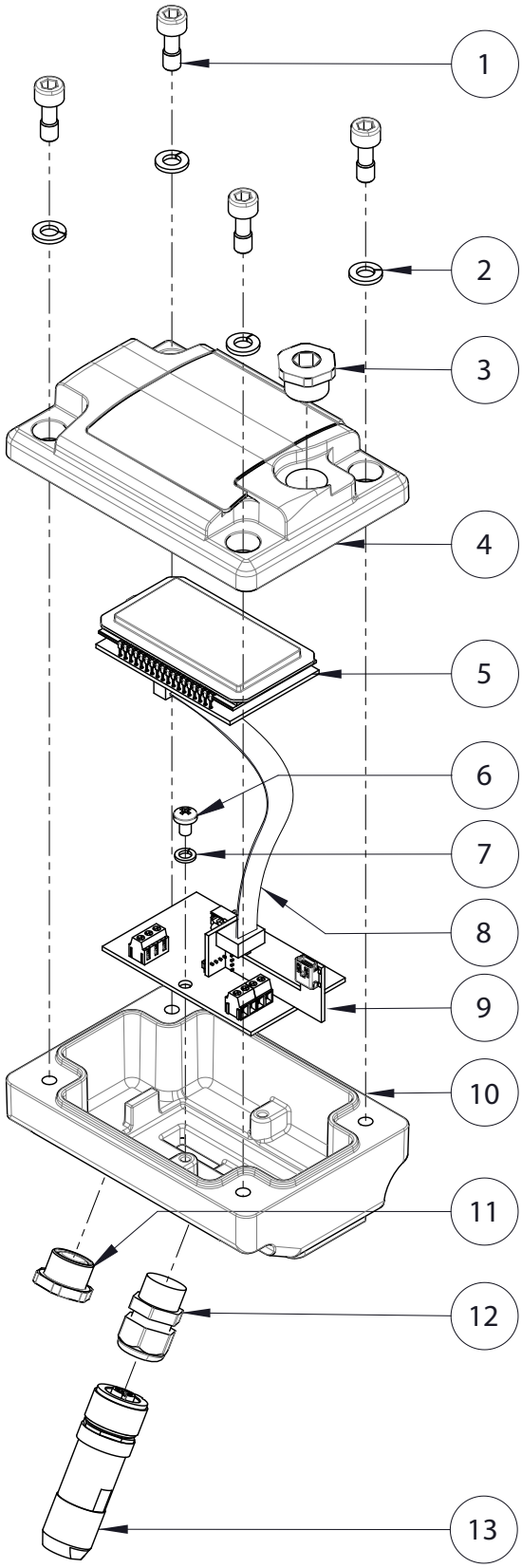
SE58 S EXPLODED LAYOUT



POS.	DESCRIPTION
1	SCREW M6x16
2	GROWER Ø6
3	PG9 PLUG
4	COVER PA06 (Display version) COVER painted aluminum (Blind version) COVER AISI 304 JB RAW (Blind version) COVER AISI 304 JB POLISHED (Blind version)
5	DISPLAY
6	SCREW M4X6 TC
7	GROWER Ø 4
8	FLAT CABLE
9	SE58 S PCB
10	Housing in painted aluminum
	Housing in AISI 304 JB RAW
	Housing in AISI 304 JB POLISHED
11	PG9 PLUG
12	5 POLES CONNECTOR COMPLETE OF PLUG
13	CABLE GLAND PG11

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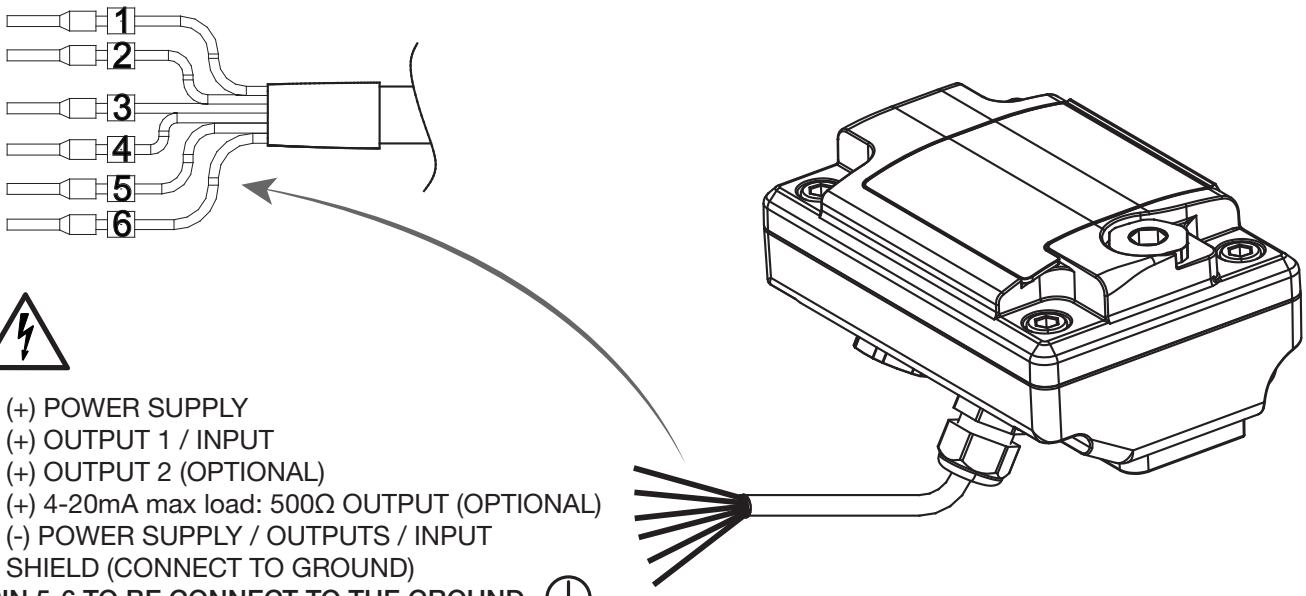
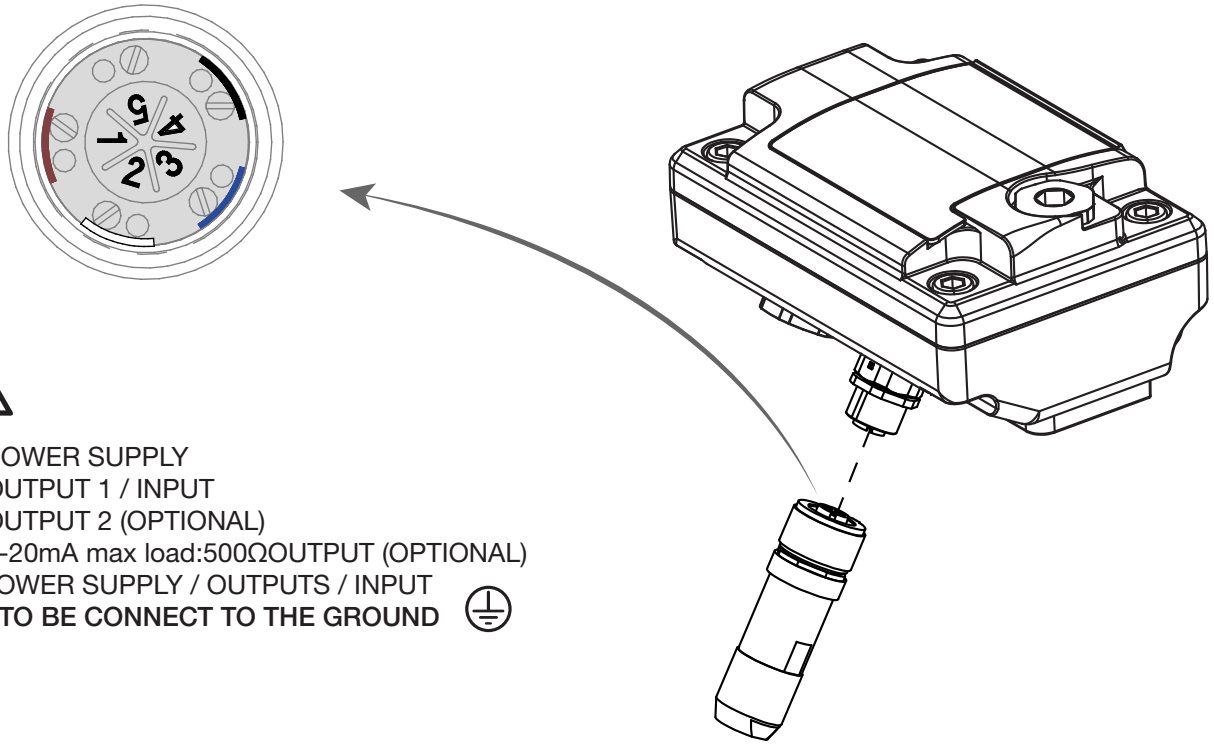
ELECTRICAL CONNECTIONS

VERSION WITH CABLE



1 (+) POWER SUPPLY
2 (+) OUTPUT 1 / INPUT
3 (+) OUTPUT 2 (OPTIONAL)
4 (+) 4-20mA max load: 500Ω OUTPUT (OPTIONAL)
5 (-) POWER SUPPLY / OUTPUTS / INPUT
6 SHIELD (CONNECT TO GROUND)
PIN 5-6 TO BE CONNECT TO THE GROUND

VERSION WITH CONNECTOR



1 (+) POWER SUPPLY
2 (+) OUTPUT 1 / INPUT
3 (+) OUTPUT 2 (OPTIONAL)
4 (+) 4-20mA max load:500ΩOUTPUT (OPTIONAL)
5 (-) POWER SUPPLY / OUTPUTS / INPUT
PIN 5 TO BE CONNECT TO THE GROUND

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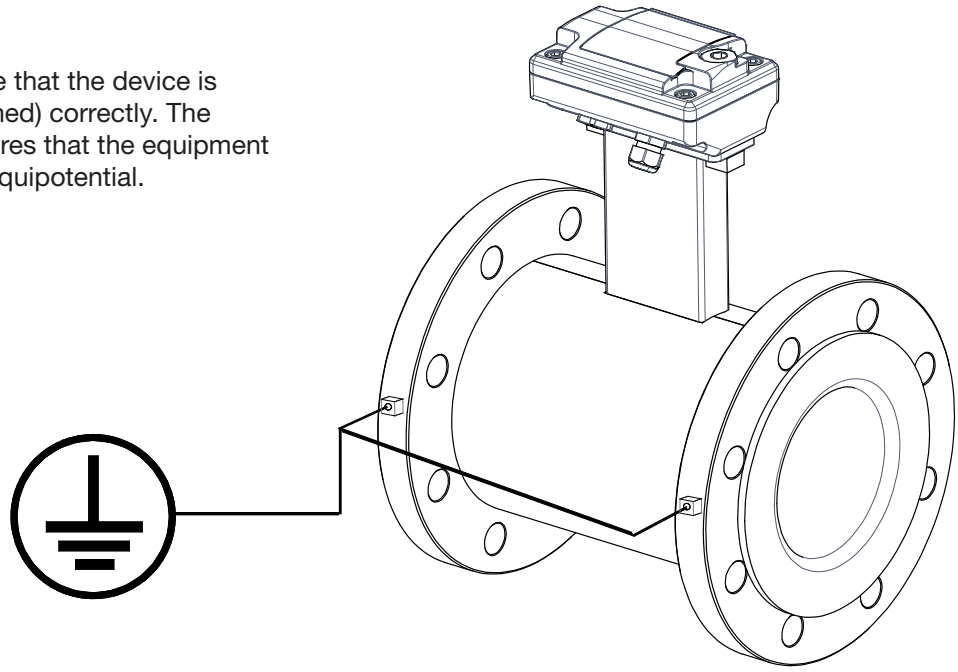
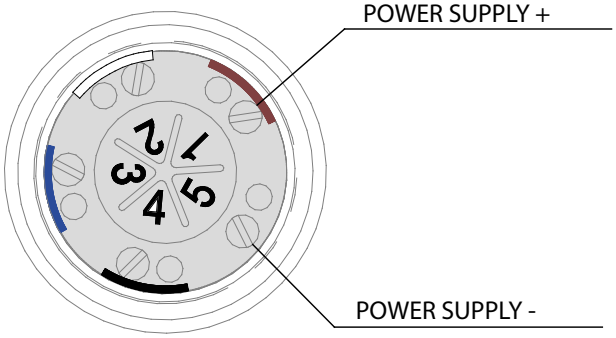
GROUNDING

ALWAYS ensure that the device is grounded (earthed) correctly. The grounding ensures that the equipment and liquid are equipotential.



POWER SUPPLY



- Before connecting the power supply, verify that the main voltage is within the limits indicated on data plate.
- For the connections use only approved conductors, with fire-proof properties, whose section varies from 0.25 mm^2 to 2.50 mm^2, based on distance/power; additionally fix the power supply wires with an additional fastening system located close to the terminal.
- The power supply line must be equipped with an external protection for overload current (fuse or automatic line breaker).
- Provide in close proximity the transmitter a circuit breaker easily accessible for the operator and clearly identified; whose symbols must conform to the electrical safety and local electrical requirements.
- Ensure that the component complies with the requirements of the standard for electrical safety distance.
- Check chemical compatibility of materials used in the connection security systems in order to minimize electrochemical corrosion.

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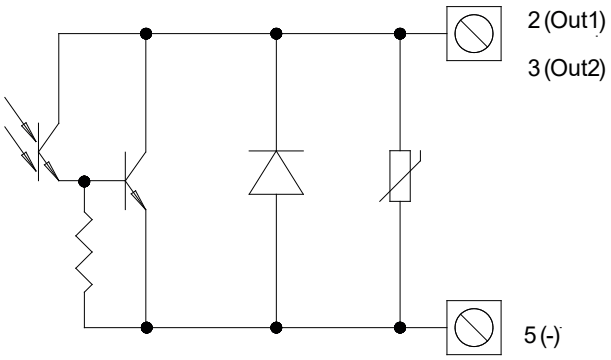
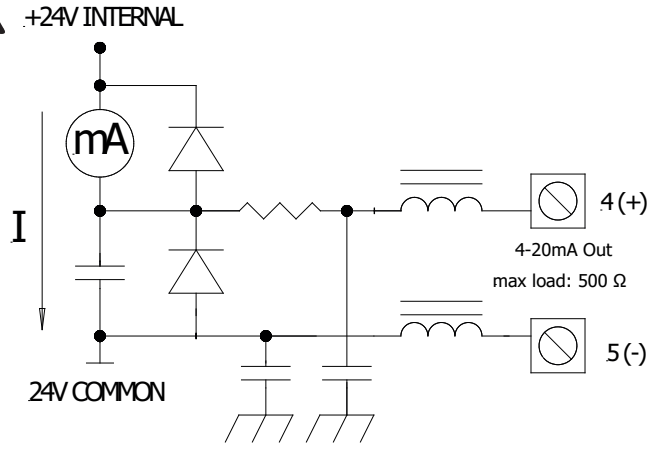
OUTPUTS WIRING



DIGITAL OUTPUTS

- Opto-insulated output
- Maximum switching voltage: 30V ⎓
- Maximum switching current: 100mA @ 25°C
- Maximum saturation voltage between collector and emitter @100mA: 1.2V ⎓
- Maximum switching frequency (load on the collector or emitter, RL=470Ω, VOUT= 24V⎓: 1250Hz
- Maximum reverse current bearable on the input during and accidental polarity reversion (VEC): 100mA
- Insulation from other secondary circuits: 500V ⎓



ANALOG OUTPUT

- Maximum load: see “Electrical Characteristic” page 4
- Refresh frequency equal to the sample frequency
- Protected against persistent over voltages up to 30V ⎓

NOTE: shielded cables are recommended for input and output wiring

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DISPLAY VISUALIZATION

The direct exposure of the transmitter to the solar rays, could damage the liquid crystal display. No display pages are provided.

EMPTY PIPE WARNING

ALARM WARNING

PROCESS ALARM

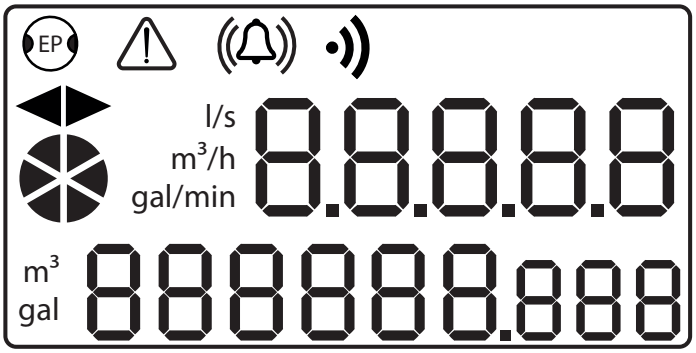
DATA TRANSMISSION

FLOW DIRECTION

ACTIVE FLOW RATE

l/s
m³/h
gal/min
FLOW RATE Unit of measure

m³
gal
TOTALIZER Unit of measure



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ACCESS TO THE CONFIGURATION MENU

Access Via Mcp interface (Virtual Display)

You can access the device configuration menu by MCP.
MCP is a software that can be installed on Microsoft Windows® and allows you to set all the functions of the transmtter and customize the menu. To use the MCP interface, see its own manual.

However any changes using MCP are not recommended, unless:

- after receiving corresponding training by burkert,
- done by professional,
- agreed by the end user, and done inline with the MCP manual

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7. Good data processing procedure dictates that any program shall be thoroughly tested in a non-critical

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environment before using the Software. You must assume the entire risk of using the program. NOTE THAT USING THE SOFTWARE IMPACTS THE OPERABILITY / FUNCTIONALITY OF THE HARDWARE AND MAY HAVE SEVERE CONSEQUENCES FOR THE PRODUCTION OF THE FACILITY THE HARDWARE IS INSTALLED IN.
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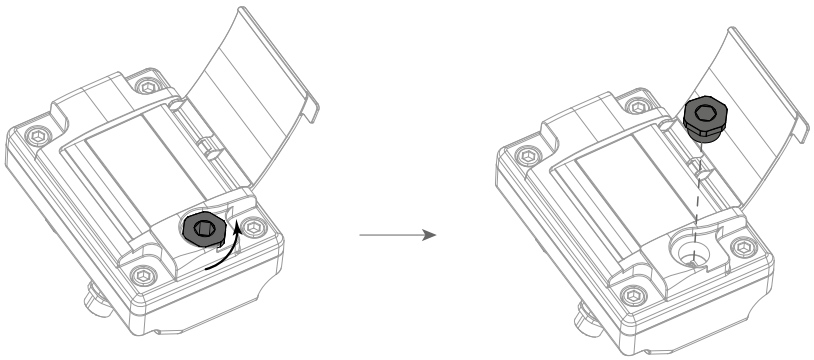
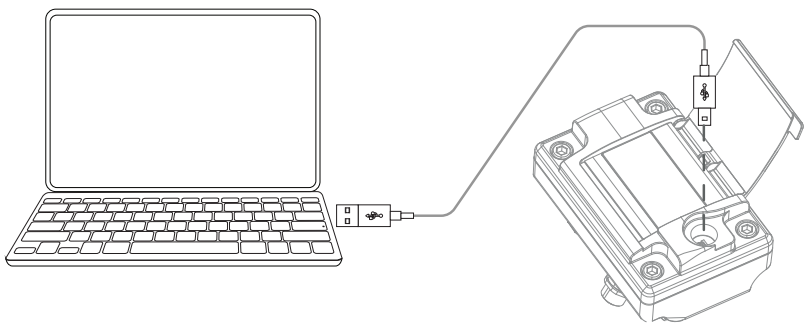
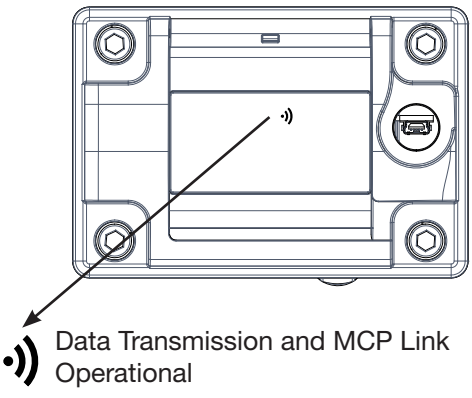
To connect the transmitter to the computer, connect the USB cable as shown below.
Remove the PG9 cap.



Connect USB cable type mini B. Verify connection symbol on display.





Data Transmission and MCP Link Operational

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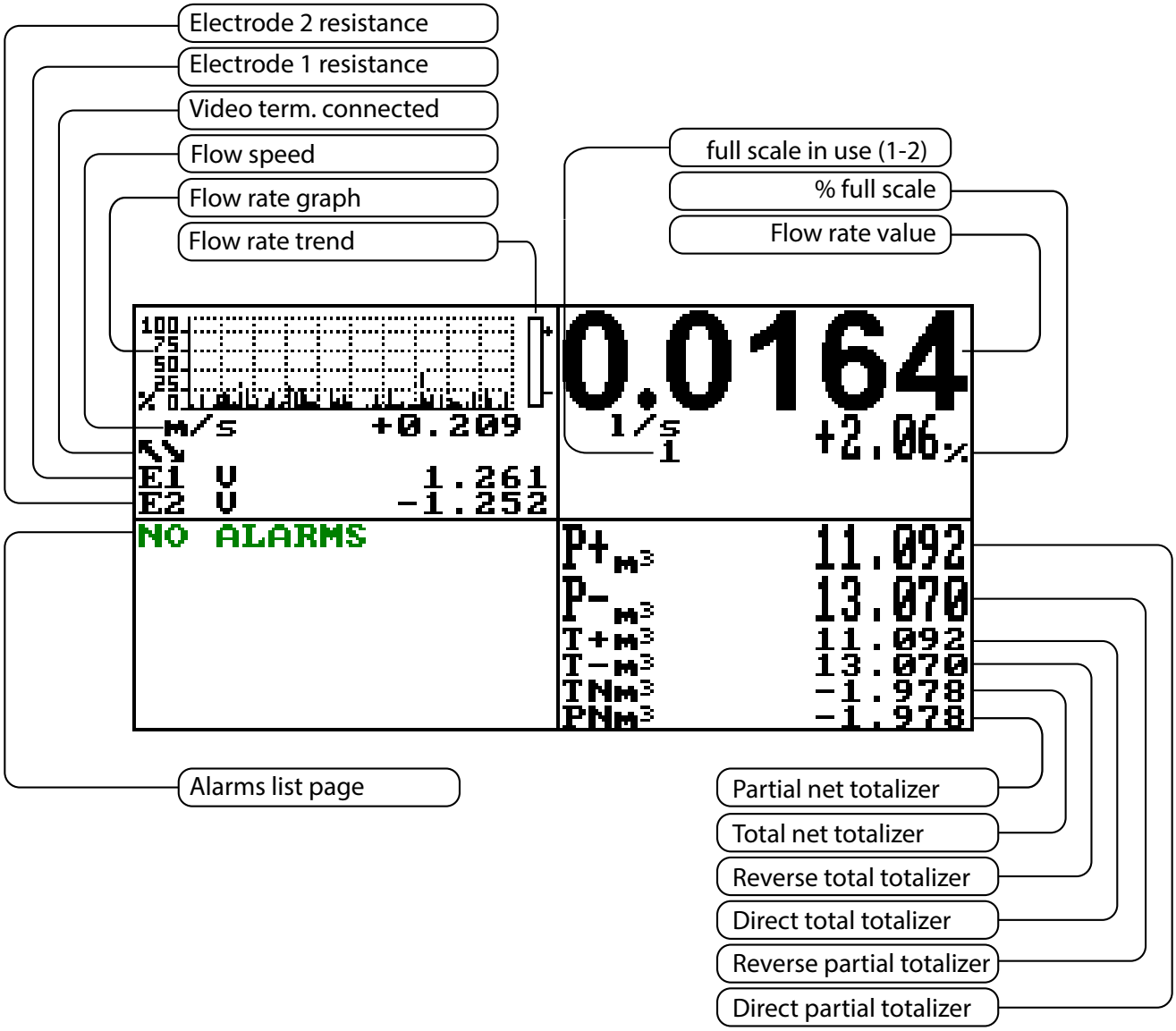
START VISUALIZATION PAGES ON MCP INTERFACE



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MEANING OF FLAGS ON MCP INTERFACE

FLAG	DESCRIPTION
	EMPTY PIPE
	FILE UPLOAD
	FILE DOWNLOAD
	FLOW RATE SIMULATION (FLASHING)
	CALIBRATION (FLASHING)
	GENERIC ALARM (FLASHING)
	SIGNAL ERROR
	EXCITATION ERROR
	MIN FLOW ALARM
	MAX FLOW ALARM
	TRANSMITTER CONNECTED TO MCP
	FLOW RATE OVERFLOW
	PULSE 1 OVERFLOW
	PULSE 2 OVERFLOW

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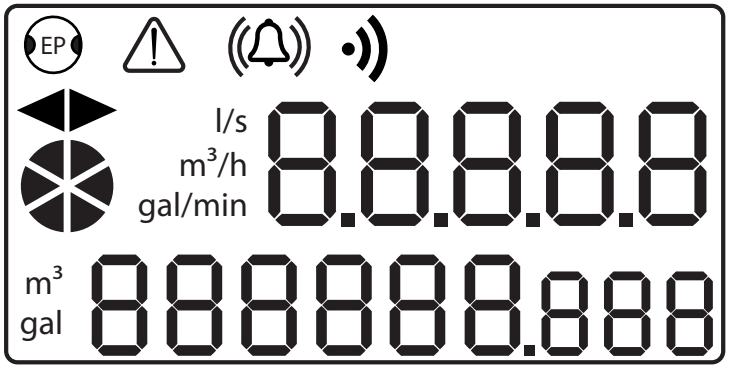
FLOW RATE AND TOTALIZER VISUALIZATION



The SE58 S can show a 5 digits display on flow rate field value; this means the maximum and minimum flow rate values that can be shown on display are:

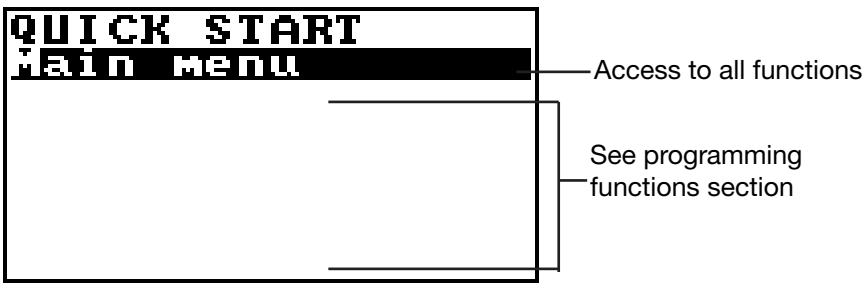
METRIC		
Unit of measures	Minimum	Maximum
l/s	0.0267	0.6667
m³	0.0960	2.4000

NON METRIC		
Unit of measures	Minimum	Maximum
Gal/m	0.423	10.567

The physical display provides the following units of measurement: l/s, m³/h, gal/min, m³, gal.
Other units available at menus, selectable by MCP interface, they will not be displayed on the physical display, but will only display their numeric values.

QUICK START MENU

The user has immediate access to the Quick Start menu when the transmitter is powered up by pressing the Enter key. If access to the quick start menu does not occur, then it could be disabled using the function POS. 9.8 see page 25. The quick start menu is only displayed by MCP.



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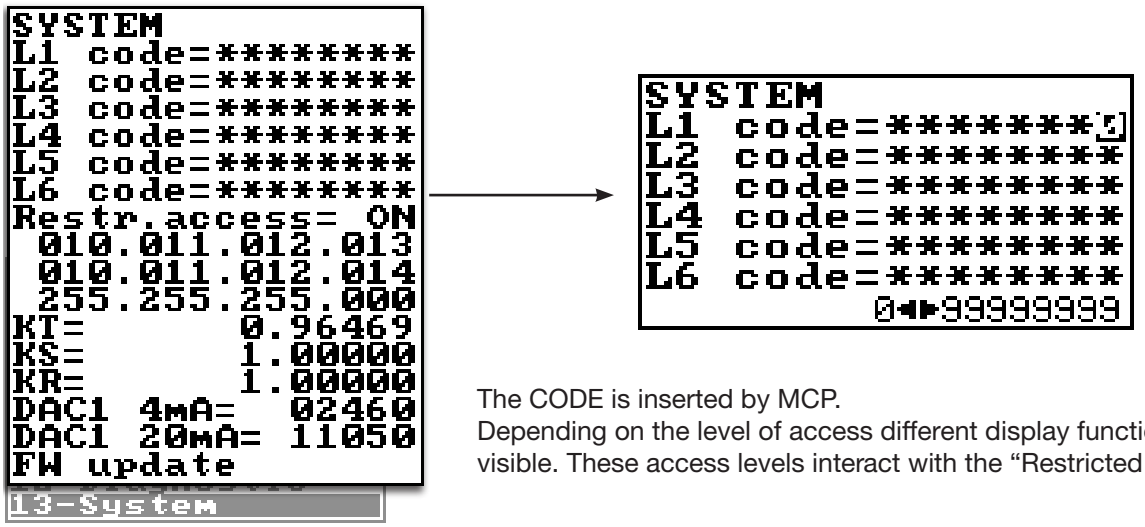
TRANSMITTER ACCESS CODE

The access for the device configuration is regulated by six access levels logically grouped.
Every level is protected by a different code.

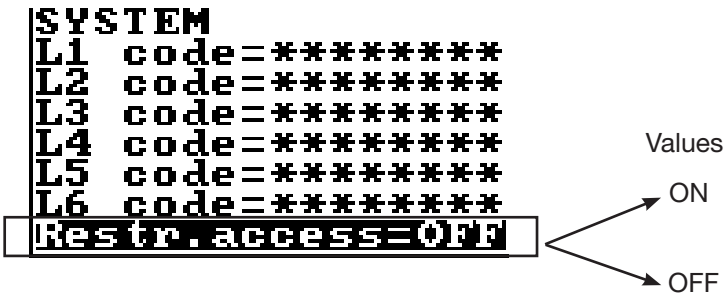
Access Levels 1-2-3-4 Freely configurable by user

Access Code Set : Menu 13 System



The CODE is inserted by MCP.
Depending on the level of access different display functions will be visible. These access levels interact with the “Restricted access”

Restricted Access Set : Menu 13 System



Restrict = ON: Access permitted only to functions provided for a specific level;
Example: If the operator has a code of access level 3, after having set it, he can change only the functions with level 3 access.

Restrict = OFF: It enables to change functions for the selected level and ALL the functions with lower access level.
Example: If the operator has the code of level 3, after having set it, he can change all the functions at level 3 and those at lower levels.

* **WARNING:** take careful note of the customized code, since there is no way for the user to retrieve or reset it if lost.

Factory preset access codes:

- L1: 10000000
- L2: 20000000
- L3: 30000000
- L4: 40000000

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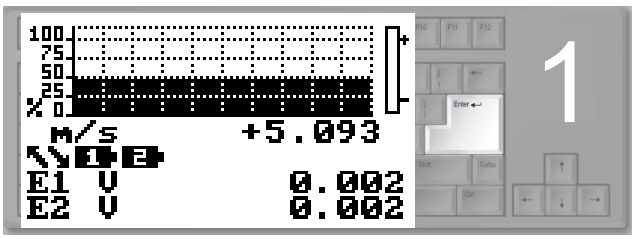
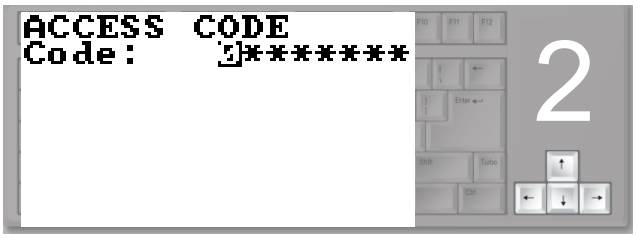
The following example shows how to change the Full scale by Quick Start menu; the second illustrates how to change the function by the Main menu.

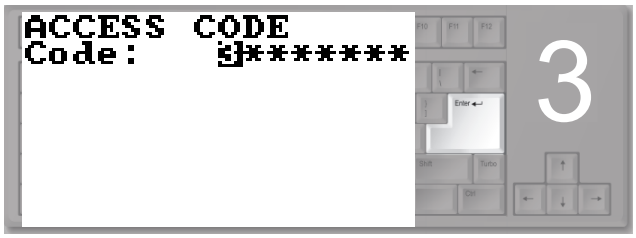
EXAMPLE: modifying the full scale value from 4.0 l/s to 5.0 dm3/s, from the “Quick start menu”



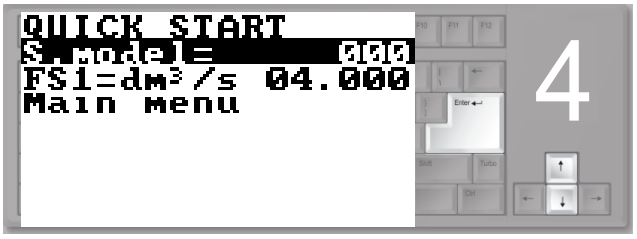
Press enter key to access in the “Quick Start menu”



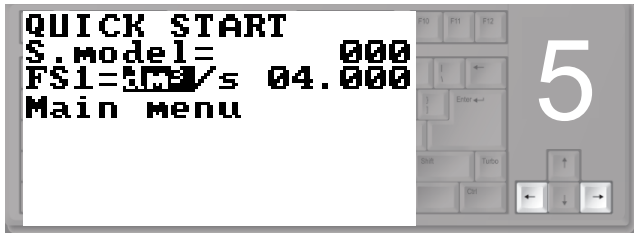
Use the right-left arrow keys to select the character and the up-down arrow key to assign the numeric value of the access code



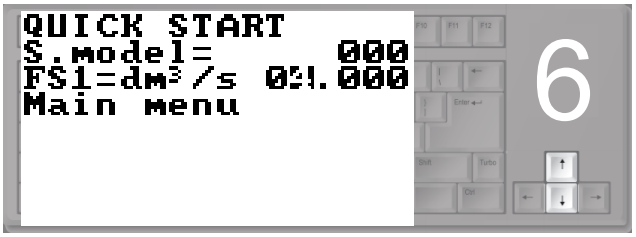
Press the enter key to confirm the access code



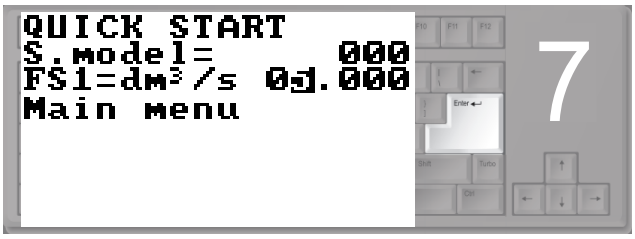
Select the FS1 function with the arrow keys
Press the enter key to modify the function



Press the indicated arrow keys to select the character

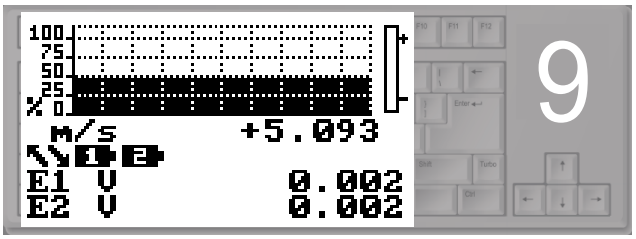


Press the arrow keys indicated to change the value



Press the enter button to confirm the changed value

Press the esc key to exit from to the “quick start menu” and return to the main page



Main Page

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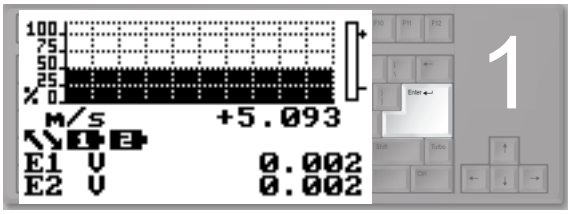
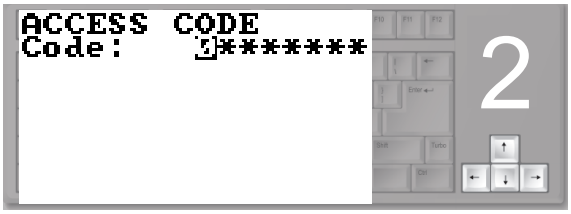
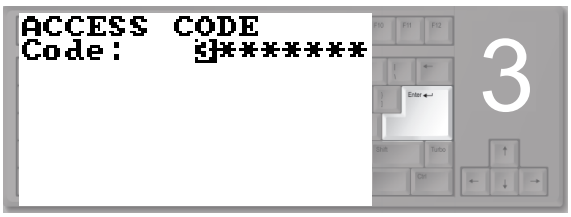
EXAMPLE: modifying the full scale value from 4.0 l/s to 5.0 dm3/s, from the “Main Menu” (quick start menu enabled)



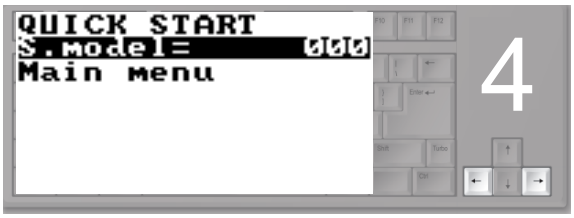
Press enter key to access in the “Quick Start menu”



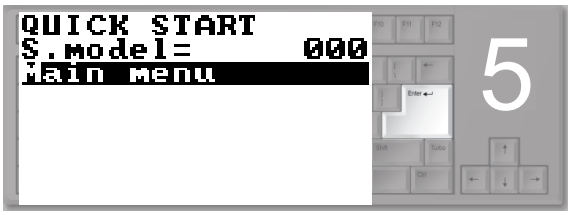
Use the right-left arrow keys to select the character and the up-down arrow key to assign the numeric value of the access code



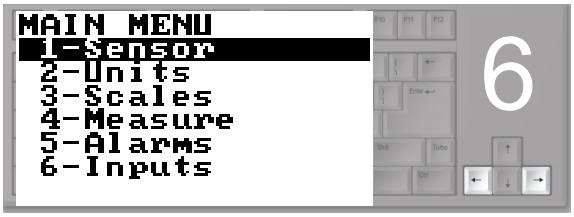
Press the enter key to confirm the access code



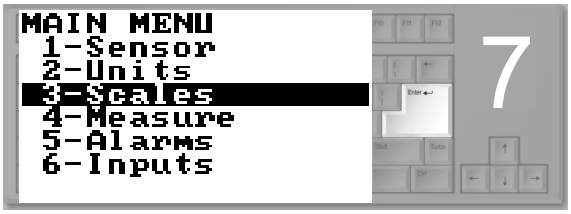
Select the Main Menu function with the arrow keys



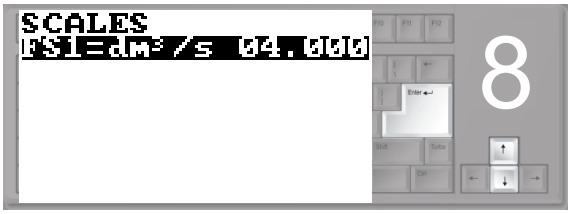
Press the enter key to access the main menu



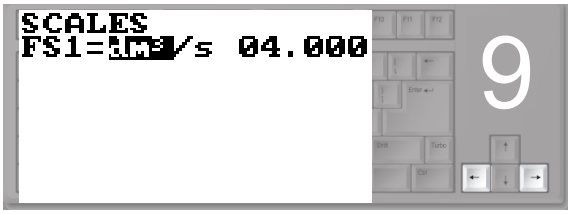
Select menu 3 with the arrow keys



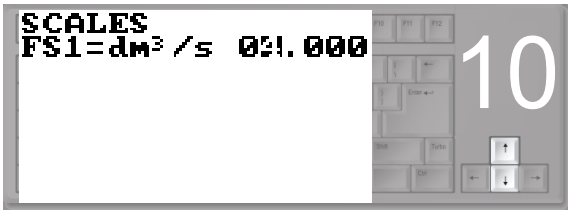
Press the enter key to access menu 3



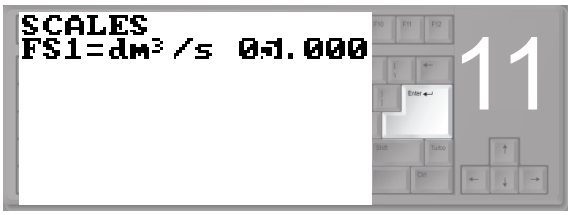
Select the FS1 function with the arrow keys and press the enter key to confirm



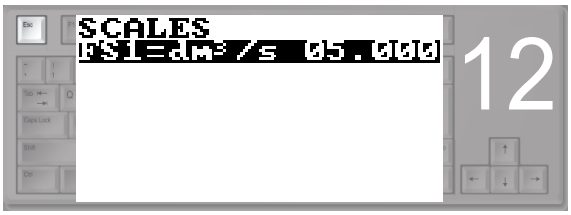
Press the indicated arrow keys to select the character



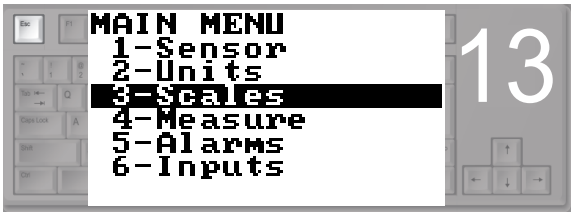
Press the indicated arrow keys to change the value



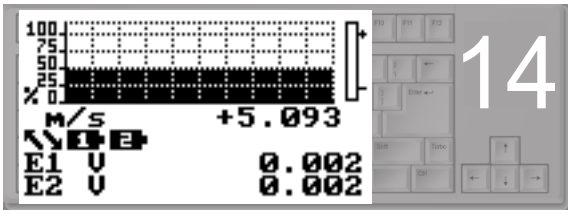
Press the enter key to confirm the changed value



Press the esc key to exit from the "quick start menu"



Press the esc key to exit from the menu and return to the main page



Main Page

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FUNCTIONS MENU

The menu display is only available with the MCP. Note: Some functions here below are displayed only with other functions active, or with optional modules.

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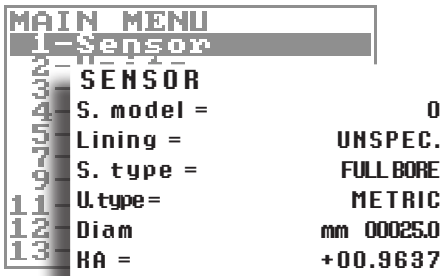
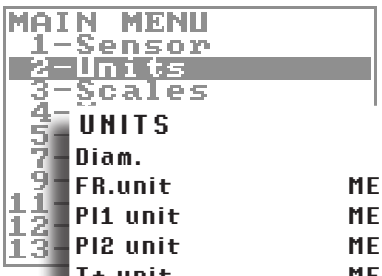
SENSOR



S. model =	0	1.1 Sensor's model
Lining =	UNSPEC.	1.2 Flow sensor lining material type
S. type =	FULL BORE	1.3 Sensor's type
U.type=	METRIC	1.4 Type of units for sensor's para.
Diam	mm 00025.0	1.5 Sensor's nominal/real diameter
KA =	+00.9637	1.6 Sensor's coefficient KA
KA- =	-04.4904	1.7 Sensor's coefficient KA Negative
KZ =	+0000000	1.8 Sensor's coefficient KZ
KD=	+0000000	1.9 Sensor 's coefficient KD
Ins. position=	0	1.10 Insertion position
KP Dynamic=	OFF	1.11 KP dynamic calculation mode
Ki=	01.8727	1.12 Sensor's coefficient Ki
Kp=	01.0000	1.13 Sensor's coefficient Kp
KC=	1.00000	1.14 Sensor's coefficient KC
C.curr =	025.0	1.15 Sensor's excitation current
C.Reg.PB=	004	1.16 Current regulator Prop.Band
C.Reg.DK=	008	1.17 Current regulator Deriv.Const.
S. Freq.= Hz	50	1.18 Measure sampling frequency
E.P Detect=	ON	1.19 Enables the empty pipe detection feature
R max= kohm	0500	1.20 Empty pipe detection
S. err. delay=	010	1.21 Signal error delay (n.samples)
Sens. verify=	OFF	1.22 Automatic sensor verify enable
KL =	0.000000000	1.23 Coefficient KL values
Zero point cal.		1.24 Pipe hydraulic zero calibration

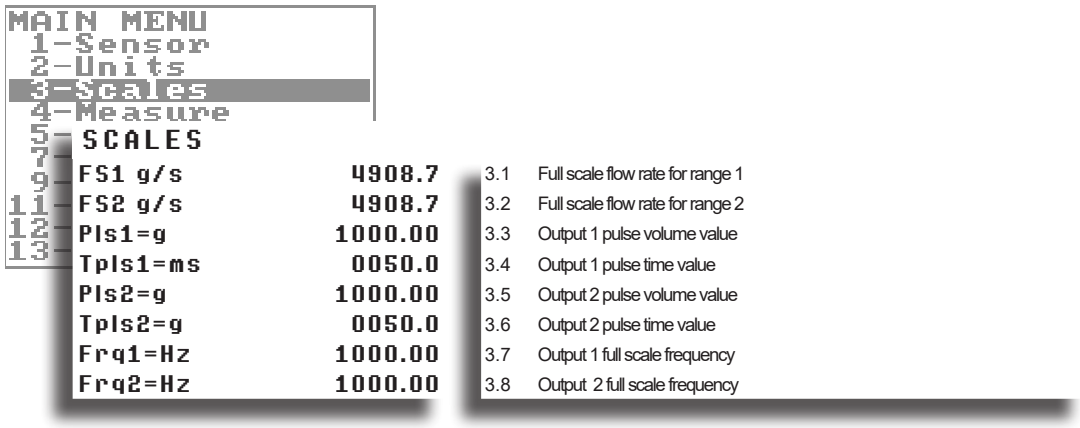
UNITS



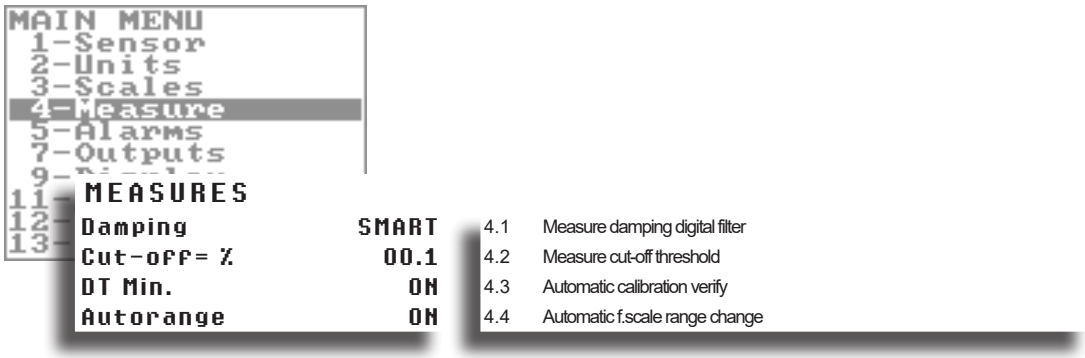
Diam.	mm	2.1 Sens.diameter unit of measure
FR.unit	METRIC	2.2 Flow rate unit of measure type
PI1 unit	METRIC	2.3 Pulse 1 type unit of measure
PI2 unit	METRIC	2.4 Pulse 2 type unit of measure
T+ unit	METRIC	2.5 Total.T+ unit of measure type
T+ unit	g	2.6 Total.T+ unit of measure
P+ unit	METRIC	2.7 Total.P+ unit of measure type
P+ unit	g	2.8 Total.P+ unit of measure
T- unit	METRIC	2.9 Total.T- unit of measure type
T- unit	g	2.10 Total.T- unit of measure
P- unit	METRIC	2.11 Total.P- unit of measure type
P- unit	g	2.12 Total.P- unit of measure
Temp.unit	°C	2.13 Temperature unit of measure
Mass units	ON	2.14 Mass units enabling
Sg=kg/dm3	1.0000	2.15 Specific gravity coefficient

The physical display provides the following units of measure: l/s, m^3/h, gal/mln, m^3, gal.
Other units available are selectable and visible only by MCP. If you choice one of this unit of measure, it will not be displayed on the physical display, but will be visible only its numeric value.

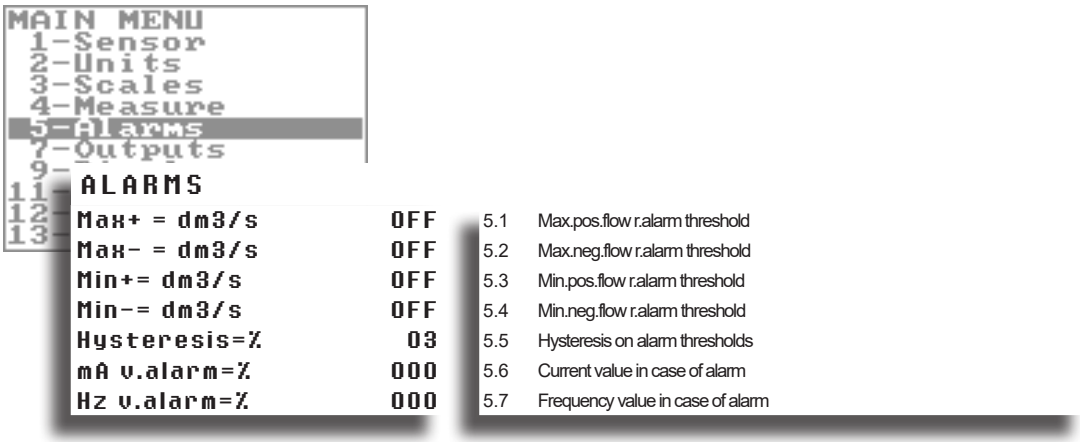
SCALES



MEASURES



ALARMS



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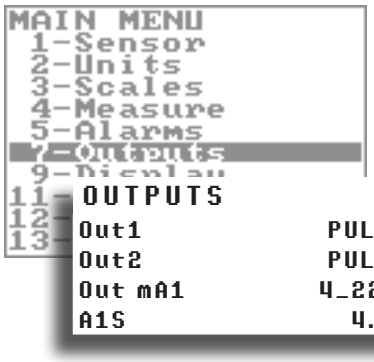
OUTPUTS

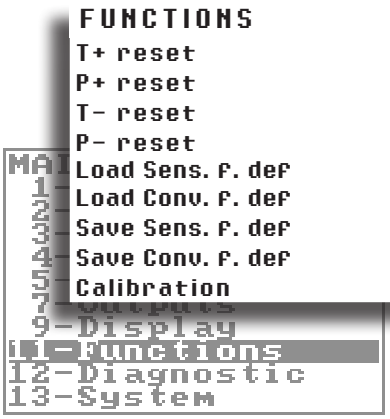


7.1	Output 1 function selection
7.2	Output 2 function selection
7.3	Analog current output 1 range
7.4	Full scale value for analog out1

DISPLAY

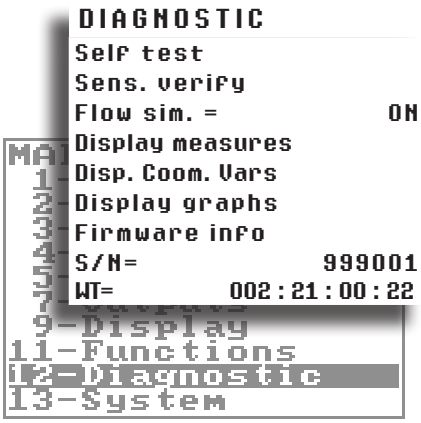
9.1	Language for all messages
9.2	Display Contrast adjustment
9.3	Display refresh rate
9.4	2nd row display item choice
9.5	Partial totalizer enable
9.6	Negative totalizer enable
9.7	Net totalizer enable
9.8	Quick start menu enable

FUNCTIONS



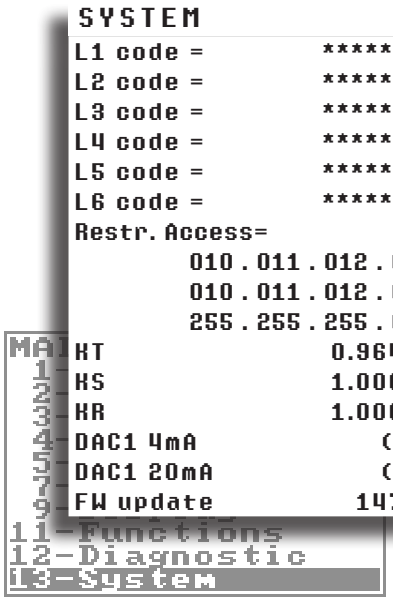
11.1	Totaliz.T+ reset function
11.2	Totaliz.P+ reset function
11.3	Totaliz.T- reset function
11.4	Totaliz.P- reset function
11.5	Load sensor factory default val.
11.6	Load converter factory def. val.
11.7	Save sensor factory default val.
11.8	Save converter factory default val.
11.9	Internal circuit calibration

DIAGNOSTIC



12.1	Self test diagnostic function
12.2	Sensor verify diagnostic function
12.3	Flow rate simulation enabling
12.4	Display internal measured value
12.5	Display comm. diagnostic values
12.6	Display measure as graphs
12.8	Firmware version information
12.9	Board serial number (read only)
12.10	Total working time (read only)

SYSTEM



13.1	Access level 1 code
13.2	Access level 2 code
13.3	Access level 3 code
13.4	Access level 4 code
13.5	Access level 5 code
13.6	Access level 6 code
13.7	Restricted access level
13.8	Device IP network address
13.9	Client IP network address
13.10	Network mask
13.11	Calibration coefficient KT
13.12	Calibration coefficient KS
13.13	Calibration coefficient KR
13.14	DAC1 out 4mA calibration point
13.15	DAC1 out 20mA calibration point
13.16	firmware update

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FUNCTIONS DESCRIPTION

Here below there is an explanation of the menu items

Menu visualized on the transmitter (from 1 to 13)

MENU 1 - SENSOR

(POS. 1.1) *Sensor MODeL* *[S. model xxx]* AL4 [SMODL]

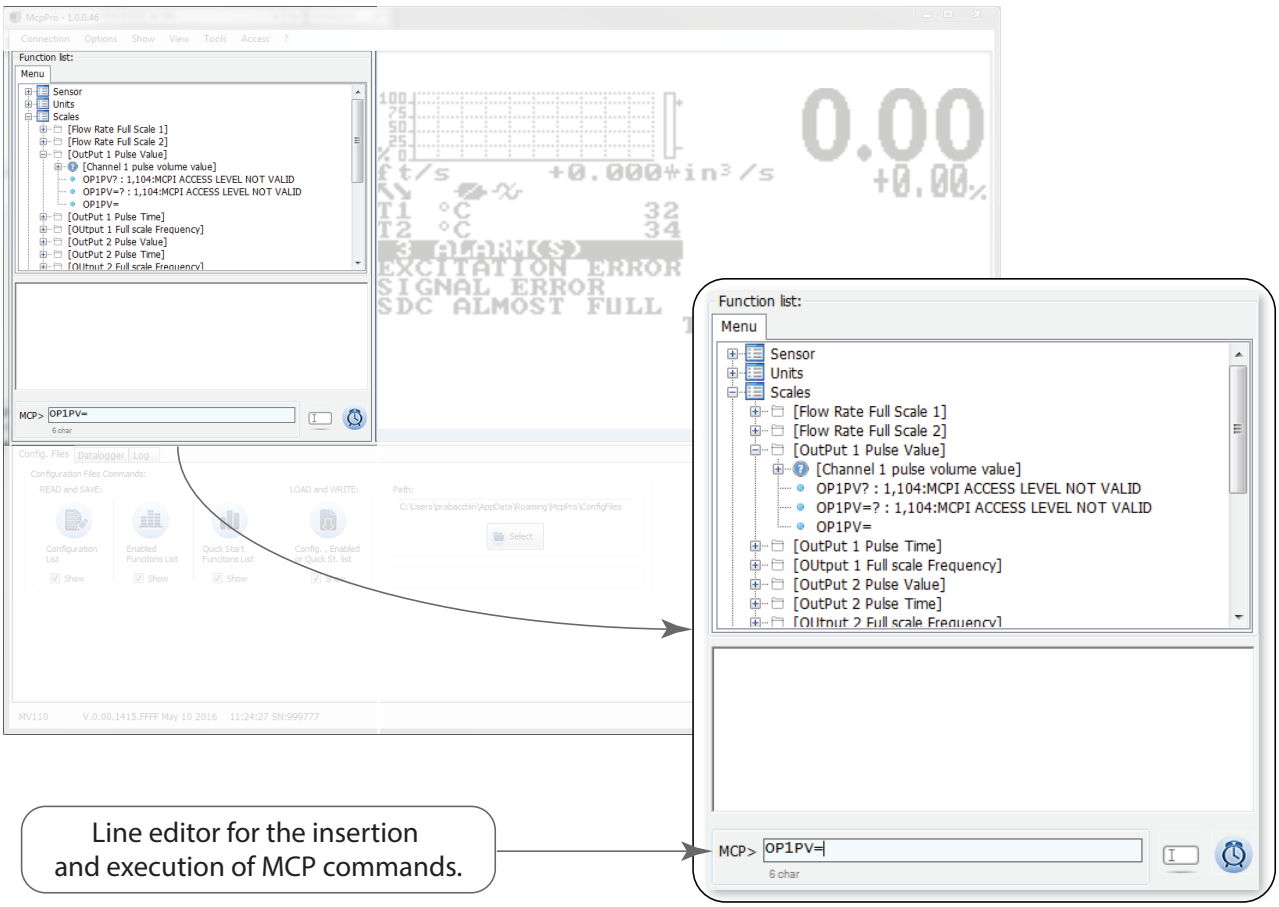
Access level

MCP command

Function as shown on device display

MCP command acronym

The following picture describes where to find the MCP functions, using MCP-software.
For more details see MCP manual.



MENU 1 - SENSOR

(POS. 1.1) Sensor MODeL	*[S. model xxx]*	AL4	[SMODL]

Enter the first two characters of the serial number of the sensor as on the sensor label.

(POS. 1.2) LIning MAterial Type	*[Lining= UNSPEC.]*	AL4	[LIMAT]

Flow sensor lining material type. (PFA; PU-TDI; ALON; PEEK; HR; PP; PA-11; PTFE-HT; PTFE)

(POS. 1.3) Sensor TYPE	*[S. type= FULL BORE]*	AL4	[STYPE]

Select the sensor type: full-bore or insertion.

(POS. 1.4) Sensor Units TYPe	*[U.type= METRIC]*	AL4	[SUTYP]

Select the type of unit of measure of sensor's parameter. Values metric or imperial (inch).

(POS. 1.5) Pipe DIaMeter Value	*[Diam.= mm xxx]*	AL4	[PDIMV]

Select the nominal diameter of the sensor (0-2500). ND is written on the sensor label.

(POS. 1.6) CoeFFicient KA	*[KA= + xx.xxx]*	AL4	[CFFKA]

KA factor: calibration coefficient

(POS. 1.7) CoeFficient KA Negative	*[KA= - xx.xxx]*	AL4	[CFKAN]

KA factor: calibration coefficient for negative flow. This function is shown only if at least 1 negative KL value is set.

(POS. 1.8) CoeFFicient KZ	*[KZ= +/- xxxxx]*	AL4	[CFFKZ]

Calibration Factor. KZ

(POS. 1.9) CoeFFicient KD]	*[KD= +/- xxxxx]*	AL4	[CFFKD]

Calibration Dynamic Factor.

(POS. 1.10) Sensor Insertion POSition	*[Ins.position= x]*	AL4	[SIPOS]

This function is active with POS.1.3 on "Insertion". See the insertion sensor manual for more details.

(POS. 1.11) Sensor Insertion Dynamic KP	*[KP dynamic= ON/OFF]*	AL4	[CFFKP]

This function is active with POS. 1.3 see page 23 set on insertion. See the insertion sensor manual for more details.

(POS. 1.12) CoeFFicient Ki	*[Ki= +/- xx.xxx]*	AL4	[CFFKI]

This function is active with POS. 1.3 see page 23 set on insertion. See the insertion sensor manual for more details.

(POS. 1.13) CoeFFicient Kp	*[Kp = +/- xxxxx]*	AL4	[SIDKP]

This function is active with POS. 13.1 see page 26 set on insertion. See the insertion sensor manual for more details.

(POS. 1.14) CoeFFicient KC	*[KC= +/- xx.xxx]*	AL4	[CFFKC]

Calibration Factor. This function is activated if the sensor model is NOT present on the sensors table standard parameters

(POS. 1.15) Coils EXCitation Current	*[C.Curr.= mA xxx.x]*	AL4	[CEXCC]

Excitation coils current. This function is activated if the sensor model is NOT present on the sensors table standard parameters

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(POS. 1.16) Coils Regulator PRoportional Band	*[C.Reg.PB= xxx]*	AL4	[CRPRB]

Current regulator parameter. This function is activated if the sensor model is NOT present on the sensors table standard parameters

(POS. 1.17) Coils Regulator DERivative constant	*[C.Reg. DK = xxx]*	AL4	[CRDER]

Current regulator parameter. This function is activated if the sensor model is NOT present on the sensors table standard parameters

(POS. 1.18) Sampling FREQuency	*[S.Freq.= Hz xx]*	AL4	[SFREQ]

Measure sampling frequency. This function is activated if the sensor model is NOT present on the sensors table standard parameters.

(POS. 1.19) Empty Pipe Detection ENable	*[E.P.Detect= ON]*	AL4	[EPDEN]

This function enables the empty pipe detection function. It'is useful to keep the meter lock to zero when the pipe becomes empty.

(POS. 1.20) Empty Pipe Detection THreshold	*[Z max= Kohm xxxx]*	AL4	[EPDTH]

Maximum value of the electrodes resistance. This feature is enabled only if the function POS. "1.19" page 23 is ON.

(POS. 1.21) Signal Error ALarm Time	*[S.err.delay=m xxx]*	AL4	[SEALT]

Delay before generating error. This function is useful to prevent unexpected lock to zero of measure caused by sporadic events (empty pipe, excitation error, signal error)

(POS. 1.22) Automatic Sensor VeriFy Enable	*[Sens. verify= OFF]*	AL3	[ASVFE]

This function enables the Automatic sensor verification (see BIV optional function).

(POS. 1.23) SET KL values	*[KL=XX +/- XXXXXXXXX]*	AL4	[SETKL]

Linearization coefficient for negative flow, reserved to the service. This command is only available if SMODL = 000.

(POS. 1.24) SET KJ value	*[Zero point cal.]*	AL4	[SETKJ]

This feature appears only when the process conditions are as follow:

- measure filters (Damping) are set to SMART
- flow rate is stable and lower than 0.1% of the absolute scale (10 m/s)
- It must have elapsed at least 10 minutes after the last significant change of flow rate

When the above conditions are met, the zero point calibration function will appear on the display, press the "Enter / ESC" and automatically the procedure will start.
NOTICE: Be sure that the sensor is completely full of liquid. Even subtle movements of the fluid can cause significant errors, therefore proceed with great care.

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MENU 2 - UNITS

WARNING: The totalizer value is updated and changed depending on the setting of unit value.
The scale change may cause accuracy loss depending of rounding up.
For example, if T +=1,234 liters with 3 decimals, it becomes T +=0.001 m^3, losing 0.234 liters in rounding up.

(POS. 2.1) Sensor Diameter Unit of Measure	*[Diam.= mm]*	AL2	[SDIUM]

Sensor diameter unit of measure (mm or inch)

(POS. 2.2) Flow Rate Unit of Measure Type	*[FR unit= METRIC]*	AL2	[FRMUT]

Flow rate type unit of measure. Select metric or not metric (Imperial units)

(POS. 2.3) PuLse 1 Unit of measure Type	*[PL1 unit= METRIC]*	AL2	[PL1UT]

This function is active with POS. 7.2 see page 25 enabled.
This function changes the choice of unit of measure POS. 3.3 see page 24
Pulse 1 type unit of measure: metric or not metric (Imperial units).

(POS. 2.4) PuLse 2 Unit of measure Type	*[PL2 unit= METRIC]*	AL2	[PL2UT]

This function is active with POS. 7.2 see page 25 enable.
This function changes the choice of unit of measure POS. 3.5 see page 24
Pulse 2 type unit of measure: metric or not metric (Imperial units).

(POS. 2.5) Totalizer Total Positive Unit of measure Type	*[T+ unit= METRIC]*	AL2	[TTPUT]

Setting total positive totalizer unit of measure type: metric or not metric (Imperial units).
This function changes the unit of measure values on POS. 2.6 see page 23

(POS. 2.6) Totalizer Total Positive Unit of Measure	*[T+ unit= dm^3]*	AL2	[TTPUM]

Setting total positive totalizer unit of measure.
This selection is used for the values on visualization pages.

(POS. 2.7) Totalizer Partial Positive Unit of measure Type	*[P+ unit= METRIC]*	AL2	[TPPUT]

This function is active with POS. 9.5 see page 25 enable.
Setting partial positive totalizer unit of measure type: metric or not metric (Imperial units).
This function changes the unit of measure values on POS. 2.10 see page 23 .
This selection is used for the values on visualization pages

(POS. 2.8) Totalizer Partial Positive Unit of Measure	*[P+ unit= dm^3]*	AL2	[TPPUM]

Setting partial positive totalizer unit of measure.
This selection is used for the values on visualization pages

(POS. 2.9) Totalizer Total Negative Unit of measure Type	*[T- unit= METRIC]*	AL2	[TTNUT]

This function is active with POS. 9.6 see page 25 enabled.
Setting total negative totalizer unit of measure type: metric or not metric (Imperial units).
This function changes the unit of measure values on POS. 2.10 see page 23.
This selection is used for the values on visualization pages

(POS. 2.10) Totalizer Total Negative Unit of Measure	*[T- unit= m^3]*	AL2	[TTNUM]

Setting total negative totalizer unit of measure.
This selection is used for the values on visualization pages.

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(POS. 2.11) Totalizer Partial Negative Unit of measure Type *[P- unit= METRIC]* AL2 [TPNUT]

This function is active with POS. 9.5 see page 25 , enabled.
Setting partial negative totalizer unit of measure type: metric or not metric (Imperial units).
This function changes the values unit of measure on POS. 2.12 see page 23.
This selection is used for the values on visualization pages

(POS. 2.12 Totalizer Partial Negative Unit of Measure *[P- unit= dm³]* AL2 [TPNUM]

Setting partial negative totalizer unit of measure.
This selection is used for the values on visualization pages

(POS. 2.13) TeMPerature Unit of Measure *[Temp. unit= C°]* AL2 [TMPUT]

Setting temperature unit of measure.

(POS. 2.14)MaSS Units Enable *[Mass units= ON/OFF]* AL2 [MSSUE]

Enable or Disable the selection of mass unit of full scale set.

(POS. 2.15) Volume to Mass Specific Gravity Coefficient *[Sg= Kg/dm³ x.xxxx]* AL2 [VMSGC]

Setting specific gravity coefficient. This Function is active with POS. 2.15 see page 23, enable.

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MENU 3 - SCALE

(POS. 3.1-2) Flow Rate Full Scale 1-2	*[FS1-2= l/s xxxx.x]*	AL2	[FRFS1-FRFS2]

The FS2 (full scale flow rate 2) function is active with POS. 4.4 see page 24 enabled.
The full scale is used to indicate the maximum value meter's flow rate. The full scale should be chosen carefully as it's parameters are used for several other parameters. There are three fields to fill in order to set this parameter, from left to right: 1) unit of measure, 2) time unit of measure and 3) numeric value. The selection is made by positioning the cursor on the field to modify. To change the type unit of measure (metric, Imperial units, mass or volume) see the menu 2 "units". The value of Fs1-2 depends on nominal diameter POS. 1.5 see page 23 . The following tables show the units of measure available and the conversion factor by comparison with 1dm3 and 1kg. The transmitter accepts any kind of combination of units of measure satisfying both of the following conditions:

- Numeric field value 99999
- 1/25 fs max ≤ numeric field value ≤ fs max.

Where fsmax is the maximum full scale value corresponding to the sensor, equal to a 10m/s liquid speed. The unit of measures are shown as appear on the display. The Imperial units are diversified by using capital and small characters.

METRIC	
cm³	Cubic centimeter
ml	Milliliter
l	Liter
dm³	Cubic decimeter
dal	Decalitre
hl	Hectolitre
m³	Cubic meter
ML	Mega Liter

NOT METRIC	
in³	Cubic inch
Gal	American gallon
GAL	British gallon
ft³	Cubic foot
bbl	Standard barrel
BBL	Oil barrel
yd³	Cubic yard
kgl	KAmerican gallon
KGL	KBritish gallon
IGL	Imperial gallon
IKG	Imperial K gallon
Aft	Acre foot
MGL	Mega gallon
IMG	Imperial mega gallon

MASS UNIT NOT METRIC	
Oz	Ounce
Lb	Pound
Ton	Short tons

When a measure mass unit is set, the specific gravity function is automatically enabled by the system. Please, note that the mass measure is heavily affected by the temperature. With certain liquids this may cause significant measurement errors. The following measure of time units can be selected:
s = second, **m =** minute, **h =** hour, **d =** day .

NOTES FOR USING THE MCP SOFTWARE

The command FRFS1 =? and command FRS2 = ?, edited by MCP software, return a list of only the unit compatible with the nominal diameter set. If the sensor is insertion type and the diameter is zero, the only possible unit is m/s if the flow rate has been selected in metric units,otherwise it is f/s if non metric has been selected

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(POS. 3.3-3.5) OutPut Pulse 1-2	*[Pls1-2= dm³ x.xxxxx]*	AL2	[OP1PV-OP2PV]

The functions on POS. 7.1 see page 25 and POS. 7.2 see page 25, if enabled and set on pulse value, allow to set a defined amount of volume to get one pulse.
To set pulse value set the 2 fields, from left to right: 1)unit of measure, 2) numeric value.
The selection is performed by positioning the cursor in the field that has to be modified.
To change the unit type (metric, imperial) see menu 2 units.
The value of Pls1-2 depends on nominal diameter (max. flow rate) units.
The avaiable units are described in the function POS. 1.4 see page 23.

(POS. 3.4-3.6) OutPut 1-2 Pulse Time	*[Tpls1-2= ms x.xxxxx]*	AL2	[OP1PT OP2PT]

When the pulse value is defined, also the duration of the pulse shall be set. It's expressed in milliseconds and the range is from 0.4 to 9999.99. Be carefull to set a right value of pulse duration, according to the receiver. It shall be compatible with the external device which receives the pulses.
ATTENTION: If the pulse is too long receiver's coils/resistor may burn out or if the pulse is too short, the counter may not be able to recognize the pulses.

(POS. 3.7-3.8) OUtput Full scale Frequency 1-2	*[Frq1-2= x.xxxxx]*	AL2	[OU1FF-OU2FF]

Frq1 and Frq2 are activated with POS. 7.1 see page 25 POS. 7.2 see page 25 enabled and set to the value freq+/-/+-. Setting duration of the pulse generated on channel 1 and 2.

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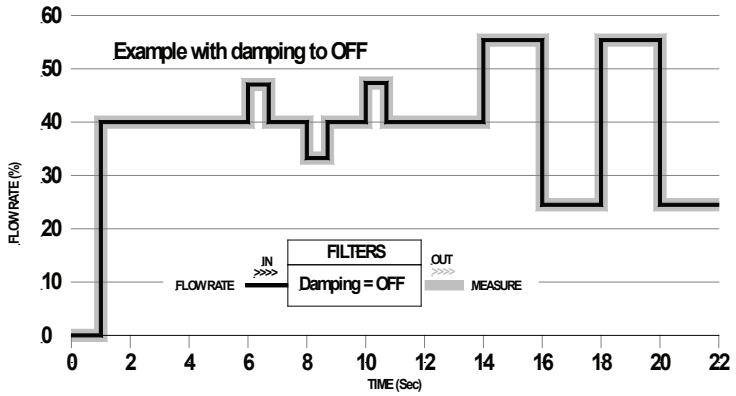
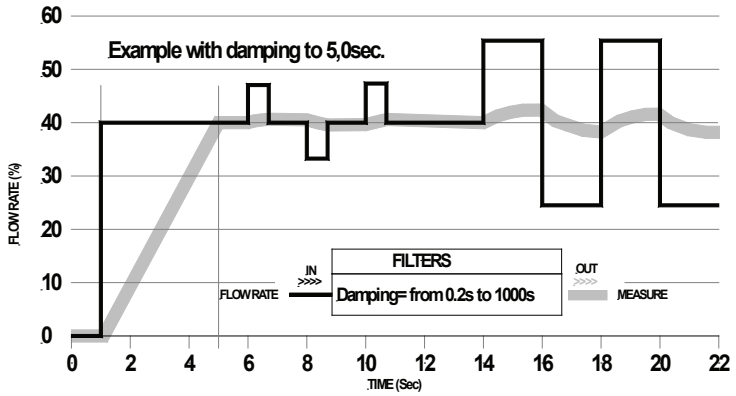
MENU 4 - MEASURE

(POS. 4.1) Measure Filter DaMPing *[Damping=OFF/SMART/(TIME)]* AL3 **[MFDMP]**

This section of the manual is extremely important because the correct setting of the filters allows to obtain a proper response of the device to the measured flow rate and the specific requirements of use; as a general rule, consider that, starting from Damping = OFF (no filter applied to the measure), successive values, introduce increasing damping. The following diagrams show the device's response to changes in flow rate from 0 to 100%, using the different settings of the damping function.
The SMART is an adaptive filter that adapts automatically to most of the processes (recommended value), making the response of the meter very ready to fast changes of flow and at the same time extremely precise and stable for slow variations. It may be convenient to use a constant damping filter time, where there is a pulsating flow (for example generated by peristaltic pumps). With longer times you get a mean value stable, while with short times the measure will closely follow the flow pulses, but consequently more unstable.



Damping function (OFF): the meter follows the trend of fast changes in flow.



Damping mode based on time (from 0.2s to 1000s) The measure is averaged over a number of samples determined by the value assigned to the damping function. When the damping parameter is expressed in seconds, the filter works damping the measurement noise and sudden change of flow rate. Increasing the parameter of damping increases the stability of the measurement.

(POS. 4.2) Measure Filter CUt-off Threshold *[Cut-off=% xxx]* *AL3* **[MFCUT]**

Setting the low flow cutoff threshold. This function is useful to avoid increasing of the totalizers if a flow rate is close to zero and instable, due to the electrical noises from tiny movements of liquid (due for example to vibrations of the pipe). The allowed range for this function is 0-25% of full scale set. For most applications a value between 0.5 and 1% is recommended.

(POS. 4.3) Auto CAlibration Verify Enable *[Cal.verify=ON]* *AL3* **[ACAVE]**

This function enables an automatic verification of board's coefficients. As the transmitter performs continuously a large number of tests, we recommend to use this function only in presence of wide range of environment temperature. Instead it is NOT recommended to use it if the device is used in metering applications (batch).

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(POS. 4.4) Auto RaNGe Enable	*[Autorange=ON/OFF]*	AL3	[ARNGE]

This function enables the automatic change of scale. The meter may have two different working ranges in order to suit to the variable process conditions. In order to get the best results out of this function it is important that the range N.2 (Fs2), if enabled, is bigger than N.1 (Fs1). When the flow rate increases and reaches the 100% of the full scale 1, then the meter automatically switches to scale 2. When the flow rate decreases again reaching a value on scale 2 equal to the 90% of full scale N.1, then the active scale is N.1 again. Allowed values for this parameter: ON/OFF.
Note: when the autorange is enabled, is not allowed to use the manual range change. This function does NOT increase the accuracy of the measure; its aim is to increase the resolution of 4/20 mA when the meter work at very low flow rates (typical case: the flow rate of water distribution with daytime flow is much higher than the night flow).

MENU 4 - MEASURE: ONLY MCP FUNCTIONS

Measure Filter Cut-off Threshold 2	*[MCP ONLY]*	AL3	[MFCT2]

Setting the low flow cutoff threshold, it is similar to the function in POS. 4.2 see page 24. The value of this function is NOT visible on display but only with MCP command.

High Immunity INPuts	*[MCP ONLY]*	AL4	[HIINP]

The HIINP command (INPut High Immunity filter) introduces a hardware filter to be used ONLY IN CASE OF ABSOLUTE NECESSITY, when the measure is absolutely unstable or it is NOT possible to make the measure, and every possible attempt to reduce or eliminate the noise do not give a positive result, with particular attention of device ground connection. When this function is activated (HIINP = ON) the measure will be influenced by an unavoidable error estimated around 1%.

DYNamic Sample Analysis	*[MCP ONLY]*	AL4	[DINSA]

Reserved to the service

DYNamic Sample Time	*[MCP ONLY]*	AL4	[DYNST]

Reserved to the service

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MENU 5 - ALARMS

(POS. 5.1) Flow Rate Alarm maX Positive	*[Max+=technical unit XXX]*	AL3	[FRAXP]

Maximum value alarm set for positive flow rate set (expressed in technical units). When the flow rate value exceeds such a threshold, then an alarm message is generated. Setting this parameter to zero disables the alarm generation.

(POS. 5.2) Flow Rate Alarm maX Negative	*[Max-=technical unit XXX]*	AL3	[FRAXN]

Maximum value alarm set for negative flow rate set (expressed in technical units). When the flow rate value exceeds such a threshold, then an alarm message is generated. Setting this parameter to zero disables the alarm generation.

(POS. 5.3) Flow Rate Alarm miN Positive	*[Min+=technical unit XXX]*	AL3	[FRANP]

Minimum value alarm set for positive flow rate set (expressed in technical units). When the flow rate value falls below such a threshold, then an alarm message is generated. Setting this parameter to zero disables the alarm generation.

(POS. 5.4) Flow Rate Alarm miN Negative	*[Min-=technical unit XXX]*	AL3	[FRANN]

Minimum value alarm set for negative flow rate set (expressed in technical units). When the flow rate value falls below such a threshold, then an alarm message is generated. Setting this parameter to zero disables the alarm generation.

(POS. 5.5) Alarm Thresholds HYSteresis	*[Hysteresis=% XX]*	AL3	[ATHYS]

Hysteresis threshold set for the minimum and maximum flow rate alarms. The value of this parameter is expressed as percentage of the full scale value and may be set from 0 to 25%.

(POS. 5.6) Output Current Alarm Condition Value	*[mA V.alarm =% XXX]*	AL3	[OCACV]

The output current signal can be specified by the user in case of alarm of either, empty pipe, coils interrupted, or ADC (Analogue to Digital Converter) error. The signal current is set as a percentage (0 to 125%) of the 0/4-20mA max load: 500 Ω current. 125% corresponds to 24mA and does not depend on the selected range (0-20/4-20mA). The NAMUR NE43 recommendation asks for an alarm signalling value for the current output lower than 3.6mA (<18%) or bigger than 21mA (>105%). It would then be preferable to set the value of this function at the 10%, so that the current value in case of alarm would be 2 mA, allowing the following diagnostics:
current < 2mA - 5%: line interrupted, power supply failure or faulty transmitter;
2mA -5% current 2mA + 5%: hardware alarm;
4mA current 20mA: normal working range;
20mA < current 22mA: out of range, measure above 100% f.s.

(POS. 5.7) Output Frequency Alarm Condition Value	*[Hz V.alarm=%XXX]*	AL3	[OFACV]

This function is active with POS. 7.2 see page 25 enabled to (FREQ.+, FREQ.-, FREQ.±)
To set the frequency value assigned to the on/off output in one or more of the following alarm cases:
Empty pipe; Coils interrupted ; ADC error
Allowable range is from 0 to 125% of the frequency full scale value. Although there are no specific rules regulating cases such as these, it would be convenient to use the failure information as follows:
0% Hz < frequency 100% f.s.: normal working range;
100% f.s. < frequency 110% f.s.: overflow, measure above the 100% of the f.s.;
115% f.s. < frequency 125% f.s.: hardware alarm condition.

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MENU 7 - OUTPUTS

(POS. 7.1) OUTput 1 Function	*[Out1=XXXXXX]*	AL3	[OUT1F]

Function choice corresponding to digital Output 1. The functions are listed in the table below.

(POS. 7.2) OUTput 2 Function	*[Out2=XXXXXX]*	AL3	[OUT2F]

Function choice corresponding to digital Output 2. The functions are listed in the table below.

FUNCTIONS FOR OUTPUTS 1 AND 2

- **OFF:** DISABLE
- **MAX AL. +:** MAX DIRECT FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MIN AL. +:** MIN DIRECT FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MAX/MIN+:** MAX/MIN DIRECT FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MAX AL.-:** MAX INVERSE FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MIN AL.-:** MIN INVERSE FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MAX/MIN-:** MAX/MIN REVERSE FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **MAX/MIN+/-:** MAX/MIN DIRECT / REVERSE FLOW RATE OUTPUT (ENERGIZED = AL. OFF)
  For more details “MENU 5 - ALARMS” page 36
- **P.EMPTY:** EMPTY PIPE ALARM OUTPUT (ENERGIZED = AL. OFF)
- **HARDW.AL.:** SUM OF ALL ALARMS ”energized interrupted ” AND ”error input signal ”
- **OVERFLOW:** OUT OF RANGE ALARM OUTPUT (ENERGIZED = FLOW RATE OK)
- **ALL ALARMS:** SUM OF ALL ALARMS POSSIBLE
- **EXT. COMM:** THE OUTPUT MAY HAVE A STATE DEPENDENT FROM AN EXTERNAL COMMAND (via MCP, MODBUS, etc.)
- **F.R. SIGN:** FLOW DIRECTION (ENERGIZED WHEN FLOW IS NEGATIVE)
- **SCALE:** INDICATION SCALE
- **FREQ.+:** FREQUENCY POSITIVE FLOW RATE
- **FREQ.-:** FREQUENCY NEGATIVE FLOW RATE
- **FREQ.+/-:** FREQUENCY POSITIVE/NEGATIVE FLOW RATE
- **PULSES.+:** PULSE POSITIVE FLOW RATE
- **PULSES.-:** PULSE NEGATIVE FLOW RATE
- **PULSES+/-:** PULSE NEGATIVE/POSITIVE FLOW RATE

(POS. 7.3) Analog Output 1 ConFiguration	*[Out mA1=X_XX XXX]*	AL3	[AO1CF]

This function sets the current output 1. This function is optional and will not appear unless the option has been requested. There are three fields to modify for this function:

- Scale zero: 4 or 0mA
- Full scale: 20 or 22mA
- Field: + = positive, - = negative, blank = both, -0+ = central zero scale
- The values corresponding to the scale points are shown in the following chart.

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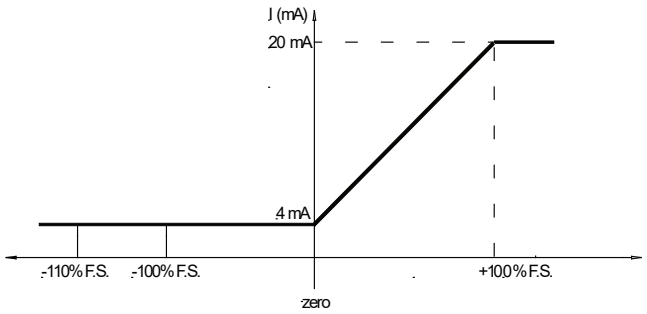
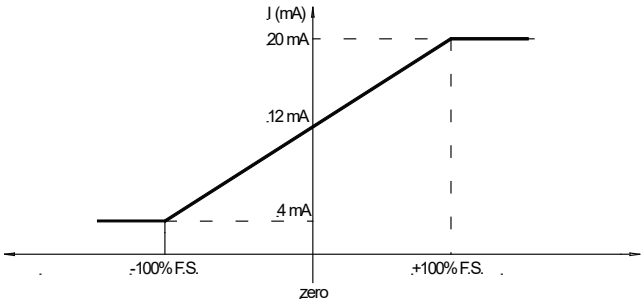
CURRENT VALUES IN mA ASSOCIATE TO THE % FULL SCALE VALUE					
POSSIBLE SELECTION	REVERSE FLOW VALUE		ZERO	DIRECT FLOW VALUE	
	≤-110%	-100%	0%	+100%	≥+110%
Out.mA = 0 ÷ 20 +	0	0	0	20	20
Out.mA = 0 ÷ 22 +	0	0	0	20	22
Out.mA = 4 ÷ 20 +	4	4	4	20	20
*Out.mA = 4 ÷ 22 +	4	4	4	20	22
Out.mA = 0 ÷ 20 -	20	20	0	0	0
Out.mA = 0 ÷ 22 -	22	20	0	0	0
Out.mA = 4 ÷ 20 -	20	20	4	4	4
Out.mA = 4 ÷ 22 -	22	20	4	4	4
Out.mA = 0 ÷ 20	20	20	0	20	20
Out.mA = 0 ÷ 22	22	20	0	20	22
Out.mA = 4 ÷ 20	20	20	4	20	20
Out.mA = 4 ÷ 22	22	20	4	20	22
Out.mA = 0 ÷ 20 –0+	0	0	10	20	20
Out.mA = 0 ÷ 22 –0+	0	1	11	21	22
**Out.mA = 4 ÷ 20 –0+	4	4	12	20	20
Out.mA = 4 ÷ 22 –0+	4	4.8	12.8	21	22

In hardware alarm conditions “HARDW AL.” (interrupted coils, empty pipe, measure error) the current value is configured by the function “mA v.fault” and it is expressed as percentage of a fixed current range, where: 0% = 0mA and 110% = 22mA.

* Example 1: out 4-22 +



** Example 2: out 4-20 –0+



(POS. 7.4) Analog Output 1 Full Scale *[A1S= dm/s x.xxxx]* **AL3** **[AO1FS]**

It allows to set the full scale value for analog output 1 independently from the main scale of the device.

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MENU 9 - DISPLAY

(POS. 9.1) Layout LANGuage	*[Language= GB/...]*	AL1	[LLANG]

Choice of the language. There are 8 languages available: **GB** = English, **IT** = Italian, **TR** = Turkish, **PL** = Polish, **DE** = German, **FR** = French, **PT** = Portuguese, **ES** = Spanish.

(POS. 9.2) Display CoNTRast	*[Contrast= x]*	AL1	[DCNTR]

Display contrast set. The contrast change automatically if room temperature changes. The allowed range is from 0 to 9.

(POS. 9.3) DISplay Refresh Frequency	*[D.rate=Hz xx]*	AL1	[DISRF]

Frequency of the display data refresh. This parameter effects only the display content and not the response time of the meter itself. The possible choices are: 1/2/5/10 Hz.

(POS. 9.4) LCd Display Item Choice	*[D. item= x]*	AL2	[LCDIC]

Second row display item choice

(POS. 9.5) Partial TOTalizers Enable	*[Part. tot= ON]*	AL2	[PTOTE]

This function enables the display of partial totalizer in visualization pages

(POS. 9.6) NEGative value Totalizers Enable	*[Neg. tot= ON]*	AL2	[NEGTE]

This function enables the display of negative totalizer in visualization pages

(POS. 9.7) Net Value ToTalizers Enable	*[Net. tot= ON]*	AL2	[NVTTE]

This function enables the display of net totalizer in visualization pages

(POS. 9.8) Quick STart Menu Enable	*[Quick start= ON]*	AL2	[QSTME]

This function enables the quick start menu.

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MENU 11 - FUNCTION

The following functions are activated by first pressing the “ENTER” key and then the “ESC” key. When the screen appears “confirm” to start the function.

(POS. 11.1) Volume Totalizer Total Positive Reset	*[T+ RESET= ON]*	AL3	[VTTPR]

Reset total positive totalizer for positive flow rate (+)

(POS. 11.2) Volume Totalizer Partial Positive Reset	*[P+ RESET= ON]*	AL3	[VTPPR]

Reset total partial totalizer for positive flow rate (+)

(POS. 11.3) Volume Totalizer Total Negative Reset	*[T- RESET= ON]*	AL3	[VTTNR]

Reset total negative totalizer for direct flow rate (-)

(POS. 11.4) Volume Totalizer Partial Negative Reset	*[P- RESET= ON]*	AL2	[VTPNR]

Reset partial negative totalizer for direct flow rate (-)

(POS. 11.5) Load Factory Default Sensor Data	*[Load sens.f.def= ON]*	AL3	[LFDSD]

This function resets the parameters of the sensor to the factory default delivered. To Load the saved files see function POS. 11.7.

(POS. 11.6) Load Factory Default Converter Data	*[Load conv.f.def= ON]*	AL3	[LFDCD]

This function resets the parameters of the transmitter to the factory default. To Load the saved files see function POS. 11.8.

(POS. 11.7) Save Factory Default Sensor Data	*[Save sens.f.def= ON]*	AL6	[SFDSD]

This function saves the factory default parameters of the sensor.

(POS. 11.8) Save Factory Default Converter Data	*[Save conv.f.def= ON]*	AL6	[SFDCD]

This function saves the factory default parameters of the transmitters

(POS. 11.9) CALibration Immediate Command	*[Calibration]*	AL5	[CALIC]

Perform manually a board’s calibration. Press Enter and the message “ EXECUTE?” will be visualized on the display then long press the Enter key to proceed. Press any other key to stop the operation.
If the sensor table is valid, the calibration is performed also when one of the following parameter has been changed:

SENSOR DIAMETER -> Menu Sensor 1
SENSOR MODEL -> Menu Sensor 1
Exc. CURRENT -> Menu Sensor 1
S. Freq. -> Menu Sensor 1

To check the calibration status, active or inactive, type the command MCP Calic? and check as follows:

CALIC = 1 calibration in progress
CALIC = 0 calibration terminated

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MENU 12 - DIAGNOSTIC

(POS. 12.1) AutoTeSt Immediate Command	*[Self Test]*	AL3	[ATSIC]

Meter auto-test function. This function stops the normal functions of the meter and performs a complete test cycle on the measure input circuits and on the excitation generator. To activate this function, after selecting it, push Enter key, at the question: “CONFIRM EXEC.?” Long Push the same key to start auto-test, or any other key to cancel the operation. At the end of operation the transmitter will revert to one of the initial visualization pages.

This function is automatically performed when switching on the device. This function restarts the transmitter.

(POS. 12.2) Sensor VERify Command	*[Sens. verify]*	AL3	[SVERC]

This function performs a sensor verification. The function checks the coil leakage current (isolation test) and also that the sensor is connected and functioning within the normal operating limits

(POS. 12.3) Measure SIMulation ENable	*[Flow sim=ON]*	AL3	[MSIEN]

Flow rate simulation enabling. With this function it is possible to generate an internal signal that simulates the flow rate, allowing to test all the outputs and all the external devices.

After enabling it, a ‘▲▼’ appears at the MCP screen below the flow rate indication.
Set: By pressing the “Enter” key on the computer keyboard with MCP started, compare the value to be set to% of flow, and pressing “Enter” again confirms the set value.
Finished: pressing the “Enter” key from the computer keyboard with MCP started, the flow simulation setting screen is displayed and pressing the “Esc” stops the simulation process.

(POS. 12.4) Diagnostic Measure VaLueS	*[Display measures]*	AL5	[DMVLS]

This Function shows the values of the various internal parameters as listed below :

VPS:V	4.7	CAL_G:	31.2103
+AVCC:V	+2.7	CAL_O:mA	-0.008
-AVCC:V	-2.7	CAL_R0:	0.99990
VIN1:V	+0.002	CAL_R1:	1.00501
VIN2:V	+0.002	SYS_F:MHz	50.0367
VIN_C:V	+0.002	CURR_K:	0.99399
VIN_D:V	-0.000	HFN_ADC:mV	0.004
C_C:mA	25.15	LFN_ADC:mV	0.001
C_V:V	0.6	MEAS_NB:%	0.12
C_VPK:V	1.1	CAL_I:mV	0.525
C_R:Ω	22.0	CAL_U:mV	16.296
C_PWR:W	0.014	PROC1:%	49.0
C_T:°C	-.-	PROC2:%	13.9
C_RT:ms	1.72	PROC3:%	6.8
C_LK:mA	0.000	PROC4:%	7.1
C_ST:	0	PROC5:%	23.0
S_VER.RSLT:	000	CPU_T:°C	+34.12
E1R:kΩ	00		
E2R:kΩ	00		
LFN_COM:V	0.01		
LFN_DIF:V	0.00		

(POS. 12.5) Diagnostic Communication VaLueS	*[Disp. comm. vars]*	AL5	[DCVLS]

This Function creates a list of diagnostic values related to the device communication.

PPP link status →
MCPI socket status →

PPP_STATUS:	NETW	E_PPPFRM2:	0
MCPI_S:	ESTABLISH	E_IP_HDR1:	0
RxCNT:	1138022 89	E_IP_HDR2:	0
TxCNT:	1489758012	E_IP_HDR3:	0
E_SR_LINK:	0	E_IP_HDR4:	0
E_PAKTLEN:	0	E_IP_HDR5:	0
E_BFOVERR:	0	E_IP_HDR6:	0
E_TSPLAYR:	0	E_IP_HDR7:	0
E_PPPFRM1:	0	BROADCAST:	85
E_PPPFRM2:	0	E_IP_HDR9:	0
E_IP_HDR1:	0	E_TCPHDR1:	0
E_IP_HDR2:	0	E_TCPHDR2:	0
E_IP_HDR3:	0	E_UDPHDR1:	0
E_IP_HDR4:	0	E_UDPHDR2:	0
E_IP_HDR5:	0	E_UDPHDR3:	0
E_IP_HDR6:	0	E_ICMPHDR:	0

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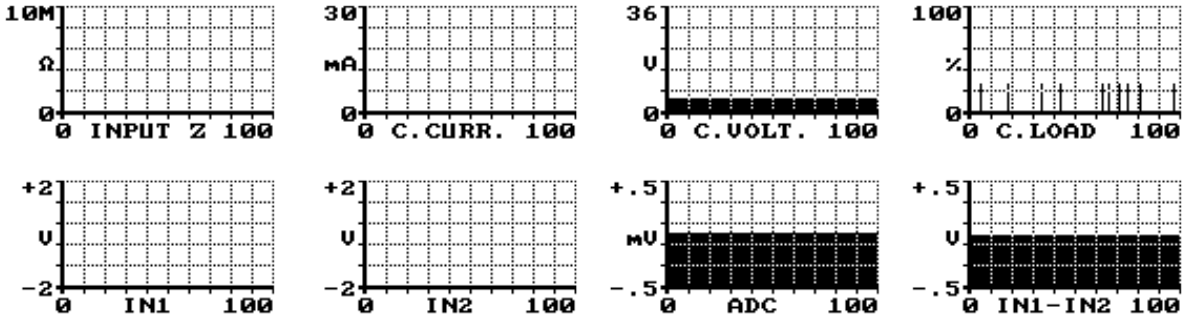
The following are the states for the PPP link and MCPI to connect the device.

PPP link status:
"UNDT" = undetermined
"DEAD" = dead, link down, persistent condition
"LCP" = LCP phase, transition condition
"AUTH" = Authentication phase, transition condition
"IPCP" = IP and DNS addressess assign phase, transition condition
"NETW" = network established (normal persistent condition when the link is UP)
"TERM" = link termination request, transition condition

MCPI link status:
"CLOSED" = socket closed
"ACCEPT" = socket awaiting for new connection
"ESTABLISH" = link established
"CLS_WAIT" = waiting for closure
"LAST_ACK" = last ACK sent
"FIN_WAIT" = (see TCP/IP RFC documentation)
"TIME_WAIT" = (see TCP/IP RFC documentation)

(POS. 12.6) OscilloSCOPe function	*[Display graphs]*	AL5	**[OSCOP]**

This function displays graphs of input Z, C. current, C. Volt, C.Load, Input 1, Input 2, Input1-Input 2, Analog to Digital Converter.

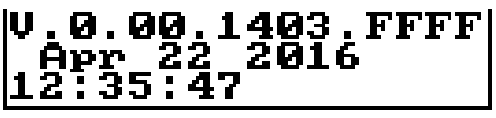


(POS. 12.7) Generic sensor set	*[Gen.sens. set]*	AL5	**NO MCP COMMAND**

Automatic finding of a parameter set for a generic sensor.

(POS. 12.8) MODel and Software Version	*[Firmware info]*	AL0	**[MODSV]**

Firmware informations version/revision



(POS. 12.9) SeRial NUMber	*[S/N= xxxxxx]*	AL0	**[SRNUM?]**

View the Board serial number. (read only)

(POS. 12.10) Total WorKing TiMe	*[WT= xxxx: xx: xx: xx]*	AL0	**[TWKTM?]**

View the Total working time of the device. (read only)

MENU 13 - SYSTEM

(POS. 13.1-2-3-4-5-6) Level n° Access CoDe	*[Ln code xxxxxxxx]*	---	[L1ACD]-> [L6ACD]

This function enables or disables, for each access level code, the main menu functions.
Each level unlocks the functionality of the lower level. (Function “POS. 13.7 see page 26”)
L1 code= ******** Access level value code 1 L4 code= ******** Access level value code 4
L2 code= ******** Access level value code 2 L5 code= ******** Access level value code 5
L3 code= ******** Access level value code 3 L6 code= ******** Access level value code 6

(POS. 13.7) ReStricted Access Rule Enable	*[Restr. access= ON]*	AL6	[RSARE]

This function enables or disables the access level code. If it’s active displays only the functions related to the level entered access.

IP ADDRESS SETTING (13.11-12-13)

(POS. 13.8) Device IP ADdress	*[XXX.XXX.XXX.XXX]*	AL3	[DIPAD]

Device IP network address

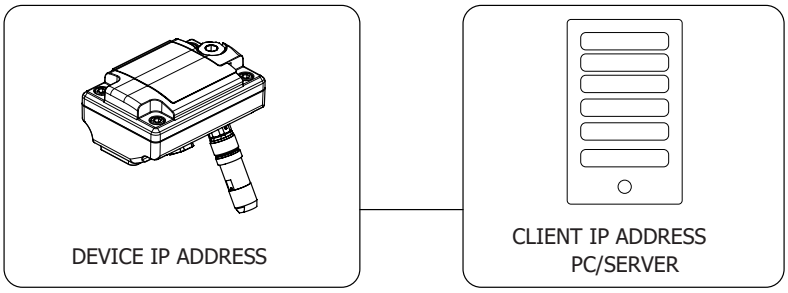
(POS. 13.9) Client IP ADdress	*[XXX.XXX.XXX.XXX]*	AL3	[CIPAD]

Client IP network address

(POS. 13.10) NETwork MaSk	*[XXX.XXX.XXX.XXX]*	AL3	[NETMS]

Network mask.

Caution: Changes to the functions of the points 13.11-13.12-13.13 are enabled after the device restart (see function POS. 12.1 see page 26 Self test for restart transmitter).



(POS. 13.11) CoeFFicient KT	*[KT=X.XXXXX]*	AL6	[CFFKT]

Gain correction coefficient (calculated automatically)

(POS. 13.12) CoeFFicient KS	*[KS=X.XXXXX]*	AL5	[CFFKS]

Correction coefficient constant flowmeter (reserved to the service)

(POS. 13.13) CoeFFicient KR	*[KR=X.XXXXX]*	AL5	[CFFKR]

Correction coefficient constant flowmeter (reserved to the service)

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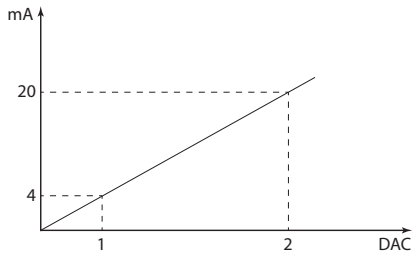
DIGITAL ANALOG Converter (Correction Parameters)(13.17-18-19-20)



The diagram shows how the DAC4-4-20mA max load:500Ω parameters are setup. The DAC1 value corresponds to 4 mA corresponding to a zero flow rate, while the value of 20mA corresponds to a 100% of the flow rate.

(POS. 13.14) Current output 1 Calibration Point 1	*[DAC1 4mA =XXXXX]*	AL5	[C1CP1]

DAC1 out 4mA calibration point. (current output1 calibration point 1)

(POS. 13.15) Current output 1 Calibration Point 2	*[DAC1 20mA=XXXXX]*	AL5	[C1CP2]

DAC1 out 20mA calibration point. (current output1 calibration point 2)

(POS. 13.16) FirmWare UPDate	*[FW update]*	AL4	[FWUPD]

Enable firmware update. The firmware can be uploaded using MCP software.
MCP interface is activated by the command FWUPD = name.file

MENU 13 - SYSTEM: ONLY MCP FUNCTIONS

Unique Identity KEY	*[MCP ONLY]*	AL0	[UIKEY]

Device Unique Identity key

HardWare SET	*[MCP ONLY]*	AL0	[HWSET]

Device hardware configuration

HardWare CODe	*[MCP ONLY]*	AL0	[HWCOD]

Device hardware code

CALibration eXecution status Memory	*[MCP ONLY]*	AL6	[CALXM]

Calibration Execution status Memory. This function checks the device's internal calibration status.
CALXM=1 valid calibration in execution.
CALXM=0 invalid calibration (If the function is zero, start the calibration function [MCP command CALIC])

Function CODe Selection	*[MCP ONLY]*	AL0	[FCODS]

Select the function code

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Quick Start FuNction Selection	*[MCP ONLY]*	AL6	[QSFNS]

Select function for quick start menu

Quick Start All Functions Selection	*[MCP ONLY]*	AL6	[QSAFS]

Select ALL transmitter functions for quick start menu.

Quick start function Status LiST	*[MCP ONLY]*	AL6	[QSLST]

View the status of the functions in the quick start menu.

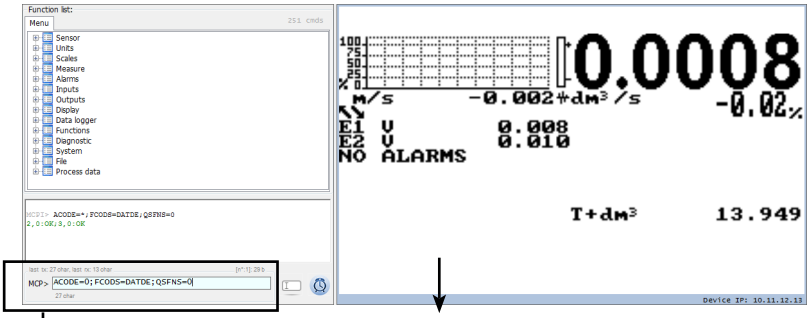
Function enable Status LiST	*[MCP ONLY]*	AL6	[FSLST]

List enable status of functions

Access CODE	*[MCP ONLY]*	AL0	[ACODE]

Input the right access code

Example set quick start menu function for MCP.



ACODE=0; FCODS=[MCP COMMAND]; QSFNS=1

Access Code

INSERT MCP Command of the function to be activated in the QS menu.

LINK Terminate	*[MCP ONLY]*	AL0	[LTERM]

Terminate the PPP data link

MCPI session QUIT	*[MCP ONLY]*	AL0	[MQUIT]

Quit the MCPI connection

Functions LIST	*[MCP ONLY]*	AL0	[FLIST]

View list of all available transmitter functions.

Functions LISt Compact	*[MCP ONLY]*	AL0	[FLISC]

View compact list of all available transmitter functions.

Functions Menu SELection	*[MCP ONLY]*	AL0	[FMSEL]

Select menu for functions list

ConFiguration LiST	*[MCP ONLY]*	AL0	[CFLST]

Configuration parameter list. The list with the status / values of the transmitter parameters

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Volume Totalizer Total Positive Set	*[MCP ONLY]*	AL4	[VTTPS]

This function allows to set the value of total positive totalizer.

Volume Totalizer Partial Positive Set	*[MCP ONLY]*	AL4	[VTPPS]

This function allows to set the value of partial positive totalizer.

Volume Totalizer Total Negative Set	*[MCP ONLY]*	AL4	[VTTNS]

This function allows to set the value of total negative totalizer.

Volume Totalizer Partial Negative Set	*[MCP ONLY]*	AL4	[VTPNS]

This function allows to set the value of partial negative totalizer.

Volume Total Positive Overflow Set	*[MCP ONLY]*	AL4	[VTPOS]

This function allows to set the overflow value of total positive totalizer

Volume Partial Positive Overflow Set	*[MCP ONLY]*	***AL4***	[VPPOS]

This function allows to set the overflow value of partial positive totalizer

Volume Total Negative Overflow Set	*[MCP ONLY]*	AL4	[VTNOS]

This function allows to set the overflow value of total negative totalizer

Volume Partial Negative Overflow Set	*[MCP ONLY]*	AL4	[VPNOS]

This function allows to set the overflow value of partiall negative totalizer

CPU MaX.recorded temperature	*[MCP ONLY]*	AL6	[CPUMX]

CPU maximum recorded temperature

CPU MiN.recorded temperature	*[MCP ONLY]*	AL6	[CPUMN]

CPU minimum recorded temperature

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MENU 15 - PROCESS DATA (ONLY MCP)

OUTput 1 Set	*[MCP ONLY]*	AL0	[OUT1S]
This function allows to set the value for digital output 1			
OUTput 2 Set	*[MCP ONLY]*	AL0	[OUT2S]
This function allows to set the value for digital output 2			
Flow Rate Scale Range Number	*[MCP ONLY]*	AL0	[FRFSN]
Flow rate full scale value in chosen units			
Flow Rate Value PerCentage	*[MCP ONLY]*	AL0	[FRVPC]
Flow rate value in percentage of full scale			
Flow Rate Value Percentage without cut-off	*[MCP ONLY]*	AL0	[FRVPX]
Flow rate in percentage without cut-off			
Flow Rate Value Binary without cut-off	*[MCP ONLY]*	AL0	[FRVBX]
Flow rate in binary without cut-off			
Flow Rate Value Technical Unit	*[MCP ONLY]*	AL0	[FRVTU]
Flow rate value in unit of measure			
Volume Totalizer Total Positive Value	*[MCP ONLY]*	AL0	[VTTPV]
Total positive totalizer read value			
Volume Totalizer Partial Positive Value	*[MCP ONLY]*	AL0	[VTPPV]
Totalizer P+ read value			
Volume Totalizer Total Negative Value	*[MCP ONLY]*	AL0	[VTTNV]
Totalizer T- read value			
Volume Totalizer Partial Negative Value	*[MCP ONLY]*	AL0	[VTPNV]
Totalizer P- read value			
Volume Totalizer Total Positive Overflow	*[MCP ONLY]*	AL0	[VTTPO]
Totalizer T+ number of overflows			
Volume Totalizer Partial Positive Overflow	*[MCP ONLY]*	AL0	[VTPPO]
Totalizer P+ number of overflows			
Volume Totalizer Total Negative Overflow	*[MCP ONLY]*	AL0	[VTTNO]
Totalizer T- number of overflows			
Volume Totalizer Partial Negative Overflow	*[MCP ONLY]*	AL0	[VTPNO]
Totalizer P- number of overflows			

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CPU TemPerature	*[MCP ONLY]*	AL0	[CPUTP]

CPU temperature

LiQuid VELocity	*[MCP ONLY]*	AL0	[LQVEL]

Liquid velocity in m/s

AVeraGe process data Samples Numbe	*[MCP ONLY]*	AL0	[AVGSN]

Number of samples for averaged values

ALARM status	*[MCP ONLY]*	AL0	[ALARM]

Active alarm(s) status

Sensor TeSt Result Code	*[MCP ONLY]*	AL0	[STSRC]

Sensor test result code

Main PoWeR Status	*[MCP ONLY]*	AL0	[MPWRS]

Status of main power supply

INput RESistance	*[MCP ONLY]*	AL0	[INRES]

Equivalent Input resistance of liquid measured by electrodes

INput VoLtageS	*[MCP ONLY]*	AL0	[INVLS]

Electrodes input voltages

SEQuence NumBer	*[MCP ONLY]*	AL0	[SEQNB]

This function allows to create a random sequential number to identify the MCP reply messages and verify that the messages are sent in the right sequence.
The user can combine to MCP comand the command SEQNB=n, with a different n to every sent command. The reply that the meter will give, will include the same SEQNB sent number, so you can correctly match each reply with the respective request, maintaining control of the messages time line. With this function you can also monitor if there are missed messages or messages that have not been answered by the device.

Sensor table Version	*[MCP ONLY]*	AL0	[STBLV]

Sensor's table version

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ALARM MESSAGES (CAUSES AND ACTIONS TO BE TAKEN)

MESSAGE	CAUSE	ACTION TO TAKE
NO ALARMS	All works regularly	---
[000] SYSTEM RESTART	---	---
[005] F-RAM ERROR	Error writing / reading Flash-RAM	Contact the service
[006] EXCITATION ERROR	The circuit powering the sensor coils is interrupted/ open.	Check the connecting cables to the sensor.
[007] SIGNAL ERROR	The measure is strongly effected by external noise or the cable connecting the transmitter to the sensor is broken.	Check the status of the cables connecting the sensor, the grounding connections of the devices and the possible presence of noise sources.
[008] PIPE EMPTY	The measuring pipe is empty or the detection system has not been properly calibrated.	Check whether the pipe is empty or repeat the empty pipe calibration procedure.
[009] FLOW>MAX+	The flow rate is higher than the maximum positive threshold set.	Check the maximum positive flow rate threshold set and the process conditions.
[010] FLOW>MAX-	The flow rate is higher than the maximum negative threshold set.	Check the maximum negative flow rate threshold set and the process conditions.
[011] FLOW<MIN+	The flow rate is lower than the minimum positive threshold set.	Check the minimum positive flow rate threshold set and the process conditions.
[012] FLOW<MIN-	The flow rate is lower than the minimum negative threshold set.	Check the minimum negative flow rate threshold set and the process conditions.
[013] FLOW>FULL SCALE+	The flow rate is higher than the full scale positive value set on the device.	Check the full scale positive value set on the device and the process conditions.
[014] FLOW>FULL SCALE-	The flow rate is higher than the full scale negative value set on the device.	Check the full scale negative value set on the device and the process conditions.
[015] PULSE 1>RANGE	The pulse generation output 1 of the device is saturated and cannot generate the sufficient number of impulses.	Set a bigger unit of volume or, if the connected counting device allows it, reduce the pulse duration value.
[016] PULSE 2>RANGE	The pulse generation output 2 of the device is saturated and cannot generate the sufficient number of impulses.	Set a bigger unit of volume or, if the connected counting device allows it, reduce the pulse duration value.
[017] CALIBR. ERROR	Calibration Error	Contact the service
[018] SYSTEM FREQ. ERR	System Freq. Error	Contact the service
[019] B.DATA NOT INIT	Uninitialized data system	Contact the service
[020] FL.SENSOR ERROR	Flow rate sensor error	Contact the service

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At the end of its lifetime, this product shall be disposed of in full compliance with the environmental regulations of the state in which it is located.

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MANUAL REVIEWS

REVIEW	DATE	DESCRIPTION
SE58S_EN_DE_BURKERT_R00_1.02.XXXX	25/02/2021	FIRST EDITION
SE58S_EN_BU_R01_1.04.XXXX	08/10/2021	Changes to data relating to digital output
SE58S_EN_BU_R02_1.04.XXXX	03/12/2021	Added note for maintenance
SE58S_EN_BU_R03_1.04.XXXX	26/02/2022	Added notes for MCP and made some corrections on texts

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