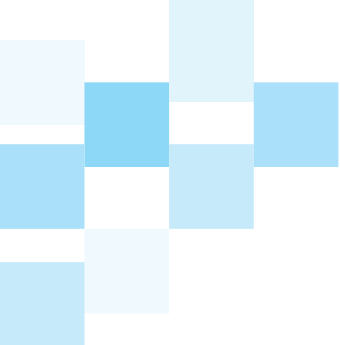




ISOMAG®

The friendly magmeter

DATA SHEET

CS3820



Certified to
NSF/ANSI/CAN 61



ISOIL
I N D U S T R I A

INDEX

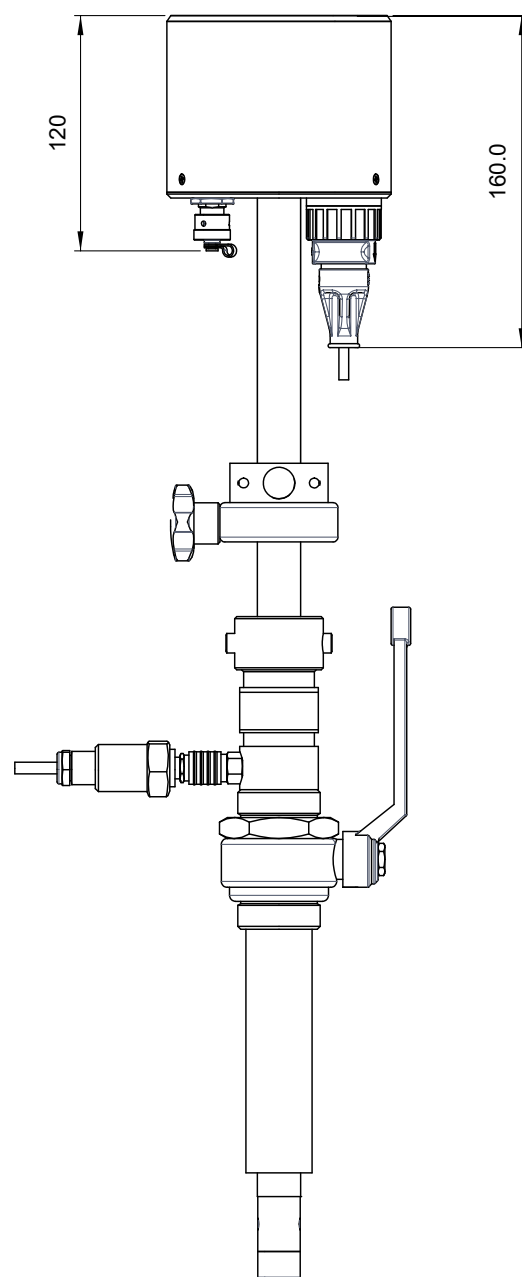
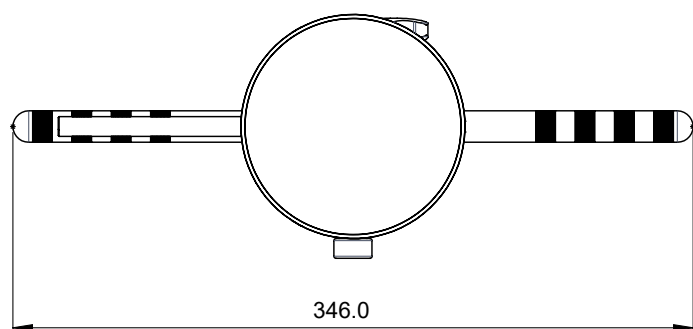
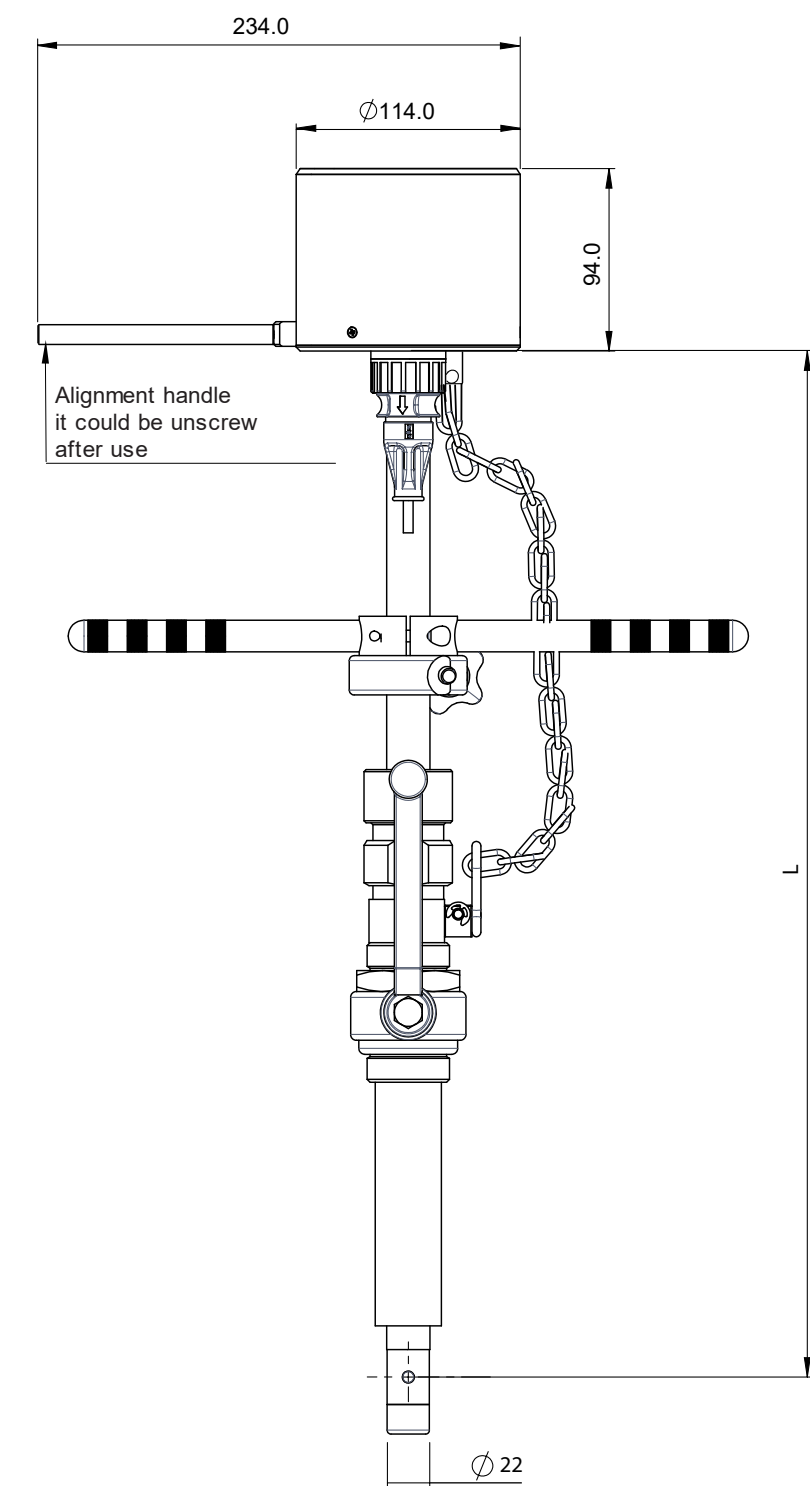
TECHNICAL DATA	1
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TECHNICAL DATA

OVERALL FEATURES

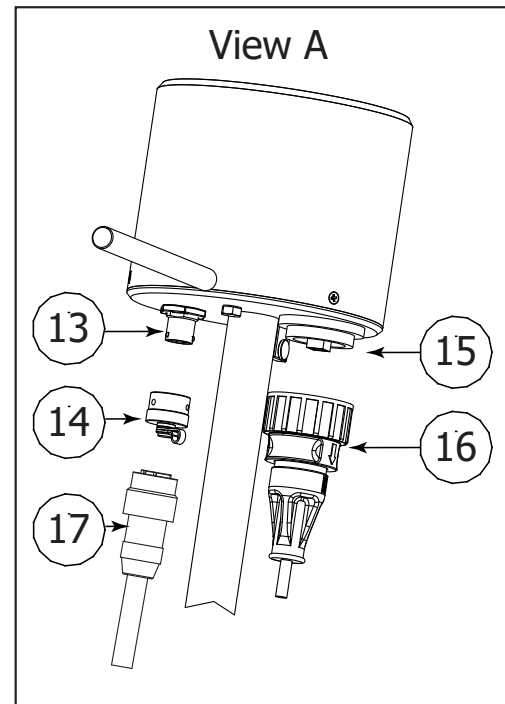
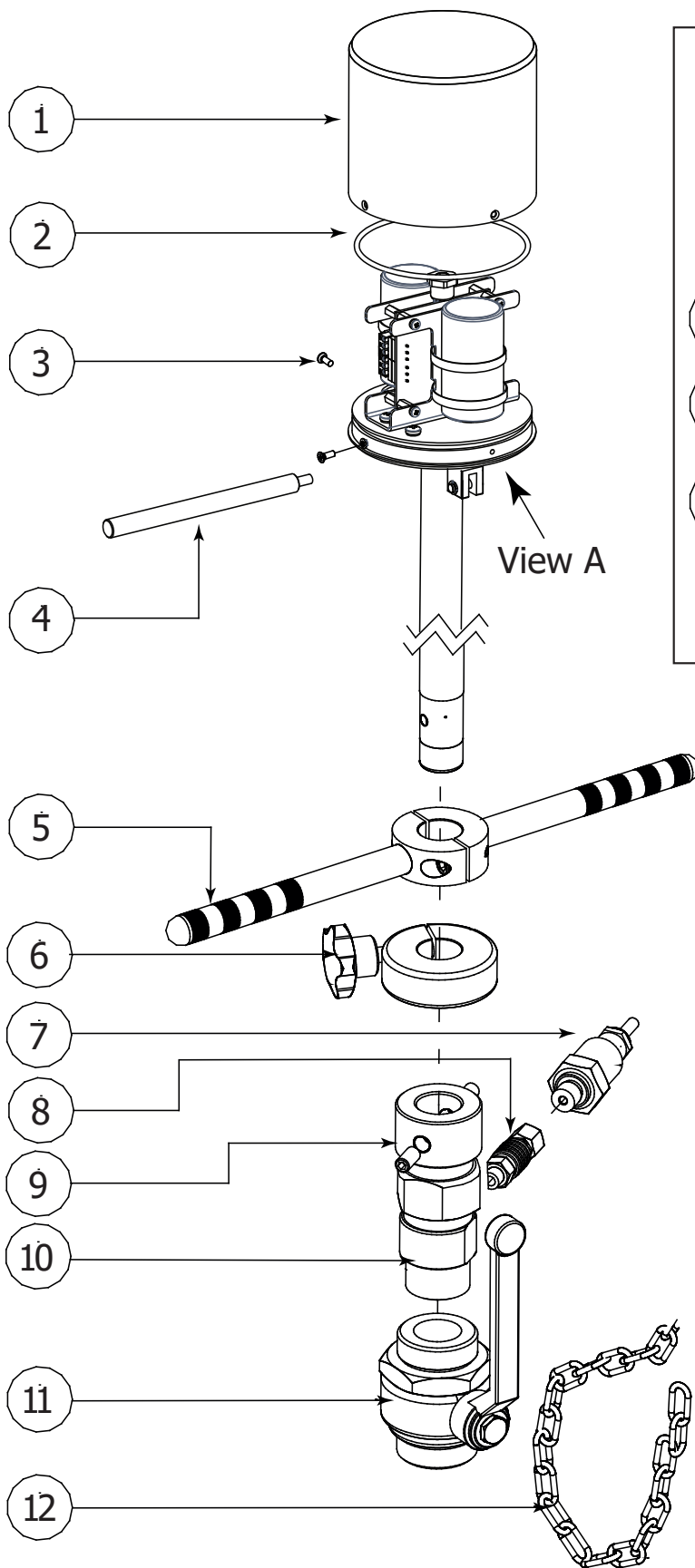
Minimum Fluid Conductivity	☐ 20 μ S/cm
Ambient Temperature	☐ -20... +50°C / -14... +122 °F
Liquid Temperature Range	☐ 0 °C to 100 °C
Protection	☐ IP 68 (1 meter Depth)
Pipeline Pressure Rating	☐ 2500 kPa
Sensor Material	☐ Stainless Steel AISI 316
Body/Electrodes Material	☐ PEEK + Electrodes in Hastelloy C276 / PEEK + Electrodes in AISI 316L
Process Connection	☐ 1 Inch (25mm) BSP Threaded End
Pressure tapping	☐ Female Quick-Release Connector
Adjustment method	☐ 5mm Allen Key Fits All Screws
Flow Determination	☐ Assumes Developed Profile (Determined Via Flow Profiling Software)
Size For Pipe Line Ø	☐ 65 mm To > 2000 mm. Maximum Size Dependant On Position In Pipe (For Pipe Sizes $\leq$ 150mm Accuracy Can Be Improved By Special Calibration With The Specified Pipe Size).
Measurement Range	☐ Bidirectional From 0.02m/s to 5m/sec (Maximum Could Be Lower Dependent Upon Insertion Length And Position In Pipe)
Accuracy	☐ See table pag. 8
Response Time	☐ liquid speed step variations > 0,25 m/s CONTINUOUS CYCLE: 300 ms SMART1: 3 s SMART2: 6 s SMART5: 15 s
Power Supply	☐ N°2 Lithium Batteries Size D Not Rechargeable
Battery life	☐ CONTINUOUS CYCLE: 7.8 months SMART1 : 4.8 years SMART2 : 8.3 years SMART5 : 11.8 years ☐ Power consumption in case of EMPTY PIPE (the device shuts down the coil drive circuits) CONTINUOUS CYCLE : 4.5 years SMART CYCLES (ALL) : $\leq$ 16 years
Safety	☐ Probe Fitted With Safety/Anti-Bounce Chain
Gasket Material	☐ FPM (O-Ring)
Altitude	☐ -200 m Up To 4000 m
Data Storage	☐ EEProm
Programming Plug In	☐ Protected Plug In For Connection To PC - USB Type A/USB Mini-B
Communications/Protocols	☐ MCP protocol Via USB Interface ☐ MODbus
Diagnostic Functions	☐ Yes
Pulses/Alarm Outputs	☐ N°2 On/Off Outputs; Pulses Proportional To Velocity/Flow-Rate (Max. Frequency 100 Hz), flow rate alarms
Data Logger	☐ SD-HC card (4 GB) for flow rate/volume/alarms (optional)

OVERALL DIMENSION



SIZE	L
0	510
1	660
2	860
3	1060
4	1360
5	2360

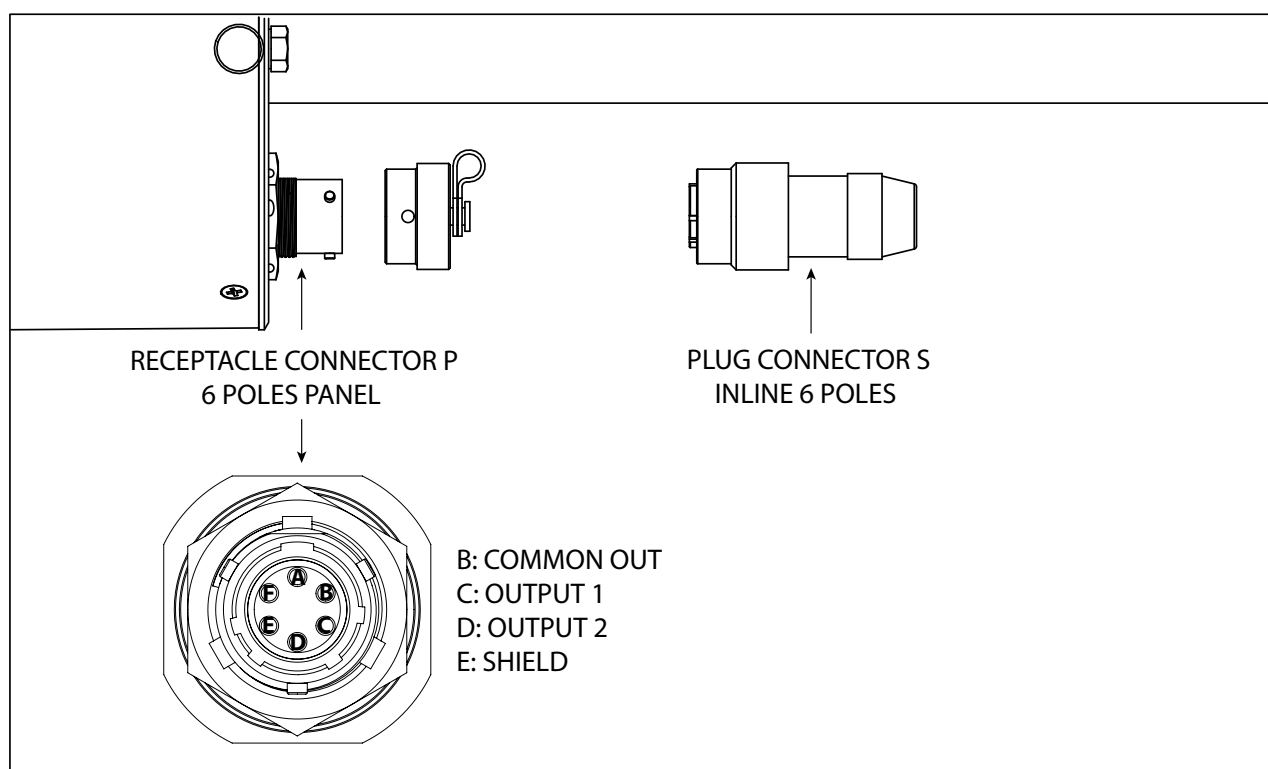
CS3820 LAYOUT



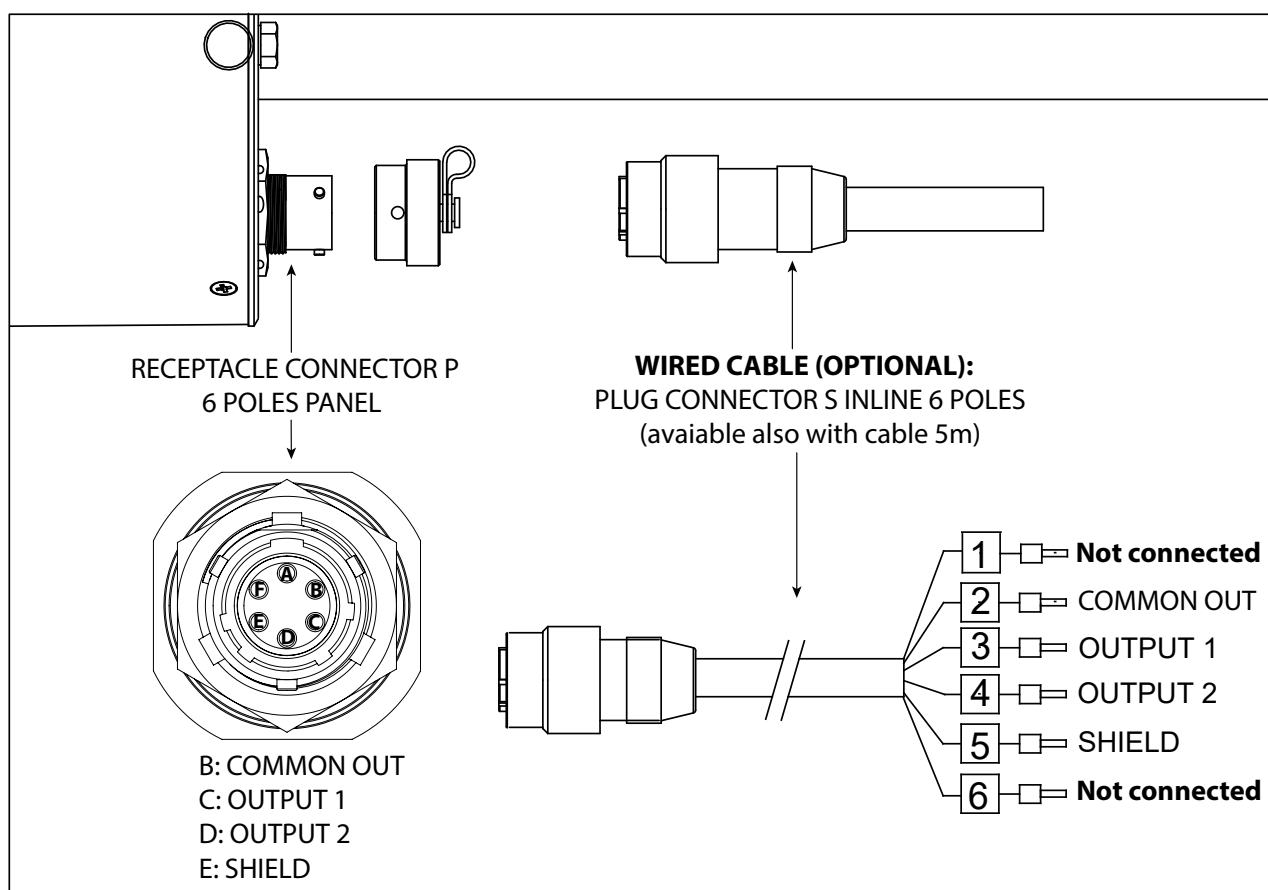
POS.	DESCRIPTION
1	POLISHED COVER
2	ORING 3500
3	STAINLESS SCREW M3x8
4	ALIGNMENT HANDLE
5	PUSH HANDLE
6	FIXING KNOB
7	PRESSURE SENSOR
8	QUICK CONN.
9	GRUB SCREW M10X12
10	1" JACKET
11	1" VALVE
12	SAFETY CHAIN
13	CONN. 62GB-814-10 (METAL 6 POLES) CONN. UTS7-10E6P (PLASTIC 6 POLES)
14	CAP 62GB-814-10 (METAL 6 POLES) CAP UTS10DCGR (PLASTIC 6 POLES)
13	CONN. UTS7-8E4P (PLASTIC UL94-V0)
14	CAP. UTS8DCGR (PLASTIC UL94-V0)
15	CONN. PAN USB CONNECTOR PX0843-B
16	USB CONNECTOR IP68 PX0840_B_3M00
17	ED79AXXX15X (METAL 6 POLES) ED79RXXX15X (PLASTIC 6 POLES)

ELECTRICAL CONNECTIONS

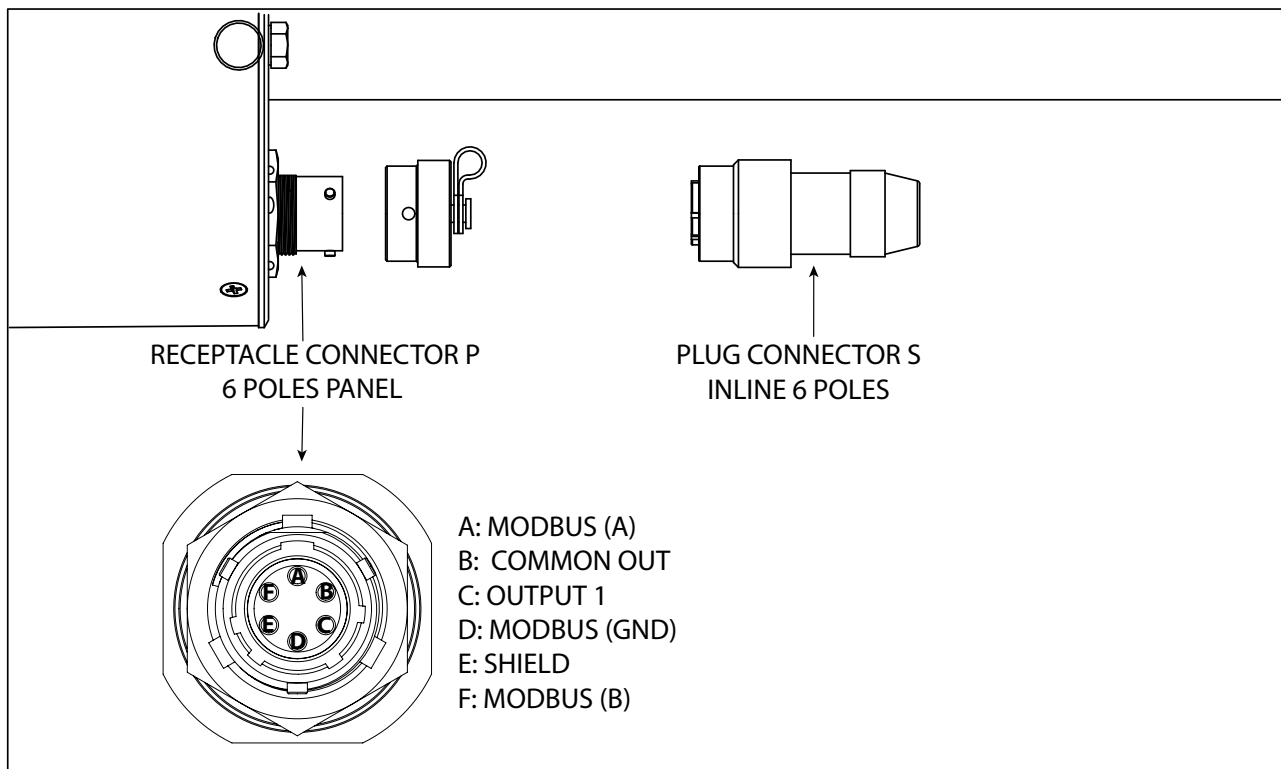
OPTION WITH **TWO OUTPUTS** WITH CONNECTOR NOT WIRED



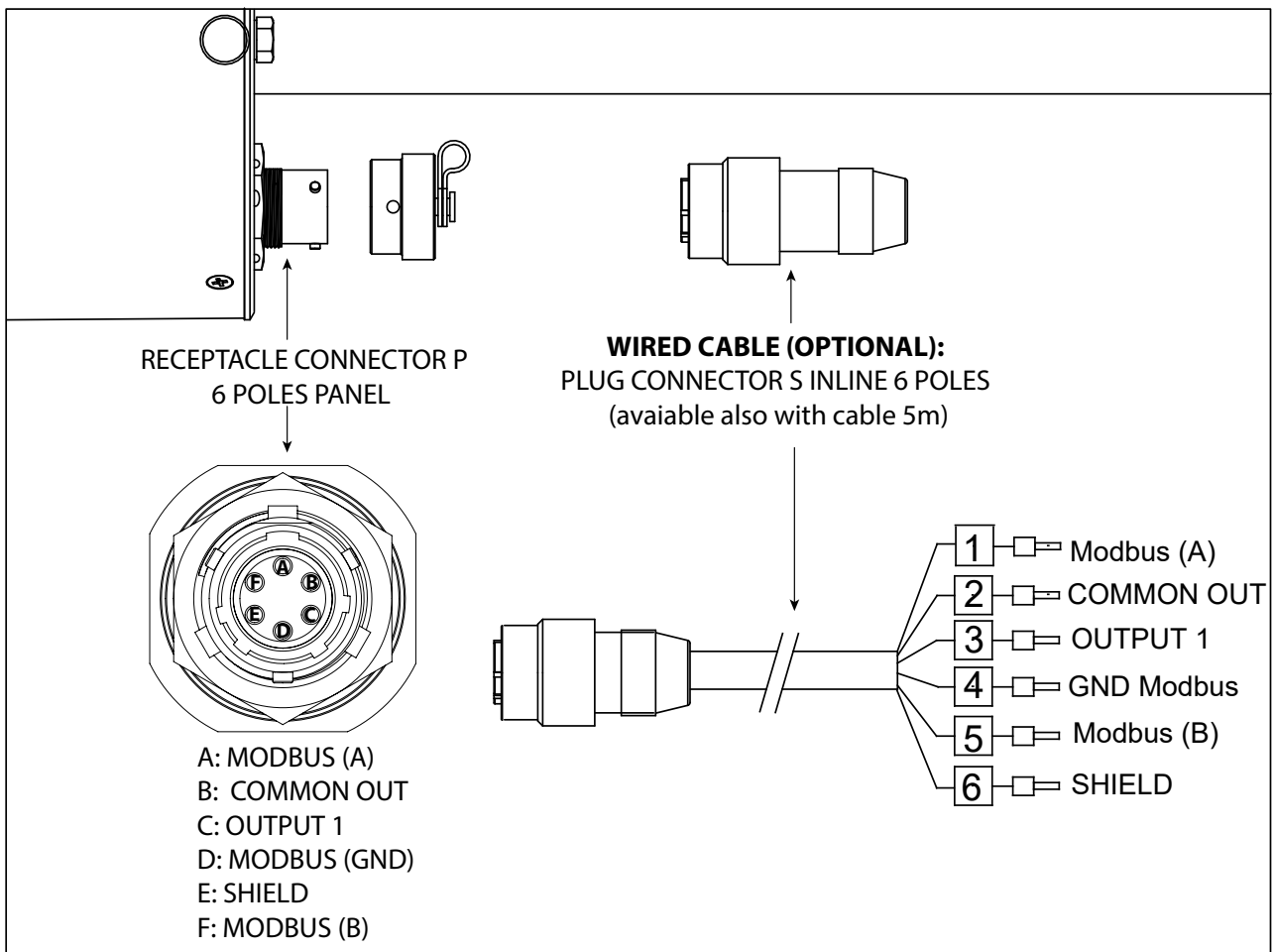
OPTION WITH **TWO OUTPUTS** WITH CONNECTOR WITH WIRED CABLE



OPTION **WITH OUTPUT+ MODBUS** WITH CONNECTOR NOT WIRED



OPTION **WITH OUTPUT+ MODBUS** WITH CONNECTOR WITH WIRED CABLE



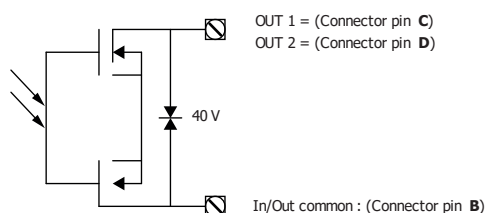
Technical characteristics input/outputs

- Opto-insulated output (Opto- MOS)
- Maximum switching voltage: 40 Vdc
- Maximum switching current: 100mA
- Maximum Ron = 70 Ohm
- Maximum switching frequency (loadRL=240Ω,VOUT=24Vdc): 32 Hz
- Insulation from other secondary circuits: 500 Vdc

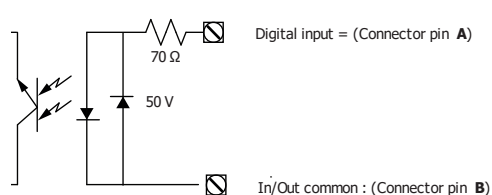
Electrical connections to the connector

- A: DIGITAL INPUTS
- B: OUTPUTS/INPUT COMMON
- C: OUT 1
- D: OUT 2

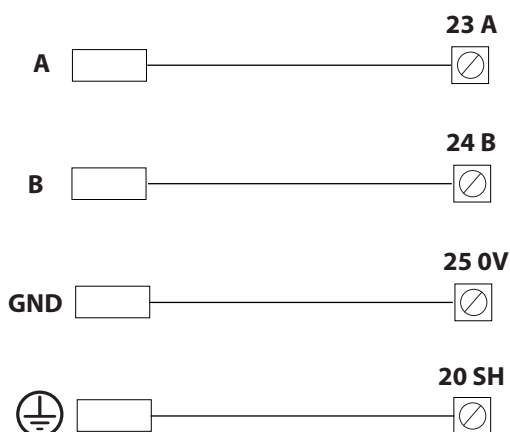
Outputs wiring diagram



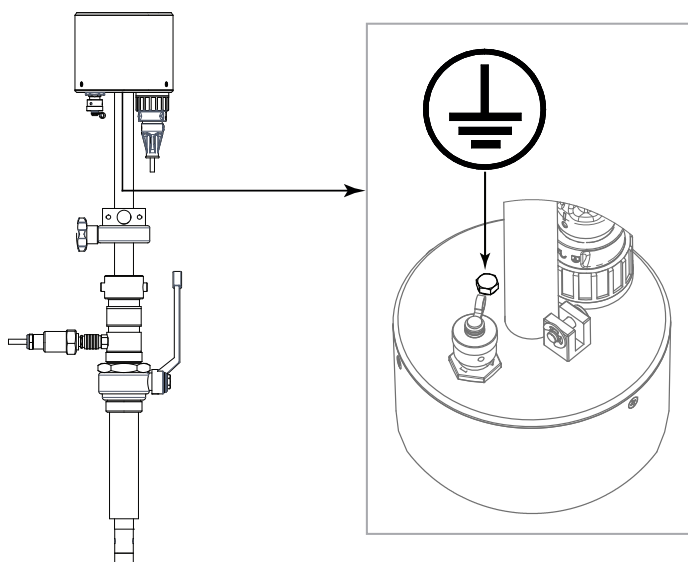
Input wiring diagram



RS485



GROUNDING CONNECTION



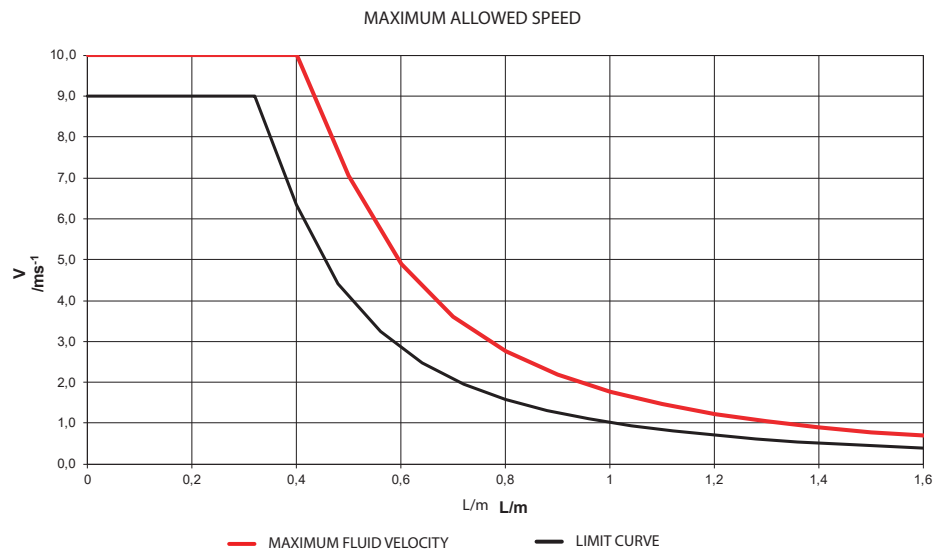
MAXIMUM ALLOWED SPEED

WARNING! The insertion and extraction operations of the insertion instruments are operations that can be dangerous when working with the pressure tube.

The pressure inside the tube apply a significant force on the probe that can be ejected violently, creating dangerous situations for the operators. However, the protection chain provided by the instrument does not allow it to completely escape from the cylinder linear. It is recommended to perform the insertion or extraction operations of the insertion instrument in safe conditions, if possible with not in pressure pipe or at least reduced pressure pipe. The extraction operations can be dangerous as well as for the risk connected to the ejection forces of the probe, also due to the possible leakage of liquid from the piping caused by incorrect operation or defect in the shut-off valve.

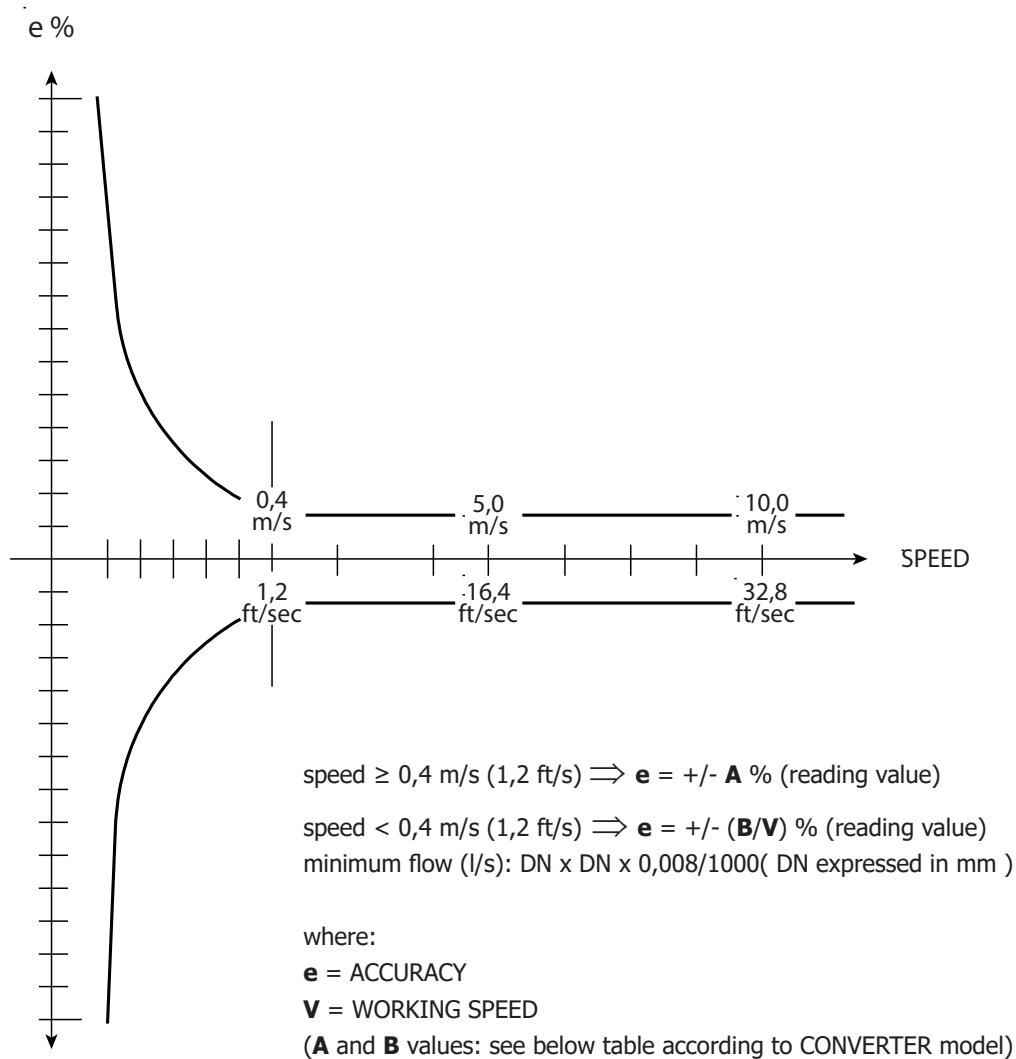
The following are the indicative values of expulsion force at different pressure values:

Internal pressure pipe [bar]	Expulsion force [kg]
6	30
10	50
16	80
25	125



Insertion depth	Maximum fluid velocity
L	V
m	ms-1
0.10	10.0
0.20	10.0
0.30	10.0
0.40	10.0
0.50	7.06
0.60	4.91
0.70	3.60
0.80	2.76
0.90	2.18
1.00	1.77
1.10	1.46
1.20	1.23
1.30	1.04
1.40	0.90
1.50	0.78
1.60	0.69

ACCURACY TABLE



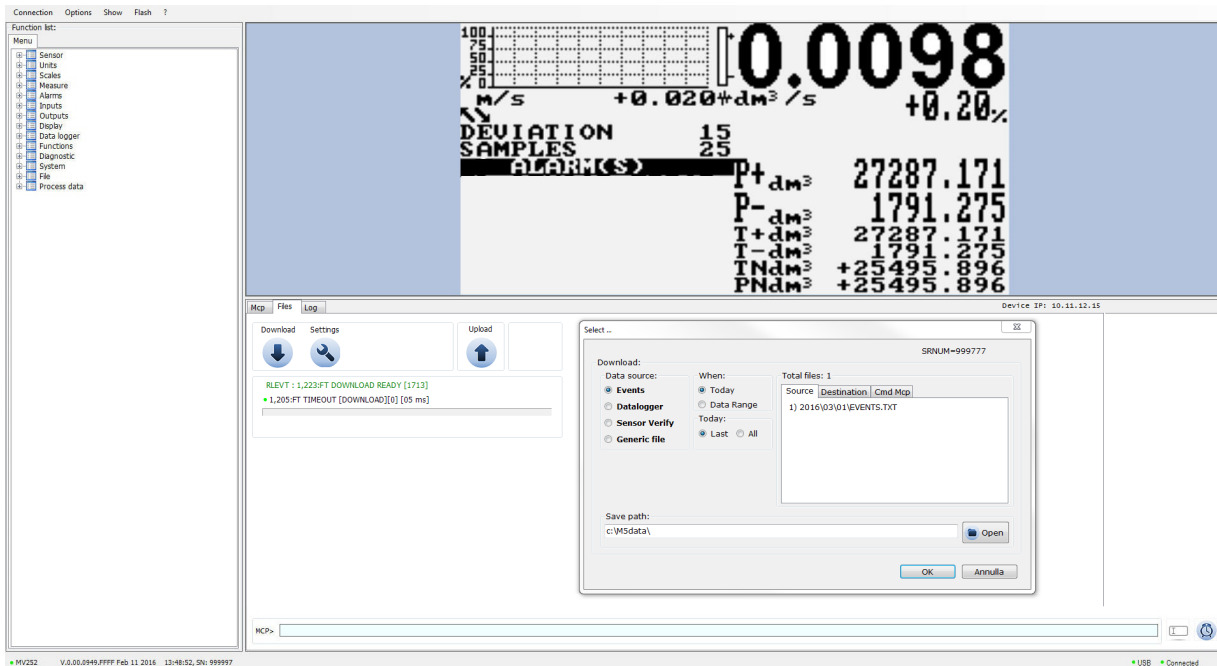
A	B (speed m/s)	B (speed ft/s)
2	0,8	0,24

Reference conditions:

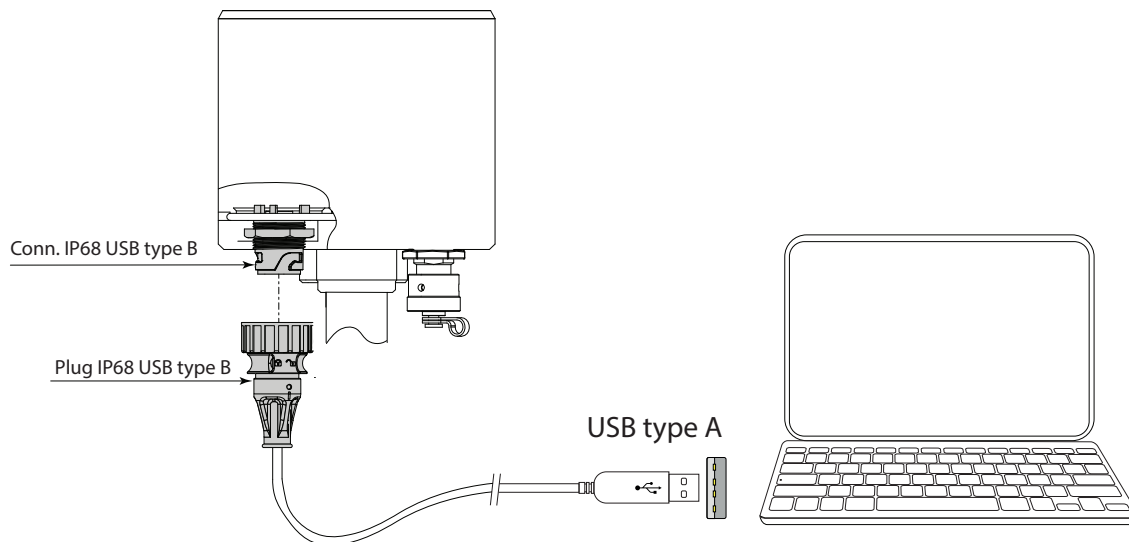
- Constant flow rate during the test
- Pressure: > 30 kPa
- Flow condition : fully developed flow profile
- Zero stability +/- 0,005 %
- ID accuracy: mean value better than 1%, IDmin/IDmax>0,98

USER INTERFACE

CS3820 can be programmed by MCP interface (USB cable is required see below)



Make the USB connection as shown in the following figure.



FUNCTIONS MENU

SENSOR

MAIN MENU			
1	Sensor		
2	Units		
3	Scales		
4	Sensor		
5	S.model	0	1.1 Sensors model: Enter the first two characters of the serial number of the sensor
6	Lining	UNSPEC.	1.2 Flow sensor lining material type
7	S.type	FULLBORE	1.3 Type of sensor: fullbore or insertion
8	U.type	METRIC	1.4 Type of measure units for sensor parameter: metric or imperial
9	Diam.	00700	1.5 Sensor's nominal/real diameter DN (0-2500)
10	KA	+00.9637	1.6 Sensor coefficient KZ (zero point)
11	KA-	-44904	1.7 Calibration data of sensor for negative flow
12	KZ	-18852	1.8 Sensor coefficient KZ (zero point)
13	KD	+00.4014	1.9 Sensor coefficient KD
14	Ins.position	0	1.10 Insertion position
15	HP dynamic	OFF	1.11 KP dynamic, coefficient for insertion
16	Ki	10000	1.12 Sensor coefficient Ki
17	Kp	10000	1.13 Sensor coefficient Kp
18	KC	100000	1.14 Sensor coefficient KC
19	C.Curr.	mA025.0	1.15 Sensor excitation current
20	C.Reg. PB	ms03	1.16 Current regulator proportional band
21	C.Reg.DH	stp 005	1.17 Current regulator derivation constant
22	C.R.time	ms03	1.18 Measure sampling frequency
23	E.P.Detect	ON	1.19 Enables the empty pipe detection feature
24	Z max	Hohm 0500	1.20 Empty pipe detection threshold
25	S.err.delay	10	1.21 Signal error delay (n. sample)
26	Sens.verify	OFF	1.22 Automatic sensor verify enable
27	KL	00. +000000	1.23 Linearization coefficient
28	Zero point cal.		1.24 Pipe hydraulic zero calibration

UNITS

MAIN MENU			
1	Sensor		
2	Units		
3	Scales		
4	Units		
5	Diam.	mm	2.1 Nominal diameter measure unit
6	S.cable	m	2.2 Cable length on separate version
7	FR.unit	METRIC	2.3 Flow rate type measure unit: metric or imperial
8	Pls1 u.	METRIC	2.4 Pulse 1 type measure unit: metric or not metric
9	Pls2 u.	METRIC	2.5 Pulse 2 type measure unit: metric or not metric
10	T+ unit	METRIC	2.6 Total direct totalizer measure unit type: metric or imperial
11	T+ unit	(m3)	2.7 Total direct totalizer measure unit
12	T+ D.P.	4	2.8 Total direct totalizer decimal point position
13	P+ unit	METRIC	2.9 Partial direct totalizer measure unit type: metric or not metric
14	P+ unit	(m3)	2.10 Partial direct totalizer measure unit
15	P+ D.P.	4	2.11 Partial direct totalizer decimal point position
16	T- unit	METRIC	2.12 Total reverse totalizer measure unit type: metric or not metric
17	T- unit	(m3)	2.13 Total reverse totalizer measure unit
18	T- D.P.	4	2.14 Total reverse totalizer decimal point position
19	P- unit	METRIC	2.15 Partial reverse totalizer measure unit type: metric or not metric
20	P- unit	(m3)	2.16 Partial reverse totalizer measure unit
21	P- D.P.	4	2.17 Partial reverse totalizer decimal point position
22	Temp.unit	°C	2.18 Temperature measure
23	Mass units	ON	2.19 Enable/disable the selection of mass units on full scale set
24	Sg	(kg/dm3)	2.20 Specific gravity coefficient

SCALES

MAIN MENU	
1-Sensor	
2-Units	
3-Scales	
4-Measure	
5-Inputs	
6-Outputs	
7-Communication	
8-Factory reset	
9-About	
10-Exit	
11-Back	
12-Forward	
13-End	

SCALES

FS1	dm3/s	5.00
Pls1	dm3	0.15
Tpls1		(ms)
Pls2	dm3	0.15
Tpls2		15'(ms)

3.1	Full scale flow rate 1
3.2	Full scale flow rate 2
3.3	Duration of the pulse generated on channel 1
3.4	Pulse value on channel 2
3.5	Duration of the pulse generated on channel 2

MEASURE

MAIN MENU	
1-Sensor	
2-Units	
3-Scales	
4-Measure	
5-Inputs	
6-Outputs	
7-Communication	
8-Factory reset	
9-About	
10-Exit	
11-Back	
12-Forward	
13-End	

MEASURE

Filt.bypass	ON
Cut-off	00.0(%)
Cal.verify	ON
H.imm.inp.	ON

4.1	Measure filter bypass
4.2	Measure cut-off threshold
4.3	Automatic calibration verify
4.4	High immunity inputs

ALARMS

MAIN MENU	
1-Sensor	
2-Units	
3-Scales	
4-Measure	
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12-Forward	
13-End	

ALARMS

Max+	dm3/s	OFF
Max-	dm3/s	OFF
Min+	dm3/s	OFF
Min-	dm3/s	OFF
Qhyst		XXXXXX

5.1	Max.pos.flow r. alarm threshold MAX+
5.2	Max.neg.flow r. alarm threshold MAX-
5.3	Min.pos.flow r. alarm threshold MIN+
5.4	Min.neg.flow r. alarm threshold MIN-
5.5	Hysteresis on f.rate alarm threshold

INPUTS

MAIN MENU	
1-Sensor	
2-Units	
3-Scales	
4-Measure	
5-Inputs	
6-Outputs	
7-Communication	
8-Factory reset	
9-About	
10-Exit	
11-Back	
12-Forward	
13-End	

INPUTS

T+ reset	OFF
P+ reset	OFF
T- reset	OFF
P- reset	OFF
Count lock	OFF
Meas.lock	OFF
Calibration	OFF
Sys.v.detect	ON
D.In2	SYS.VIOL.
D.In3	OFF
D.in p.sup	ON

6.1	Total direct (positive) flow totalizer reset enable
6.2	Partial direct (positive) flow totalizer reset enable
6.3	Total reverse (negative) flow totalizer reset enable
6.4	Partial reverse (negative) flow totalizer reset enable
6.5	Totalizer counting lock command
6.6	Measure zero lock command
6.7	Calibration external command
6.8	System violation detect
6.9	Digital input 2 function
6.10	Digital input 3 function
6.11	Digital auxiliary input power supply.

OUTPUTS

OUTPUTS		
Out1	F.R. SIGN	7.1 Output 1 function selection
Out1 inv.	ON	7.2 Output 1 inverted status
Out1 pls.	ON	7.3 Output 1 pulsed status
Out2	AIN1 MH/MN	7.4 Output 2 function selection
Out2 inv.	ON	7.5 Output 2 inverted status
Out2 pls.	ON	7.6 Output 2 pulsed status

MAINT
1-Inputs
2-Outputs
3-Communication
4-Display
5-Data logger
6-Functions
7-Diagnostic
8-System

MENU 8 - COMMUNICATION

For further information on the commands in menu 8 "communication" that are enabled if MODbus is enabled., consult the CS3820 manual dedicated to the communication protocol.

DISPLAY

DISPLAY		
Language	EN	9.1 Language for all messages
Disp.time	s	9.2 Keyboard timeout time
Part.tot.	ON	9.3 Partial totalizers enable
Neg.tot.	ON	9.4 Negative totalizers enable
Net tot.	ON	9.5 Net totalizers enable
Disp.date	ON	9.6 Time and date display enable
Quick start	OFF	9.7 Quick start menu enable

MAINT
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DATA LOGGER

DATA LOGGER		
D.logger en.	ON	10.1 Data logger enabling
Meas.units	ON	10.2 Measure unit recording enable
Field separ.	;	10.3 Field separator character
Decim.separ.	.	10.4 Decimal separator character
Interv.	0:01:00	10.5 Sampling interval
Log T+	OFF	10.6 Totalizer Total Positive Enable T+
Log P+	OFF	10.7 Totalizer Partial Positive Enable P+
Log T-	OFF	10.8 Totalizer Total Negative Enable T-
Log P-	OFF	10.9 Totalizer Partial Net Enable P-
Log TN	OFF	10.10 Totalizer Total Net Enable
Log PN	OFF	10.11 Totalizer Partial Net Enable
Log Q(UM)	OFF	10.12 Flow rate in Technical Units Enable
Log Q(%)	OFF	10.13 Flow rate in Percentage Enable
Log AL.EV	OFF	10.14 Alarm Events Enable
Log STR	OFF	10.15 Sensor Test Results Enable
Log BTS	OFF	10.16 Board TemperatureS Enable
Log IBV	OFF	10.17 Internal Board Voltages
Log EDC	OFF	10.18 Electrodes DC Voltages Enable
Log EAC	OFF	10.19 Electrodes AC voltages Enable
Log EIZ	OFF	10.20 Electrodes Source Impedance Enable
Log SCU	OFF	10.21 Sensor Coils Values Enable

MAINT
1-Inputs
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FUNCTION

FUNCTION			
T+ reset	ON	11.1	Vector fluid vol. part. reset function
P+ reset	ON	11.2	Hot water vol. partial reset function
T- reset	;	11.3	Cold water vol. partial reset function
P- reset	.	11.4	Aux input partial reset function
Load Sens.F.def	0:01:00	11.5	Heating energy partial reset function
Load Conv.F.def	OFF	11.6	Cooling energy Partial reset function
Save Sens.F.def	OFF	11.7	Vector fluid vol. total reset function
Save Conv.F.def	OFF	11.8	Hot water vol. total reset function
Calibration	OFF	11.9	Cold water vol. total reset function

MAIN
1-Menu
2-Parameters
3-Outputs
4-Inputs
5-Outputs
6-Inputs
7-Outputs
8-Inputs
9-Display
10-Data logger
11-Functions
12-Diagnostic
13-System

DIAGNOSTIC

DIAGNOSTIC			
Self test		12.1	Auto test Immediate Command
Display test		12.2	Execute bit pattern test display
Sens.verify		12.3	Sensor Verify Command
Flow sim.	OFF	12.4	Measure Simulation Enable
Diag.sys.val.		12.5	Diagnostic system values
Display measures		12.6	Diagnostic Measure VaLues
Disp.comm.vars		12.7	Diagnostic Communication VaLues
Display graphs		12.8	Display measures as graphs
SD card info		12.9	SD memory Status
Firmware info	0	12.10	Model and Software Version
S/N	000:00:00:00	12.11	Serial Number
WT	0	12.12	Total Working Time
TC		12.13	Total Measure Cycles

MAIN
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7-Outputs
8-Inputs
9-Display
10-Data logger
11-Functions
12-Diagnostic
13-System

SYSTEM

SYSTEM			
Dayl.saving	ON	13.1	Daylight Saving Time Enable
Time zone	+00.00	13.2	Time zone
Date/time	///00:00:00	13.3	Date and Time
L1 code	XXXXXXXX	13.4	Level 1 Access CoDe
L2 code	XXXXXXXX	13.5	Level 2 Access CoDe
L3 code	XXXXXXXX	13.6	Level 3 Access CoDe
L4 code	XXXXXXXX	13.7	Level 4 Access CoDe
L5 code	XXXXXXXX	13.8	Level 5 Access CoDe
L6 code	XXXXXXXX	13.9	Level 6 Access CoDe
Restr.access	OFF	13.10	ReStricted Access Rule Enable
Device IP addr	63015504	13.11	Device IP Address
Client IP addr	11012.012	13.12	Client IP Address
Network mask	255.255.254	13.13	Network MaSk
KT	0.97882	13.14	Coefficient KT
KS	100.000	13.15	Coefficient KS
KR	100.000	13.16	Coefficient KR
DAC1 4mA	2460	13.17	Current output 1 Calibration Point 1
DAC1 20mA	11050	13.18	Current output 1 Calibration Point 2
AIN1 SS	0	13.19	Analog input 1 Calibration Point 1
AIN1 FS	20000	13.20	Analog input 1 Calibration Point 2
AIN2 SS	0	13.21	Analog input 2 Calibration Point 1
AIN2 FS	20000	13.22	Analog input 2 Calibration Point 2
Stand-by		13.23	System StandbY
FW update		13.24	Firmware update

MAIN
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2-Parameters
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4-Inputs
5-Outputs
6-Inputs
7-Outputs
8-Inputs
9-Display
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HOW TO ORDER

CODE EXAMPLE		CODE/DESCRIPTION
Size and length of the insertion rod		
0	0	Size 0 - Length of the insertion rod: 510mm
	1	Size 1 - Length of the insertion rod: 660mm
	2	Size 2 - Length of the insertion rod: 860mm
	3	Size 3 - Length of the insertion rod: 1060mm
	4	Size 4 - Length of the insertion rod: 1360mm
	5	Size 5 - Length of the insertion rod: 2360mm
	9	Other - to be specified
Sensor and electrodes material / lining		
A	A	Sensor material AISI316, lining in PEEK, electrodes in Hastelloy C276, gasket in FPM/FKM
	Z	Sensor material: to be specified
Accessory for mounting in pressurised pipe line		
1	1	Mounting in pipe without pressure (through the use of the handles MAN01); connection 1" UNI338 (GAS)
	2	Accessory kit, suitable for mounting in pressurised line, composed by: 1" hose-coupling (to weld on the pipe) and 1" ball valve (Bronze material); all connections 1" UNI 338 (GAS)
	3	Mounting in pipe without pressure (installed using manual pressure); connection 1" NPT
	4	Accessory kit, suitable for mounting in pressurised line, composed by: 1" hose-coupling (to weld on the pipe) and 1" ball valve (Bronze material); all connections 1" NPT
	6	Accessory kit, suitable for mounting in pressurised line, composed by: 1" hose-coupling (to weld on the pipe) and 1" ball valve (Bronze material); connections 1" UNI 338 (GAS) + QUICK CONNECTIONS 1/8" for pressure sensor
	7	Accessory kit, suitable for mounting in pressurised line, composed by: 1" NPT hose-coupling + QUICK CONNECTIONS 1/8" for pressure sensor
	8	Accessory kit, suitable for mounting in pressurised line, composed by: 1" UNI 338 (GAS) hose-coupling + QUICK CONNECTIONS 1/8" for pressure sensor
	9	Special connection: to be specified
Version / Protection rate/ Max temperature/ Connectors		
A	G	Compact version / IP68 / Maximum liquid temperature 100 °C / MIL Connector male 6 poles alluminium
	H	Compact version / IP68 / Maximum liquid temperature 100 °C / Plastic connector male 6 poles souriau
	I	Compact version / IP68 / Maximum liquid temperature 100 °C / MIL Connector male 6 poles alluminium + MIL connector female not wired
	L	Compact version / IP68 / Maximum liquid temperature 100 °C / MIL Connector male 6 poles alluminium + MIL connector female with pre-wired cable 5 m
	M	Compact version / IP68 / Maximum liquid temperature 100 °C / Plastic connector male 6 poles souriau + connector female not wired
	N	Compact version / IP68 / Maximum liquid temperature 100 °C / Plastic connector male 6 poles souriau+ connector female with pre-wired cable 5 m

Converter/ Batteries/Outputs		
0	0	MV252 / n.2 batteries Li-SOCl ₂ / N.2 digital outputs
	1	MV252 / No batteries (ATTENTION - the IP68 protection may be compromised) / N.2 digital outputs
	2	MV252 / n.2 batteries Li-SOCl ₂ / N.1 digital output + MODbus RTU RS485
	3	MV252 / No batteries (ATTENTION - the IP68 protection may be compromised) / N.1 digital output + MODbus RTU RS485 port
Pipe Diameter		
A	A	> 150 mm
	B	< 150 mm
Accuracy		
1	1	Standard ($V > 0,4 \text{ m/s} = 2\%$; $V < 0,4 \text{ m/s} = 0,8/\text{Measured } V$) ; $V = \text{fluid velocity}$
	2	Special (To be defined)
Data Logger		
A	A	Without Data Logger
	B	MicroSD Memory 4 GB : Data Logger + RTC (Real Time Clock)
	C	MicroSD Memory 4 GB : Data Logger + RTC (Real Time Clock) + BIV (Built In Verificator)
	D	MicroSD Memory 4 GB : Data Logger + RTC (Real Time Clock) + Meter Data (Real Time Converter & Sensor Data on SD Memory)
	E	MicroSD Memory 4 GB : Data Logger + RTC (Real Time Clock) + BIV + Meter Data

Example of
complete code to
order

CS3820 - 0A1G0A1A

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