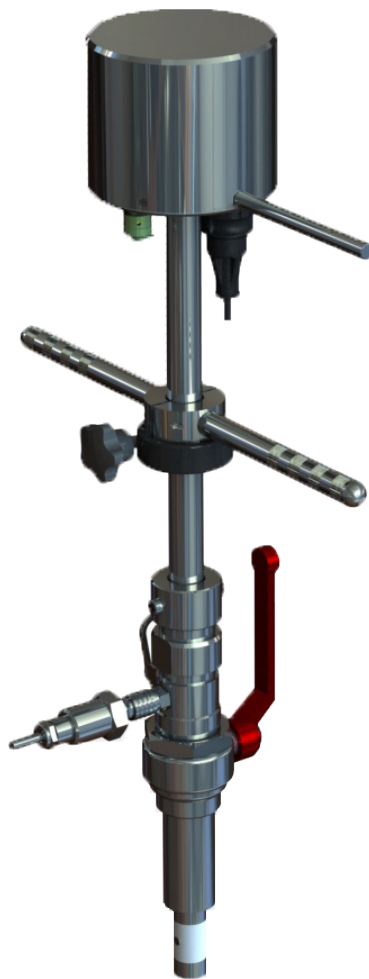


ISOMAG®

The friendly magmeter

DATA SHEET

CS3820



Certified to
NSF/ANSI/CAN 61



INDEX

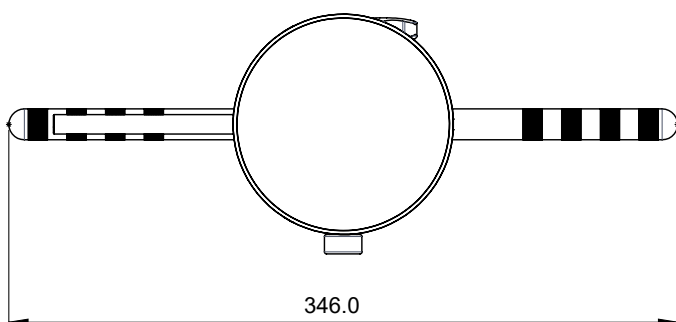
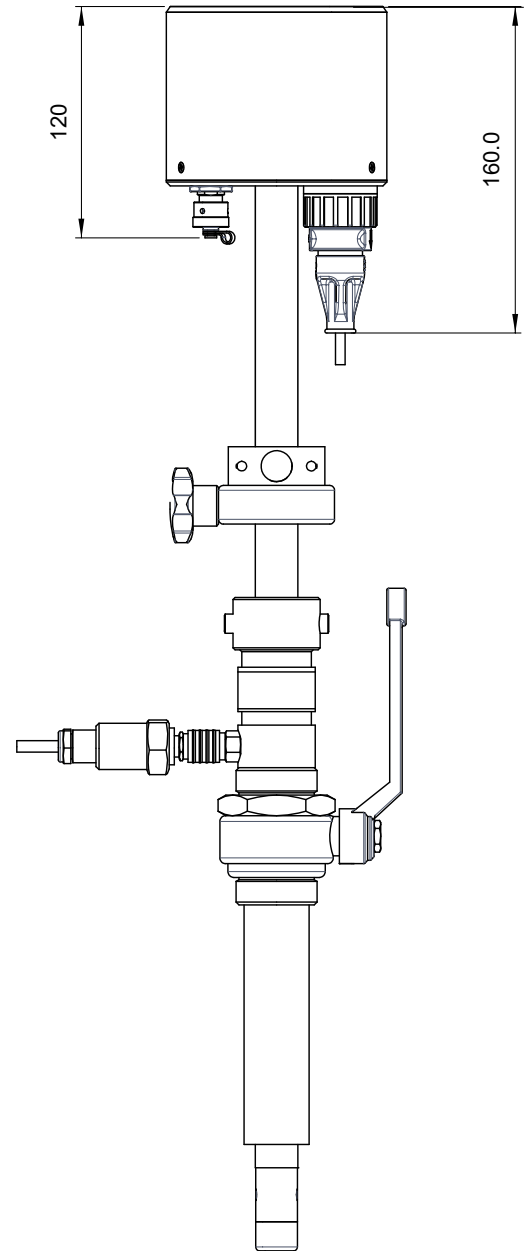
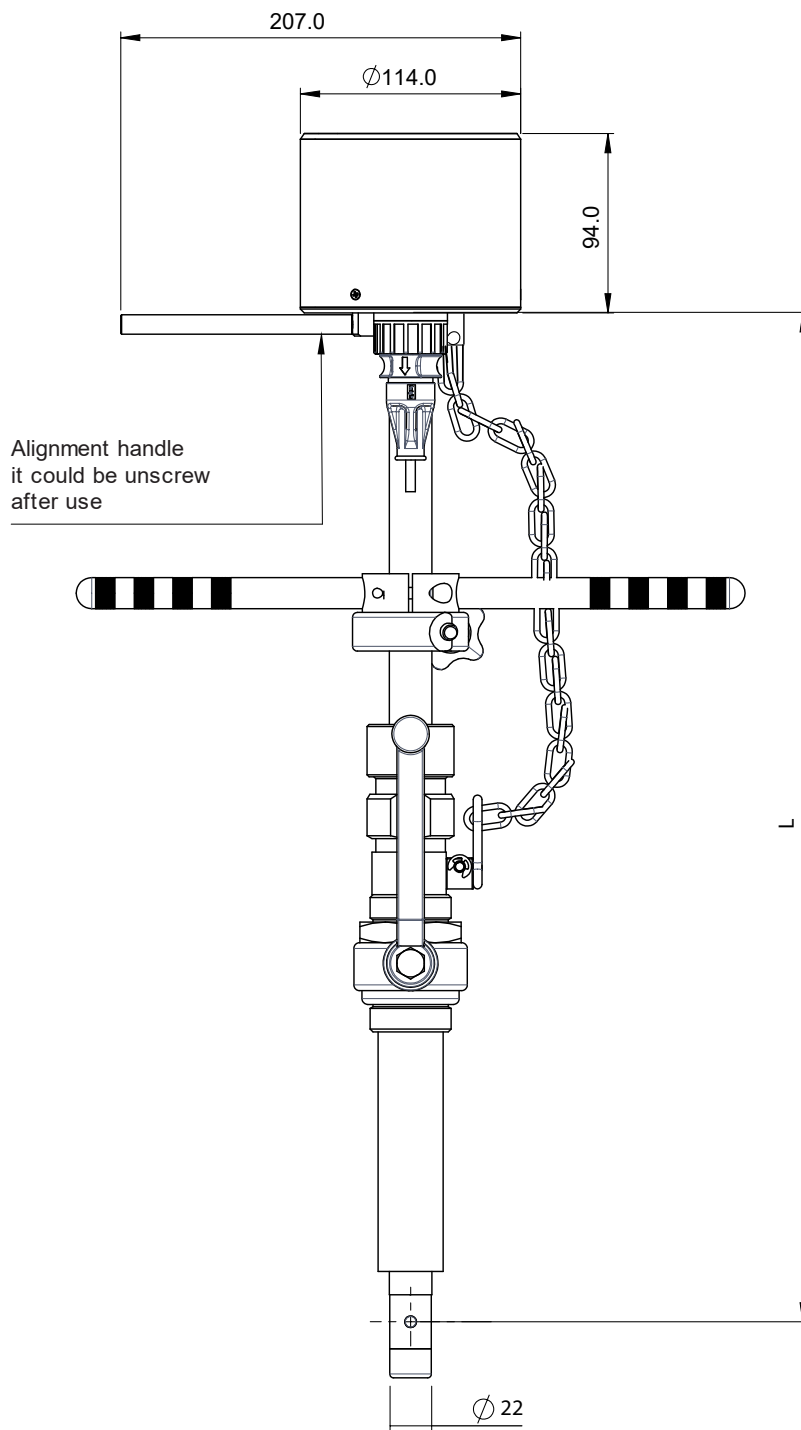
OVERALL DIMENSION	2
CS3820 LAYOUT	3
ELECTRICAL CONNECTIONS	4
MAXIMUM ALLOWED SPEED	5
USER INTERFACE	6
FUNCTIONS MENU	7
HOW TO ORDER	10

TECHNICAL DATA

OVERALL FEATURES			
Minimum Fluid Conductivity	<input type="checkbox"/> 20 µS/cm		
Ambient Temperature	<input type="checkbox"/> -20... +50°C / -14... +122 °F		
Liquid Temperature Range	<input type="checkbox"/> 0 °C to 100 °C		
Protection	<input type="checkbox"/> IP 68 (1 meter Depth)		
Pipeline Pressure Rating	<input type="checkbox"/> 2500 kPa		
Sensor Material	<input type="checkbox"/> Stainless Steel AISI 316		
Body/Electrodes Material	<input type="checkbox"/> PEEK + Electrodes in Hastelloy C276 / PEEK + Electrodes in AISI 316L		
Process Connection	<input type="checkbox"/> 1 Inch (25mm) BSP Threaded End		
Pressure tapping	<input type="checkbox"/> Female Quick-Release Connector		
Adjustment method	<input type="checkbox"/> 5mm Allen Key Fits All Screws		
Flow Determination	<input type="checkbox"/> Assumes Developed Profile (Determined Via Flow Profiling Software)		
Size For Pipe Line Ø	<input type="checkbox"/> 65 mm To > 2000 mm. Maximum Size Dependant On Position In Pipe (For Pipe Sizes ≤150mm Accuracy Can Be Improved By Special Calibration With The Specified Pipe Size).		
Measurement Range	<input type="checkbox"/> Bidirectional From 0.02m/s to 5m/sec (Maximum Could Be Lower Dependent Upon Insertion Length And Position In Pipe)		
Accuracy	<input type="checkbox"/> Point Velocity ≥0.4m/s; ±2% <input type="checkbox"/> Point Velocity <0.4m/s; ±0,8/V% (V = Measured Water Velocity)		
Response Time	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> liquid speed step variations > 0,25 m/s CONTINUOUS CYCLE: 300 ms SMART1: 3 s SMART2: 6 s SMART5: 15 s </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> liquid speed step variations ≤ 0.25 m/s CONTINUOUS CYCLE: 6 s SMART1: 60 s SMART2: 120 s SMART5: 300 s </td> </tr> </table>	<input type="checkbox"/> liquid speed step variations > 0,25 m/s CONTINUOUS CYCLE: 300 ms SMART1: 3 s SMART2: 6 s SMART5: 15 s	<input type="checkbox"/> liquid speed step variations ≤ 0.25 m/s CONTINUOUS CYCLE: 6 s SMART1: 60 s SMART2: 120 s SMART5: 300 s
<input type="checkbox"/> liquid speed step variations > 0,25 m/s CONTINUOUS CYCLE: 300 ms SMART1: 3 s SMART2: 6 s SMART5: 15 s	<input type="checkbox"/> liquid speed step variations ≤ 0.25 m/s CONTINUOUS CYCLE: 6 s SMART1: 60 s SMART2: 120 s SMART5: 300 s		
Power Supply	<input type="checkbox"/> N°2 Lithium Batteries Size D Not Rechargeable		
Battery life	<input type="checkbox"/> CONTINUOUS CYCLE: 7.8 months SMART1 : 4.8 years SMART2 : 8.3 years SMART5 : 11.8 years <input type="checkbox"/> Power consumption in case of EMPTY PIPE (the device shuts down the coil drive circuits) CONTINUOUS CYCLE : 4.5 years SMART CYCLES (ALL) : ≤ 16 years		
Safety	<input type="checkbox"/> Probe Fitted With Safety/Anti-Bounce Chain		
Gasket Material	<input type="checkbox"/> FPM (O-Ring)		
Altitude	<input type="checkbox"/> -200 m Up To 4000 m		
Data Storage	<input type="checkbox"/> EEprom		
Programming Plug In	<input type="checkbox"/> Protected Plug In For Connection To PC - USB Type A/USB Mini-B		
Communications/Protocols	<input type="checkbox"/> MCP protocol Via USB Interface		
Diagnostic Functions	<input type="checkbox"/> Yes		
Pulses/Alarm Outputs	<input type="checkbox"/> N°2 On/Off Outputs; Pulses Proportional To Velocity/Flow-Rate (Max. Frequency 100 Hz), flow rate alarms		
Data Logger	<input type="checkbox"/> SD-HC card (4 GB) for flow rate/volume/alarms (optional)		

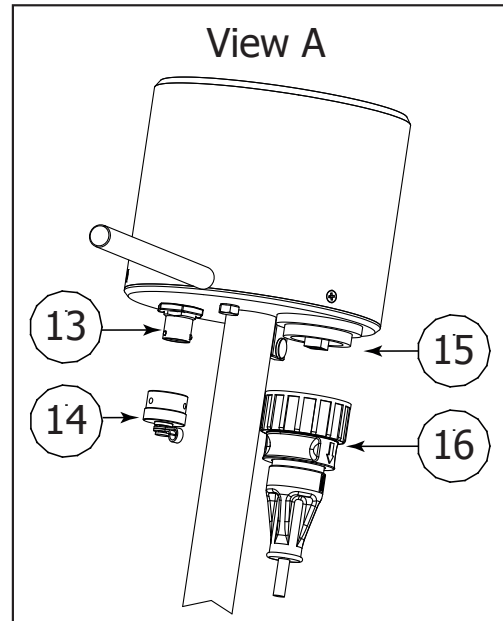
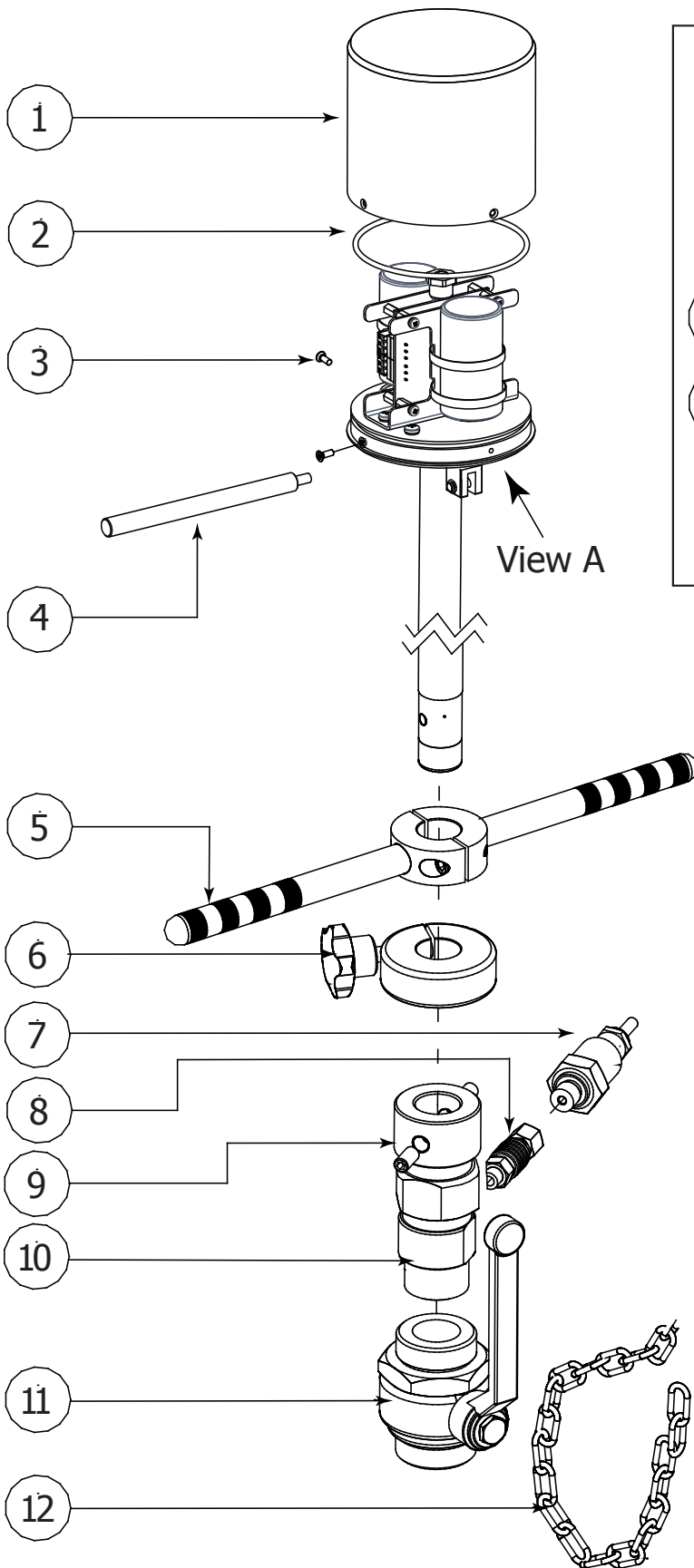
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OVERALL DIMENSION



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

CS3820 LAYOUT

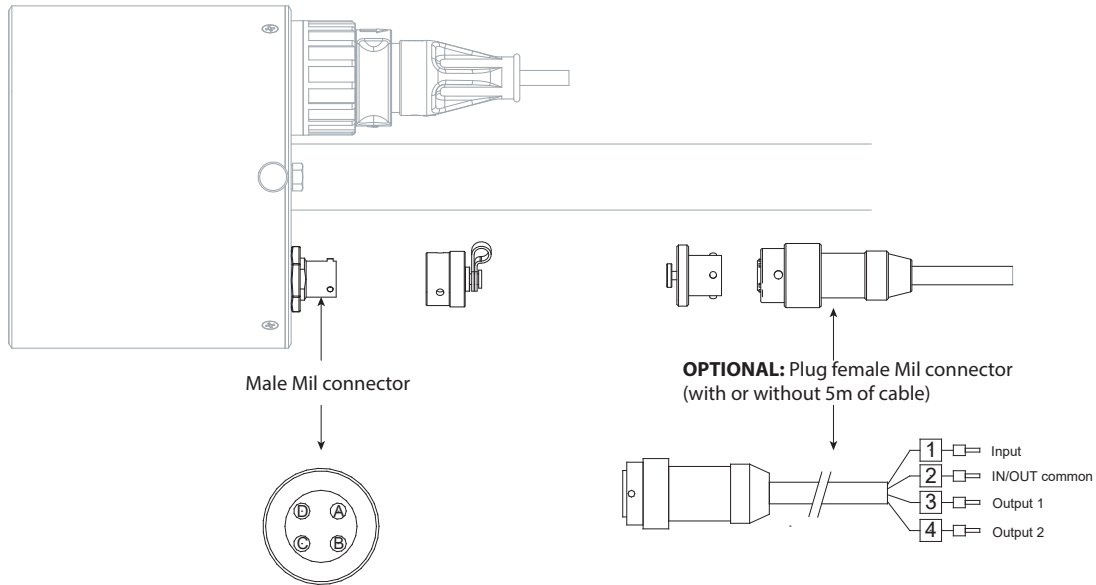


POS.	DESCRIPTION
1	POLISHED COVER
2	ORING 3500
3	STAINLESS SCREW M3x8
4	ALIGNMENT HANDLE
5	PUSH HANDLE
6	FIXING KNOB
7	PRESSURE SENSOR
8	QUICK CONN.
9	GRUB SCREW M10X12
10	1" JACKET
11	1" VALVE
12	SAFETY CHAIN
13	CONN. 62GB-57A-08-04PN (METAL)
14	CAP 62GB-814-08 (METAL)
13	CONN. UTS7-8E4P (PLASTIC UL94-V0)
14	CAP. UTS8DCGR (PLASTIC UL94-V0)
15	CONN. PAN USB CONNECTOR PX0843-B
16	USB CONNECTOR IP68 PX0840_B_3M00

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ELECTRICAL CONNECTIONS

Input / output



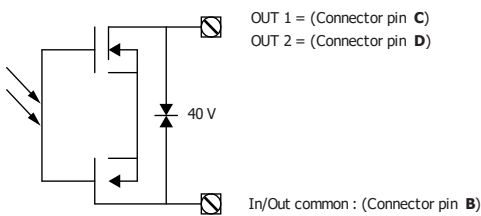
Technical characteristics input/outputs

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

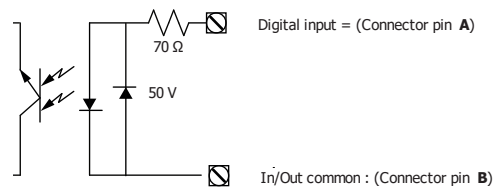
Electrical connections to the connector

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

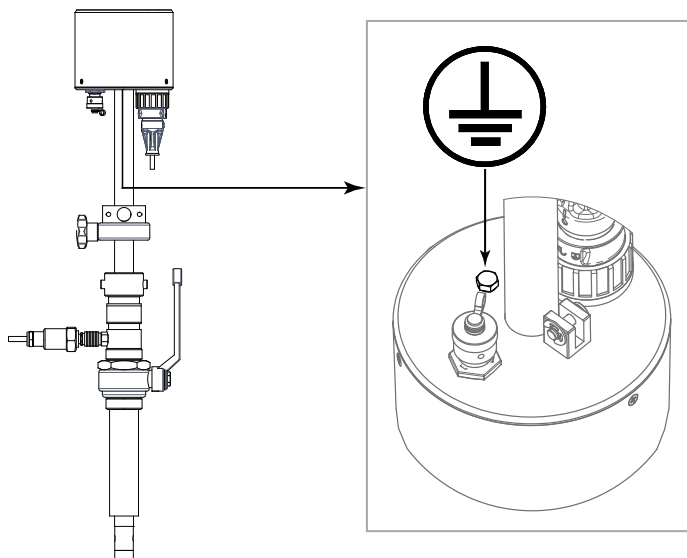
Outputs wiring diagram



Input wiring diagram



GROUNDING CONNECTION



MAXIMUM ALLOWED SPEED

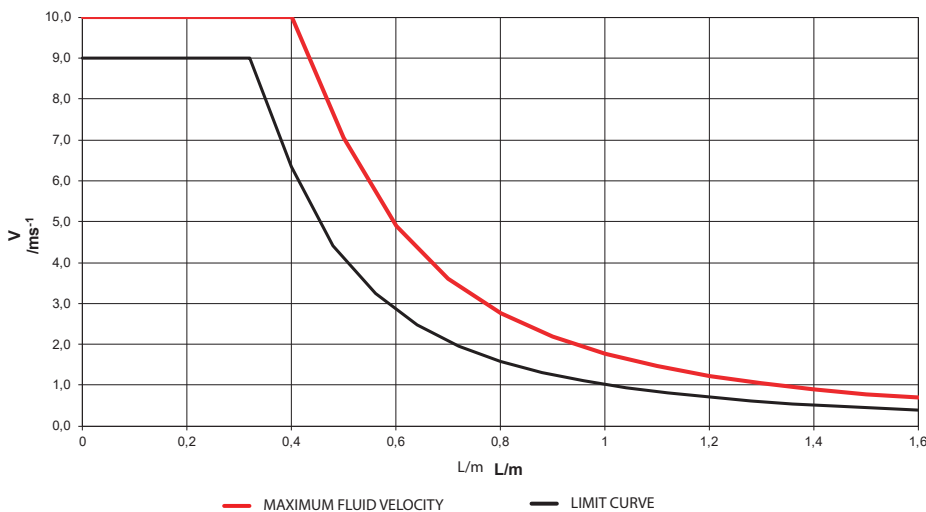
WARNING! The insertion and extraction operations of the insertion instruments are operations that can be dangerous when working with the pressure tube.

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

MAXIMUM ALLOWED SPEED

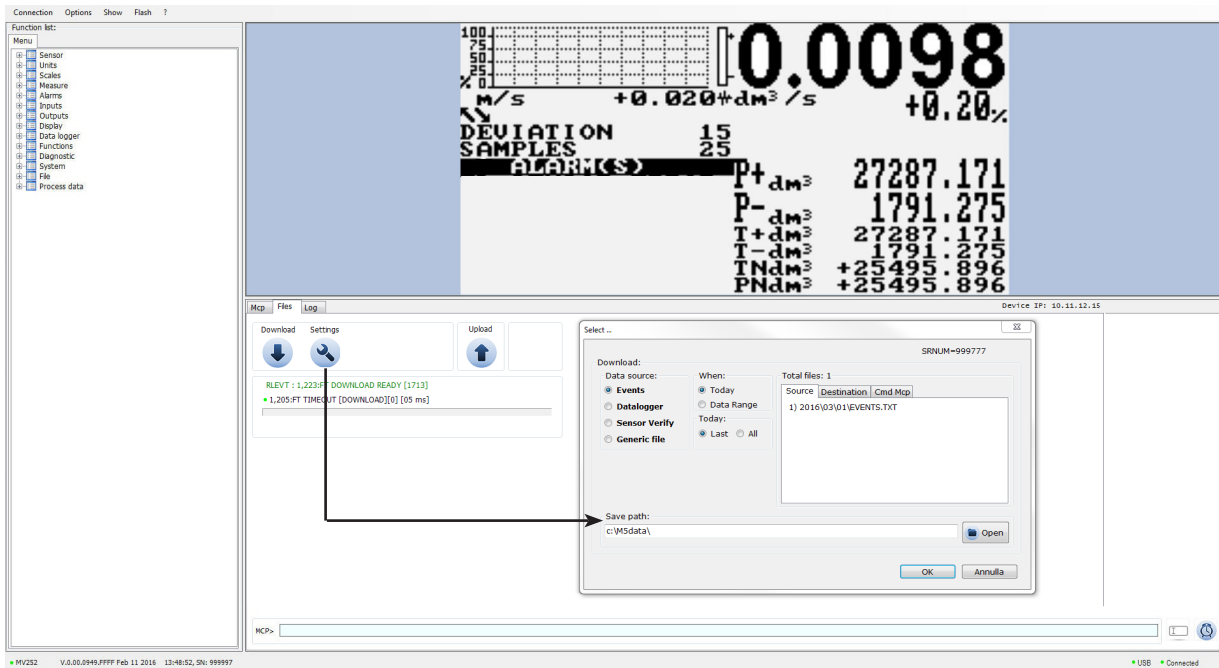


Insertion depth	Maximum fluid velocity
L	V
m	ms-1
0.10	10.0
0.20	10.0
0.30	10.0
0.40	10.0
0.50	7.06
0.60	4.91
0.70	3.60
0.80	2.76
0.90	2.18
1.00	1.77
1.10	1.46
1.20	1.23
1.30	1.04
1.40	0.90
1.50	0.78
1.60	0.69

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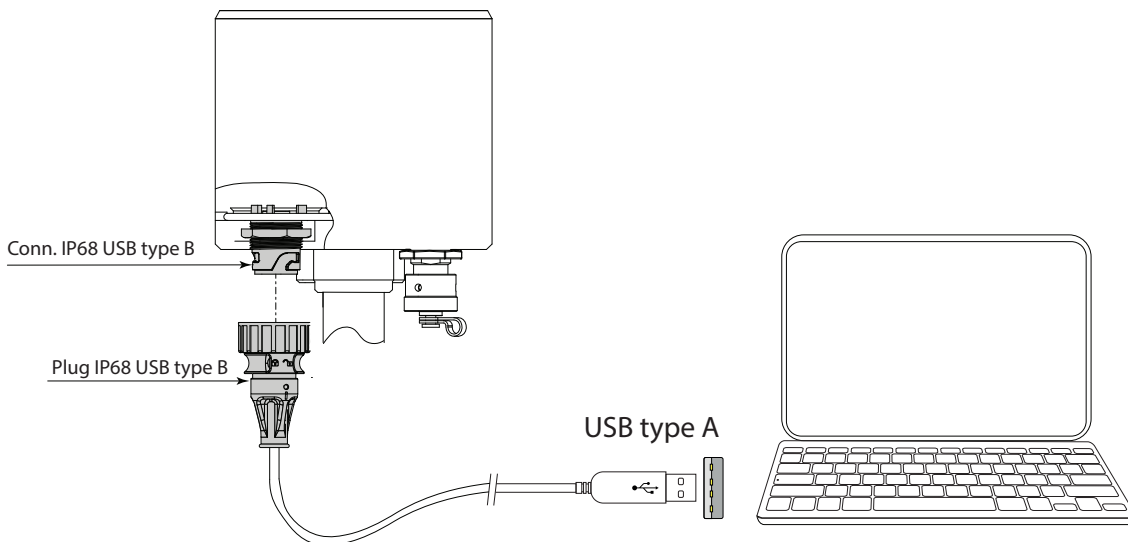
USER INTERFACE

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



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Make the USB connection as shown in the following figure.



FUNCTIONS MENU

SENSOR

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-Diagnostic
6-System
7-Factory
8-Factory
9-Factory
10-Factory
11-Factory
12-Factory
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98-Factory
99-Factory
100-Factory

SENSOR
S.model= 004
Lining= UNSPEC.
S.type= FULL BORE
U.type= METRIC
Diam.=mm 700
KA= +04.4914
KA-= -04.4904
KZ= +0018852
KD= +0000852
Ins.position= 0
KP dynamic= OFF
Ki= +01.0000
Kp= +01.0000
KC= 1.00000
C.Curr.=mA 025.0
S.time 000
Reg.C.T 000
C.R.time 000
E.P.Detect= ON
Z max=kohm 0500
S.err.delay= 010
Sens.verify= OFF
KL= 00.000000000
Zero point cal.
    
```

- 1.1 Sensors model: Enter the first two characters of the serial number of the probe
- 1.2 Flow sensor lining material type
- 1.3 Type of sensor: fullbore or insertion
- 1.4 Type of measure units for sensor parameter: metric or imperial
- 1.5 Insert ND of sensor (0-2500)
- 1.6 Calibration data of sensor visualized on sensor's label
- 1.7 Calibration data of sensor for negative flow
- 1.8 Sensor coefficient KZ (zero point)
- 1.9 Insertion position
- 1.10 KP dynamic, coefficient for insertion
- 1.11 Sensor coefficient Ki factory parameters
- 1.12 Sensor coefficient Kp factory parameters
- 1.13 Sensor coefficient KC factory parameters
- 1.14 Sensor excitation current
- 1.15 Measure sampling time
- 1.16 Current regulator charge time
- 1.17 Coils current rise time
- 1.18 Enables the empty pipe detection feature
- 1.19 Maximum input impedance thresh.
- 1.20 Signal error delay (n. sample)
- 1.21 Automatic sensor verify
- 1.22 Automatic sensor verify
- 1.23 Linearization coefficient
- 1.24 Enable zero calibration

UNITS

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-Diagnostic
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97-Factory
98-Factory
99-Factory
100-Factory

UNITS
Diam.= MM
S.cable= M
FR.unit= METRIC
Pl1 unit= METRIC
Pl2 unit= METRIC
T+ unit= METRIC
T+ unit= g
T+ D.P.= 3
P+ unit= METRIC
P+ unit= g
P+ D.P.= 3
T- unit= METRIC
T- unit= g
T- D.P.= 3
P- unit= METRIC
P- unit= g
P- D.P.= 3
Temp.unit= °C
Mass units= ON
Sg=kg/dm³ 1.0000
    
```

- 2.1 Nominal diameter measure unit
- 2.2 Cable length on separate version
- 2.3 Flowrate type measure unit: metric or not metric
- 2.4 Pulse1 Flowrate type measure unit: metric or not metric
- 2.5 Pulse2 Flowrate type measure unit: metric or not metric
- 2.6 Total direct totalizer measure unit type: metric or not metric
- 2.7 Total direct totalizer measure unit
- 2.8 Total direct totalizer decimal point position
- 2.9 Partial direct totalizer measure unit type: metric or not metric
- 2.10 Partial direct totalizer measure unit
- 2.11 Partial direct totalizer decimal point position
- 2.12 Total reverse totalizer measure unit type: metric or not metric
- 2.13 Total reverse totalizer measure unit
- 2.14 Total reverse totalizer decimal point position
- 2.15 Partial reverse totalizer measure unit type: metric or not metric
- 2.16 Partial reverse totalizer measure unit
- 2.17 Partial reverse totalizer decimal point position
- 2.18 Temperature measure unit
- 2.19 Mass unit enabling
- 2.20 Specific gravity coefficient

SCALES

```

MAIN MENU
1-Sensor
2-Units
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4-Measure
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98-Factory
99-Factory
100-Factory

SCALES
FSI= 1/s 3920.0
Pls1=dm³ 1.00000
Tpls1=ms 0000.4
Pls2=dm³ 1.00000
Tpls2=ms 0000.4
    
```

- 3.1 Full scale flow rate
- 3.2 Pulse value on channel 1
- 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-Diagnostic
6-System
7-Factory
8-Factory
9-Factory
10-Factory
11-Factory
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13-Factory
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92-Factory
93-Factory
94-Factory
95-Factory
96-Factory
97-Factory
98-Factory
99-Factory
100-Factory

MEASURE
MeProf= SMART1
Cut-off=% 00.0
LP Cycle sim.= OFF
Cal.verify= OFF
    
```

- 4.1 Consumption profiles: CONT. PWR - SMART1 - SMART2 - SMART5
- 4.2 Low flow zero threshold: 0-25% of full scale value
- 4.3 Low power Measure Cycle Simulation
- 4.4 Automatic calibration verify enable

ALARMS

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-ALARMS
6-Inputs
7-Outputs
8-Display
9-Data logger
10-Functions
11-Diagnostic
12-System
13-Exit

ALARMS
Max.thr+=% 000
Max.thr-=% 000
Min.thr+=% 000
Min.thr-=% 000
Hysteresis=% 03
    
```

- 5.1 Maximum value alarm set for direct flow rate
- 5.2 Maximum value alarm set for reverse flow rate
- 5.3 Minimum value alarm set for direct flow rate
- 5.4 Minimum value alarm set for reverse flow rate
- 5.5 Hysteresis threshold set for the minimum and maximum flow rate alarms

INPUTS

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-ALARMS
6-INPUTS
7-Outputs
8-Display
9-Data logger
10-Functions
11-Diagnostic
12-System
13-Exit

INPUTS
I+ reset= OFF
P+ reset= OFF
I- reset= OFF
P- reset= OFF
Count lock= OFF
Meas. lock= OFF
Calibration= OFF
    
```

- 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

OUTPUTS

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-ALARMS
6-INPUTS
7-OUTPUTS
8-Display
9-Data logger
10-Functions
11-Diagnostic
12-System
13-Exit

OUTPUTS
Out1= OFF
Out2= OFF
    
```

- 7.1 Output 1 functions
- 7.2 Output 2 functions

DISPLAY

```

MAIN MENU
1-Sensor
2-Units
3-Scales
4-Measure
5-ALARMS
6-INPUTS
7-Outputs
8-Display
9-Display
10-Data logger
11-Functions
12-Diagnostic
13-System

DISPLAY
Language= EN
Disp.time=s 060
Part.tot.= ON
Neg.tot.= ON
Net.tot.= ON
Disp.date= ON
Quick start= OFF
    
```

- 9.1 Choice of the language: E= English, I=italian, F= French, S= Spanish
- 9.2 Display/keyboard inactivity time
- 9.3 Partial totalizer enable
- 9.4 Negative totalizer enable
- 9.5 Net totalizer enable
- 9.6 Time and date display enable
- 9.7 Quick start menu enable

DATA LOGGER

```

DATA LOGGER
D_logger en.= ON
Meas.units= ON
Field separ.= :
Decim separ.= .
Interv.= 01:01:00
Log T+= ON
Log P+= ON
Log T-= ON
Log P-= ON
Log TN= ON
Log PN= ON
Log Q(UM)= ON
Log Q(%)= ON
Log AL.EU= ON
Log STR= ON
Log BTS= ON
Log IBU= ON
Log EDC= ON
Log EAC= ON
Log EIZ= ON
Log SCU= ON

10-Data logger
11-Functions
12-Diagnostic
13-System
    
```

- 10.1 Data logger enable
- 10.2 Measure unit recording enable
- 10.3 Field separator character
- 10.4 Decimal separator character
- 10.5 Sampling interval
- 10.6 Enable logging of total direct totalizer
- 10.7 Enable logging of partial direct totalizer
- 10.8 Enable logging of total reverse totalizer
- 10.9 Enable logging of partial reverse totalizer
- 10.10 Enable logging of total net totalizer
- 10.11 Enable logging of partial net totalizer
- 10.12 Enable logging of flow rate in measure unit
- 10.13 Enable logging of flow rate in percentage
- 10.14 Enable logging of alarm events
- 10.15 Enable logging of sensor test results
- 10.16 Enable logging of board temperature
- 10.17 Enable logging of internal board voltage
- 10.18 Enable logging of electrodes DC voltage
- 10.19 Enable logging of electrodes AC voltage
- 10.20 Enable logging of electrodes impedance
- 10.21 Enable logging of sensor coils value

FUNCTIONS

```

FUNCTIONS
T+ reset
P+ reset
T- reset
P- reset
Load Sens.f.def
Load Conv.f.def
Save Sens.f.def
Save Conv.f.def
Calibration

11-Functions
12-Diagnostic
13-System
    
```

- 11.1 Execute immediate reset of total direct totalizer
- 11.2 Execute immediate reset of partial direct totalizer
- 11.3 Execute immediate reset of total reverse totalizer
- 11.4 Execute immediate reset of partial reverse totalizer
- 11.5 Load sensor factory default
- 11.6 Load converter factory default
- 11.7 Save sensor factory default values
- 11.8 Save converter factory default values
- 11.9 Execute immediate internal circuit calibration

SCALE

```

DIAGNOSTIC
Self test
Sens.verify
Flow sim.= ON
Display measures
Disp.comm.vars
SD card info
Firmware info
S/N= 999001
WT=0002:21:00:22

12-Diagnostic
13-System
    
```

- 12.1 Self test diagnostic function
- 12.2 Sensor verify diagnostic function
- 12.3 Flow rate simulation enable
- 12.4 Display internal measured value
- 12.5 Display communication diagnostic values
- 12.6 Sd card status informations
- 12.7 Firmware version/revision
- 12.8 Board serial number
- 12.9 Total working time

SYSTEM

```

SYSTEM
Daylight saving= ON
Time zone=h+01.00
2016/04/04-16:07
L1 code=*****
L2 code=*****
L3 code=*****
L4 code=*****
L5 code=*****
L6 code=*****
Restr.access= ON
Tc 0.964
010.011.012.013
010.011.012.014
255.255.255.000
KT= 0.96469
KS= 1.00000
KR= 1.00000
Stand-by
FW update

13-System
    
```

- 13.1 Daylight saving time change
- 13.2 Localized time zone
- 13.3 System date and time
- 13.4 Access level 1 code
- 13.5 Access level 2 code
- 13.6 Access level 3 code
- 13.7 Access level 4 code
- 13.8 Access level 5 code
- 13.9 Access level 6 code
- 13.10 Restricted access level
- 13.11 Total Measure CYCles
- 13.12 Device IP network address
- 13.13 Client IP network address
- 13.14 Network mask
- 13.15 Calibration coefficient KT
- 13.16 Calibration coefficient KF
- 13.17 Calibration coefficient KR
- 13.18 Stand-by
- 13.19 Firmware update

HOW TO ORDER

CODE EXAMPLE	CODE/DESCRIPTION	
Suitable for piping diameter		
0	0	maximum insertion depth 150 mm
	1	maximum insertion depth 300 mm
	2	maximum insertion depth 500 mm
	3	maximum insertion depth 700 mm
	4	maximum insertion depth 1000 mm
	5	maximum insertion depth 2000 mm
	9	to be specified
Sensor and electrodes material / lining		
A	A	Sensor material AISI316, head in PEEK, electrodes in Hastelloy C276, gasket in FKM
	B	Sensor material AISI316, head in PEEK, electrodes in AISI316, gasket in FKM
	Z	Sensor material: to be specified
Accessory for mounting in pressurised pipe line		
1	1	Mounting in pipe without pressure (installed using manual pressure); 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
	5	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) + QUICK CONNECTIONS 1/8" for pressure sensor
	6	Accessory kit, suitable for mounting in pressurised line, composed by: 1" NPT hose-coupling + QUICK CONNECTIONS 1/8" for pressure sensor
	7	Accessory kit, suitable for mounting in pressurised line, composed by: 1" UNI 338 (GAS) hose-coupling + QUICK CONNECTIONS 1/8" for pressure sensor
	8	Special connection: to be specified
Version / Protection rate		
A	A	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES MALE CONNECTORS MIL ALUMINUM
	B	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES MALE CONNECTORS SOURIAU - PLASTIC
	C	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES CONNECTORS MIL ALUMINUM MALE + FEMALE
	D	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES CONNECTORS MIL ALUMINUM MALE + FEMALE WITH 5 METERS OF CABLE ALREADY CONNECTED
	E	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES CONNECTORS PLASTIC - SOURIAU MALE + FEMALE
	F	Compact version, IP68 protection rate, liquid maximum temperature 100 °C - 4 POLES CONNECTORS PLASTIC - SOURIAU MALE + FEMALE WITH N° 5 METERS OF CABLE ALREADY CONNECTED
Converter		
0	0	mod. MV252 (converter with: 2 Lithium battery, 2 digital out)
	1	mod. MV252 (converter WITHOUT BATTERIES, 2 digital out)

Suitable for Pipe Size		
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 = fluid velocity
	2	Special
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 - 0A1A0A1A

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<http://www.isoil.com/en>



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