CE

ML 200
Version 2.2X

The software version is visualised when
powering up the converter

ENGLISH

C:\UFFICIO TECNICO\MANUALI\ML200\ML200 INGLESE\

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INTRODUCTION

- This manual is integral part of the product. Read carefully the instructions contained in it since it contains important indications for the safety of use and of maintenance.
- The technical information and the relative products of this manual could undergo modifications without any previous notice.
- The flow meter must be used for the use it has been built for. The improper use, possible tampering of the instrument or parts of it and substitutions of any components not original, makes the warranty to decay automatically.
- The manufacturer is considered responsible only if the instrument in used in his original configuration.
- It's forbidden the reproduction of the present manual and of possible software supplied with the instrument.

SAFETY

LEGEND

Dangerous voltage, terminals identified by this symbol are subject to variable voltages that may exceed 60Vdc and cause electric shock: connecting terminal 12-13 pag. 21, 60Vdc max, 250 V max during coil's magnetic field commutation phase.

Dangerous voltage, may cause severe electric shock

General warning

Precautions

- Before using the instrument, always make a sure connection to ground (see examples on pag.22-23)

- Verify that the mains voltage is the same written on the tag plate of the converter

- Pay attention not to connect the power supply to the outputs or the other terminals of M1/M2

- When the electric connections are completed, close carefully the instruments rear cover

- Avoid to open the instrument's rear cover when the power is on.

- Avoid any attempt to repair the instrument. If the instrument is not functioning properly, please call the nearest assistance service.

GENERAL INFORMATION ON THE INSTALLATION

Flow direction

Before install the sensor locate the direction of the liquid in the piping

The sign of the flow rate is positive, when the flow direction it's (from – to +) as printed on the tag plate.
If after the installation, for plant request becomes necessary reverse the sign of the flow, it's enough reverse the sign of the coefficient KA
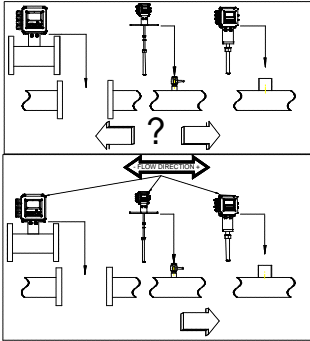
RECOMMENDATION FOR MS 500-1000-2400-2500-3700-3770
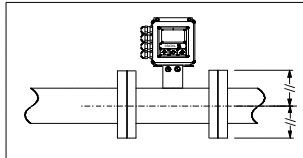
Before tighten the nuts make sure that the ending of the sensor are coaxial to those of the pipe
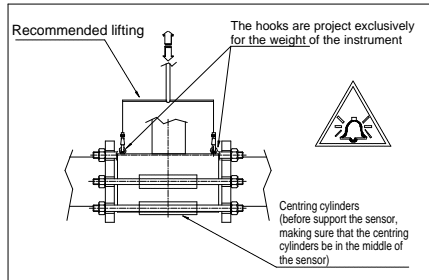
Method of upheaval recommended for all the sensors equipped from eyebolt.
For sensor MS 1000 we recommend the use of centring cylinders (available on request)

MS 500-1000-2400-2500
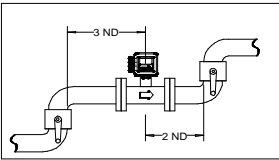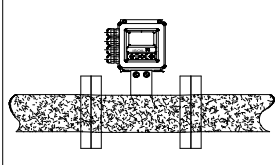
TO MAKE	TO AVOID
Install the sensor away from curves and hydraulic accessories	Avoid the installation near curves or hydraulic accessories.
During the functioning the pipe must be completely full of liquid, or completely empty	Avoid the functioning with the pipe partially empty.
For vertical installations is preferable an ascending flow	For vertical installations with descending flow direction contact the manufacturer
For installations on long pipe line, please use the anti vibration joints	Avoid the installation of the sensor in a long pipe line, without any support of the same.
Before tightening the nuts approach as more possible the flange of the piping to the flange of the sensor	Avoid the approach of the flange and counter flange using the closing force of the nuts.
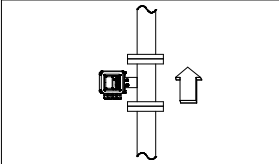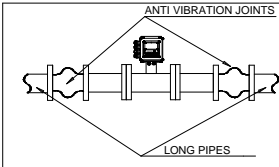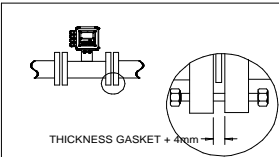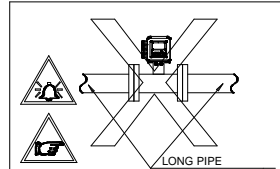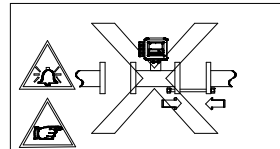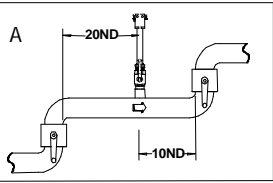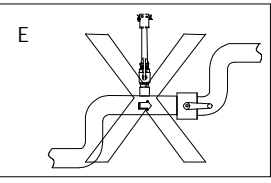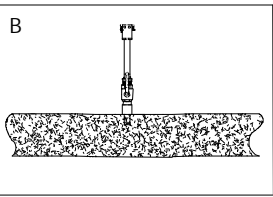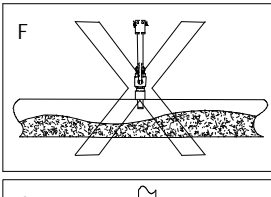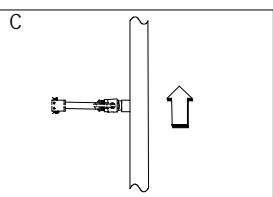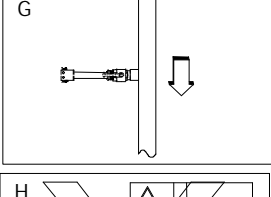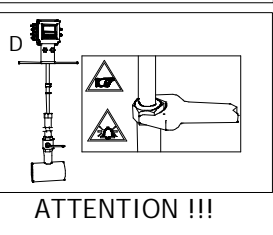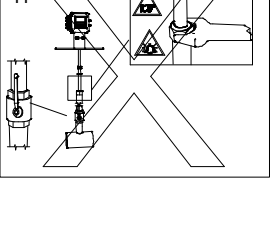
MS 3700-3770

A	TO MAKE	E	TO AVOID
20ND / **10ND**	Install the sensor away from curves and hydraulic accessories		Avoid the installation near curves or hydraulic accessories.
B	During the functioning the pipe must be completely full of liquid, or completely empty	F	Avoid the functioning with the pipe partially empty.
C	For vertical installations is preferable an ascending flow	G	For vertical installations with descending flow direction contact the manufacturer
D	Before opening the ball valve lock the centring bush with the grain in endowment	H	The opening of the ball valve before tighten the fixing nut could cause the expulsion of the sensor from the pipe line.
ATTENTION !!!			

The indications of the figures A-B-C-E-F-G are valid also for the insertion sensor MS 3770.
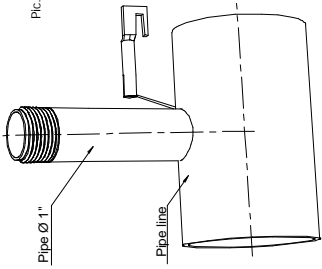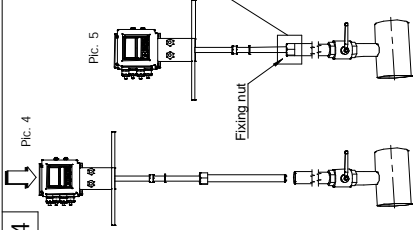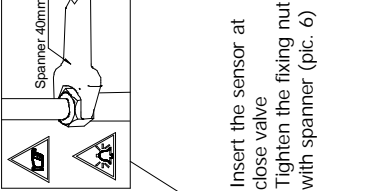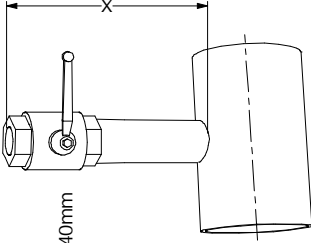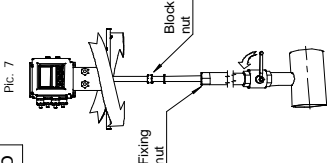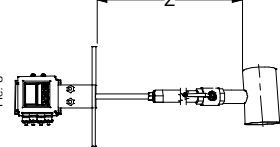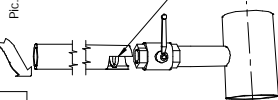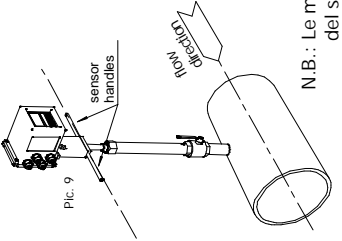
MS 3700 Sensor positioning

SIZE	ND RANGE	L
SIZE 1	from ND 80 up to ND 500	480
SIZE 2	from ND 80 up to ND 1000	621
SIZE 3	from ND 80 up to ND 2000	880

L

Z

1/8D

D

S

$$Z = L - S - 1/8D$$

METER
(IT'S SCREW WHEN THE THE FIXING
NUT Ø 1" IS FIXED ON THE JACKET)

O-RING SEAL
SENSOR

MAX 140mm

BLOCK NUT Ø 16 MA

FIXING NUT Ø 1"

JACKET   Ø 1"

VALVE 1"

WELDED
PIPE Ø 1"

MS 3700 Assemble Instructions

1

Pic. 1

Pipe Ø 1"

Pipe line

- Weld to the pipeline a pipe Ø 1".
ATTENTION: verify "X" dimension
(pic. 2).

2

Pic. 2

X

Xmax=140mm

Screw the valve Ø 1" to the welded pipe

3

Pic. 3

Inferior estremity of
the jacket
(O-Ring seal)

- Screw the 1" jacket to the valve
ATTENTION: the O-Ring in the
jacket must be place underside
(near valve)

4

Pic. 4

Pic. 5

Pic. 6

Spanner 40mm

Fixing nut

- Insert the sensor at
close valve
- Tighten the fixing nut
with spanner (pic. 6)

5

Pic. 7

Pic. 8

Pic. 9

Z

Block
nut

Fixing
nut

sensor
handles

flow
direction

- Open the valve
- Screw the sensor
up to "Z" dimension
- Verify the line up
(pic. 9)
- Tighten the block
nut manteining the
aligment

N.B.: Le maniglie di inserimento
del sensore sono removibili

MS 3770 Sensor positioning

Z=L-S-1/8D-32

SIZE	ND RANGE	L
SIZE 1	from ND 80 up to ND 500	176
SIZE 2	from ND 80 up to ND 1000	244
SIZE 3	from ND 80 up to ND 2000	462

Recommend dimensions of jacket
(in case the jacket it is not inclusive
in the supply)

2,0

2,5 (Minimum thickness)

Seal side

1" gas

20,0 Minimum height

1/8D

D

L

Seal with fixed nut

3,0

Z

FIXING NUT Ø 1"

SENSOR

GASKET

JACKET Ø 1"
(WELDED)

MS 3770 Assemble Instructions

Pic. 3

Sensor

Gasket

Jacket Ø 1"

Pipe line

- Introduce in the sensor the gasket

- Introduce the sensor in the Jacket Ø 1"

Pic. 5

Spanner 40mm

Flow direction

Pic. 4

Pic. 6

- Line up longitudinally the connector box with pipe line axle (pic.6).

- Tighten the nut with spanner (pic. 5) maintaining the alignment. The fixing of nut must assure the seal of the inside gasket

Pic. 1

Over-metal

Z

Z

Cut the jacket Ø 1" like in picture 1

ATTENTIONE: in relation to the Ø of the pipeline consider the necessary over-metal for welding

Pic. 2
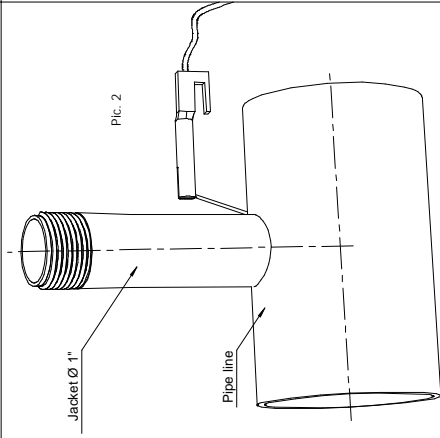
Jacket Ø 1"

Pipe line

weld the jacket to the pipe line

MS 500 OVERALL DIMENSIONS

PRE - AMPLIFIER

93,0
126,0
54,0

CONVERTER ML 190 ML 200

112,0
133,0
106,0
146,0

COVER FOR SEPARATE VERSION

100,0
30,0

170,0
80,0
L

76,0
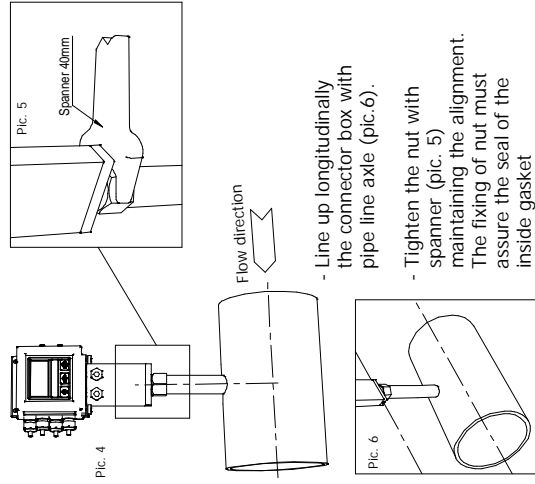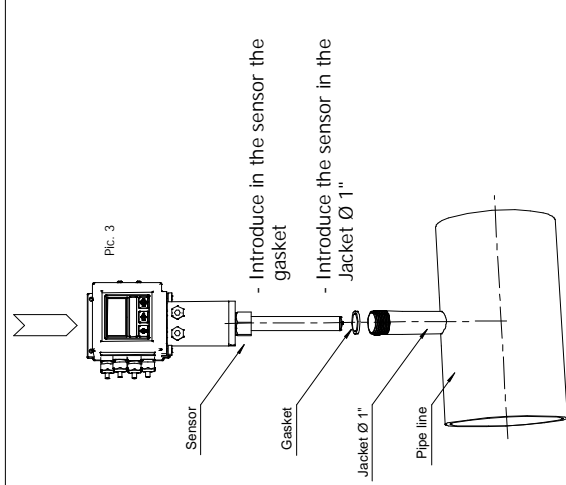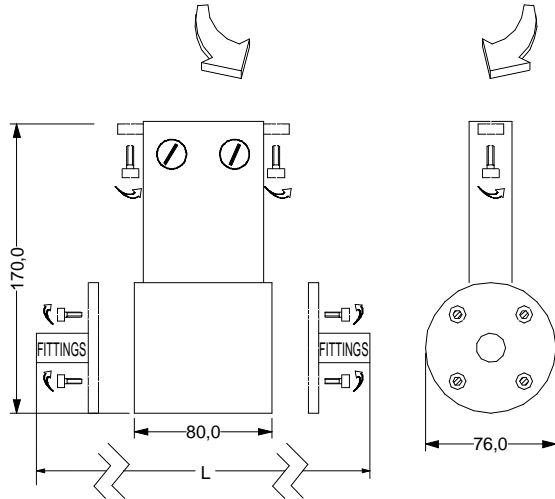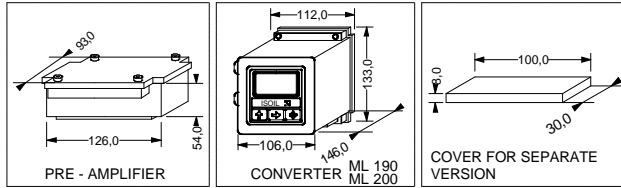
DN	3		6		10		15		20	
	L	FITTINGS	L	FITTINGS	L	FITTINGS	L	FITTINGS	L	FITTINGS
SMS	/	/	/	/	128	DN 25	128	DN 25	128	DN 25
DIN 11851	128	DN 10	128	DN 10	128	DN 10	128	DN 15	128	DN 20
TRICLAMP ISO 2852	128	I=12,7	128	I=12,7	128	I=12,7	128	I=17,2	128	I=21,3
Flanges ANSI 150	200	1/2"	200	1/2"	200	1/2"	200	1/2"	200	3/4"
Flanges UNI 2278 PN 16	200	DN 10	200	DN 10	200	DN 10	200	DN 15	200	DN 20
Gas - NPT stainless steel and P.P.	128	1\4"	128	3\8"	128	1\2"	128	3\4"	128	1"

N.B.: THE OVERALL DIMENSIONS CAN BE CHANGE WITHOUT NOTICE

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93,0
126,0
54,0

PRE - AMPLIFIER

112,0
133,0
106,0
146,0

CONVERTER ML 190 / ML 200

8,0
100,0
30,0

COVER FOR SEPARATE VERSION

G
100
H
D
L

24,0
DN
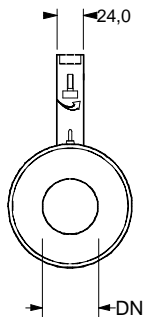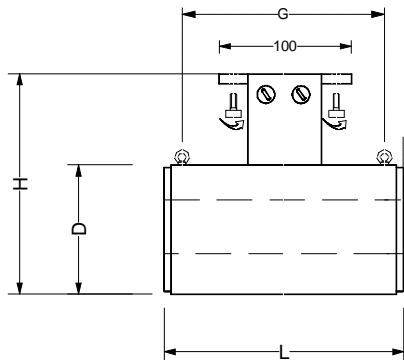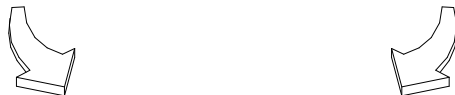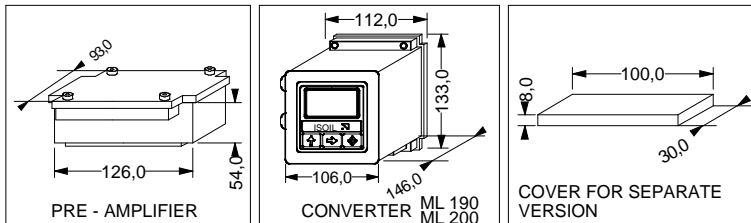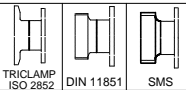
DN	25	32	40	50	65	80	100	125	150	200	250	300	350	400
L	+0 -3 100	+0 -3 100	+0 -3 100	+0 -3 100	+0 -3 150	+0 -3 150	+0 -3 150	+0 -3 180	+0 -3 180	+0 -3 200	+0 -5 250	+0 -5 300	+0 -5 350	+0 -5 400
H	147	153	161	177	199	209	235	263	291	362	417	467	527	579
D	56	62	70	86	108	118	144	172	200	271	326	376	436	488
G	–	–	–	–	–	–	–	–	–	144	194	244	294	344
Weight (Kg)	1,2	1,6	1,8	2,0	3,6	3,8	5,0	7,8	8,2	18,2	24,0	27,0	32,0	39,0
Usable flanges	PTFE - EBONITE: PN10 PN16 PN25 PN40 ANSI150 ANSI300 P.P.: PN10 PN16 ANSI150									PN10 PN16 ANSI150 (PTFE - EBONITE)				

N.B.: THE OVERALL DIMENSIONS CAN BE CHANGE WITHOUT NOTICE

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MS 2400 OVERALL DIMENSIONS

DN		TRICLAMP ISO 2852	DIN 11851	SMS
25	H	170	170	170
	L	180	180	180
	D	76	76	76
	F	DN 25	DN 25	DN 25
32	H		170	
	L		180	
	D		76	
	F		DN 32	
40	H	170	170	170
	L	180	180	180
	D	76	76	76
	F	DN 38	DN 40	DN 38
50	H	208	208	208
	L	180	180	180
	D	114	114	114
	F	DN 51	DN 50	DN 51
65	H	208	234	208
	L	180	200	180
	D	114	140	114
	F	DN 63,5	DN 65	DN 63
80	H	234	234	234
	L	200	200	200
	D	140	140	140
	F	DN 76,1	DN 80	DN 76
100	H	262	262	262
	L	200	200	200
	D	168	168	168
	F	DN 101,6	DN 100	DN 104

PRE - AMPLIFIER

CONVERTER ML 190 ML 200

COVER FOR SEPARATE VERSION

FITTINGS (F)

FITTINGS (F)

N.B.: THE OVERALL DIMENSIONS CAN BE CHANGE WITHOUT NOTICE

PRE - AMPLIFIER

CONVERTER ML 190 / ML 200

COVER FOR SEPARATE VERSION

A - B - C

DN	25			32			40			50			65			80			100			125			150			200			250		
	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D
PN 10	200	185	115	200	203	140	200	213	150	200	228	165	200	248	185	200	263	200	250	283	220	250	313	250	300	344	285	350	399	340	450	454	395
PN 16	200	185	115	200	203	140	200	213	150	200	228	165	200	248	185	200	263	200	250	283	220	250	313	250	300	344	285	350	399	340	450	460	405
PN 25	200	185	115	200	203	140	200	213	150	200	228	165	200	248	185	200	263	200	250	294	235	250	325	270	300	355	300	350	415	360	450	475	425
PN 40	200	185	115	200	203	140	200	213	150	200	228	165	200	248	185	200	263	200	250	294	235	250	325	270	300	355	300	350	425	375	450	493	450
PN 64	200	198	140	200	209	155	200	220	170	200	233	180	200	257	205	200	267	215	250	297	250	250	330	295	300	377	345	350	435	415	450	491	470

DN	300			350			400			450			500			600			700			800			900			1000			1200		
	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D
PN 10	500	504	445	550	564	505	600	620	565	600	670	615	600	725	670	600	830	780	700	945	895	800	1058	1015	900	1158	1115	1000	1269	1230	1200	1490	1455
PN 16	500	515	460	550	575	520	600	630	580	600	690	640	600	758	715	600	879	840	700	949	910	800	1060	1025	900	1160	1125	1000	1284	1255	1200	1506	1485
PN 25	500	535	485	550	598	555	600	659	620	600	709	670	600	769	730	600	880	845	700	989	960	800	1106	1085	900	1206	1185	1000	1329	1320	1200	1539	1530
PN 40	500	558	515	550	619	580	600	695	660	600	720	685	600	784	755	600	911	890	700	1016	995	800	1149	1140	900	1259	1250	1000	1369	1360	1200	1579	1575
PN 64	500	545	530	550	603	600	600	670	670																								

N.B.: THE OVERALL DIMENSION CAN BE CHANGE WITHOUT NOTICE

MS 2500 ANSI 150-300 OVERALL DIMENSIONS

PRE - AMPLIFIER (A)

CONVERTER ML 190 ML 200 (B)

COVER FOR SEPARATE VERSION (C)

DN INCH mm	1" 25			1" 1/4 32			1" 1/2 40			2" 50			2" 1/2 65			3" 80			4" 100			5" 125			6" 150			8" 200			10" 250			12" 300		
	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D
ANSI 150	200	181	108	200	192	118	200	207	127	200	222	152	200	245	178	200	259	191	250	288	229	250	315	254	300	341	279	350	401	343	450	461	406	500	527	483
ANSI 300	200	190	124	200	199	133	200	221	156	200	228	165	200	251	191	200	268	210	250	300	254	250	328	279	300	360	318	350	420	381	450	480	445	500	546	521

DN INCH mm	14" 350			16" 400			18" 450			20" 500			24" 600			26" 650			30" 750			34" 850			36" 900			42" 1000		
	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D	L	H	D
ANSI 150	550	582	533	600	639	597	600	688	635	600	751	699	600	866	813	650	921	870	750	1032	984	850	1149	1111	900	1206	1168	1000	1381	1346
ANSI 300	550	607	584	600	664	648	600	726	711	600	770	775	600	916	914	650	1002	972	750	1121	1092	850	1230	1207	900	1292	1270	1000	1467	1448

N.B.: THE OVERALL DIMENSIONS CAN BE CHANGE WITHOUT NOTICE

CONVERTER: OVERALL DIMENSIONS

Compact version

112
150
133
108
108

Separate version

112
150
133
200
108
108
25
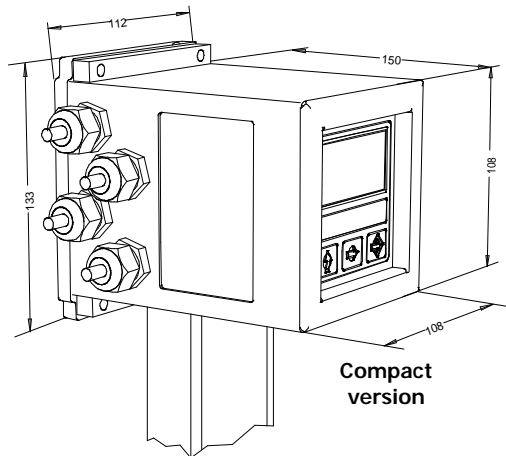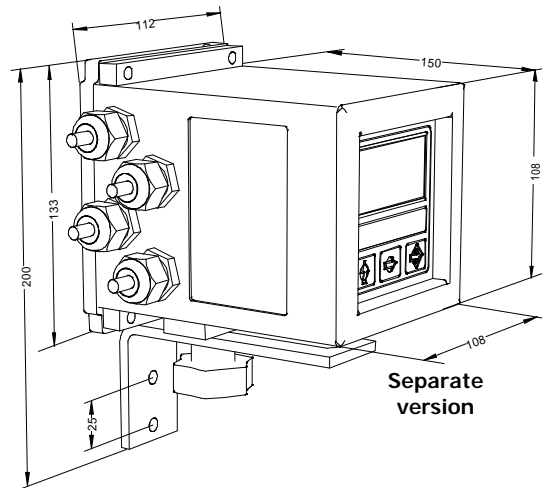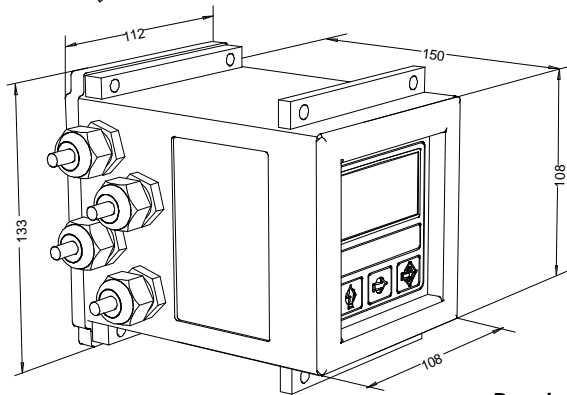
Panel version Converter

112
150
133
108
108

120
84
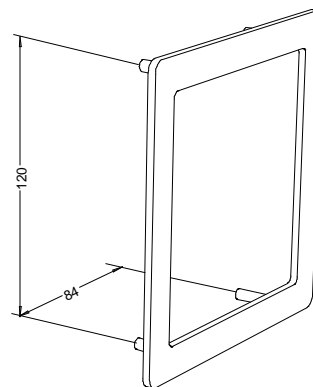
TECHNICAL CHARACTERISTICS

ELECTRIC CHARACTERISTICS

Classification of the instrument: class I, IP 67, category of installation II

Power supply versions	Power supply voltage	Power supply frequency	Pmax	current max
HV	90÷265 Vac	44÷66 Hz	20W/25VA	0,25 A
LV	18÷45 Vac/dc	0-44÷66 Hz	20W/25VA	1,6 A
LLV	10÷35 Vdc		20 W	1,5 A

Input/output isolation:
- Input/output are insulated up to 500V
- The output 4÷20 mA and the output 24 Vdc are electrically connected

ENVIRONMENTAL CONDITIONS OF USE
- The instrument can be installed inside or outside of buildings, but avoid direct sunlight exposition
- Altitude: from −200 a 6000 m (from -656 to 19685 feet)
- Temperature range: (see appendix 2)
- Humidity range: 0÷100% (IP 67)
- Line voltage range: (see table on technical characteristics)

OPERATING TEMPERATURE OF THE SENSOR

SENSOR WITH EBONITE LINING								SENSOR WITH PP LINING								SENSOR WHITH PTFE LINING							
Liquid temp.				Amb. Temp.				Liquid temp.				Amb. Temp.				Liquid temp.				Amb. Temp.			
Min.		Max		Min.		Max		Min.		Max		Min.		Max		Min.		Max		Min.		Max	
°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
0	32	80	176	-5	23	60	140	0	32	60	140	0	32	60	140	-20	-4	150	302	-10	14	60	140

OPERATING TEMPERATURE OF THE CONVERTER

CONVERTER ML 200			
Amb. Temp.			
Min.		Max	
°C	°F	°C	°F
-20*	-4*	60	140

* For discontinuous use, is necessary the installation of a heating resistance

Terminal block M1

Terminal block M2

1 2 3 4 5 6 7 8 9 10

21 22 23 24 25 26

11 12 13 14 15 16 17 18 19 20

27 28 29 30 31 32

Dangerous voltage:
- 60Vdc max
- 250 V max commutation coil's circuit

Dip switch for enable block level

Terminal block M3

Socket for
- MT 200
- IF 02

Power supply

to cover
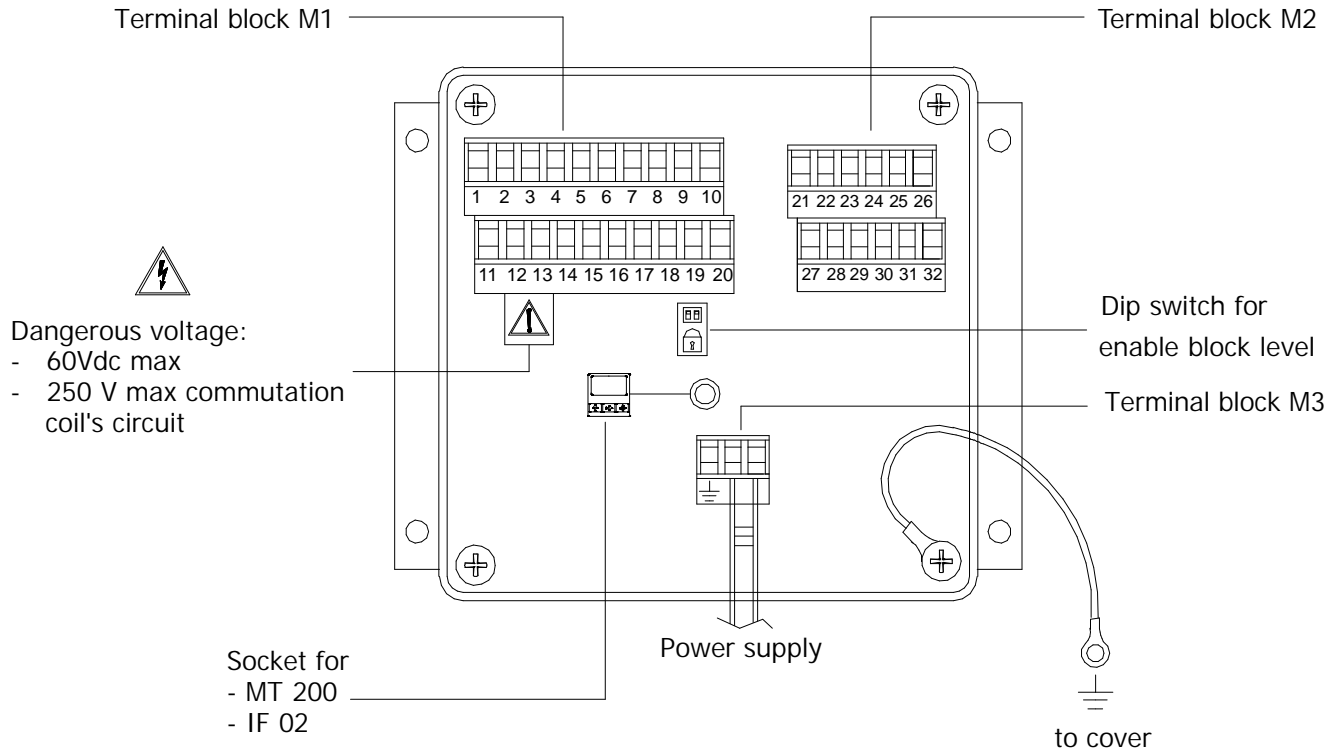
GROUNDING INSTRUCTION (with METALLIC PIPE)

MS 500   MS 2400   MS 1000   MS 2500   MS 3700   MS 3770
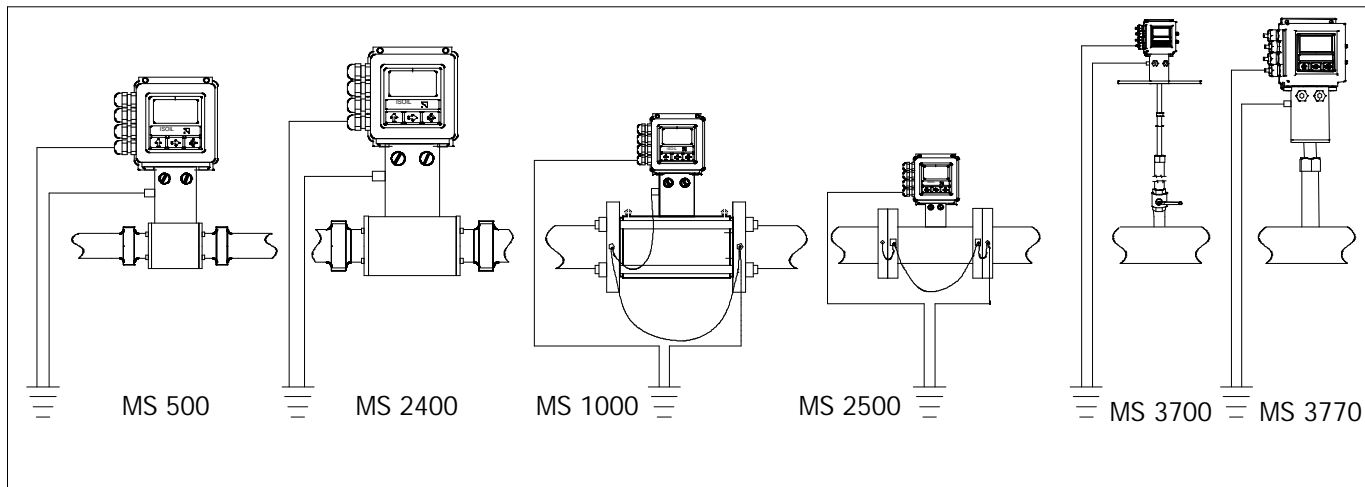
ALWAYS connect the sensor and converter to ground
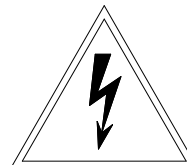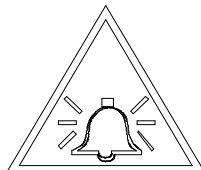
For the sensors MS 500-1000-2500, in the cases listed below, see the following instruction:
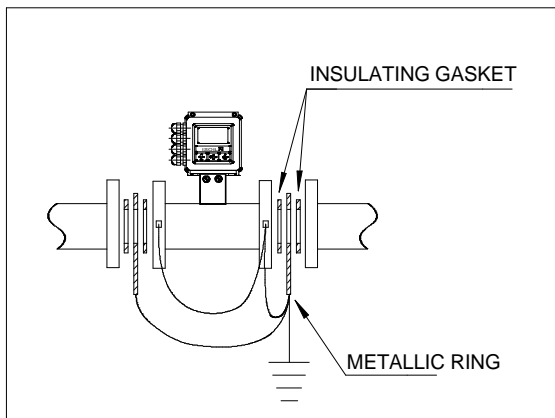
If the sensor has to be mounted on a pipe made of an insulating material, then for grounding purposes of the liquid there are two possibility:
Install two metallic ring (available on request) between the sensor flanges and the counter flanges of the pipe line; or:
Use a sensor with the additional grounding electrode.
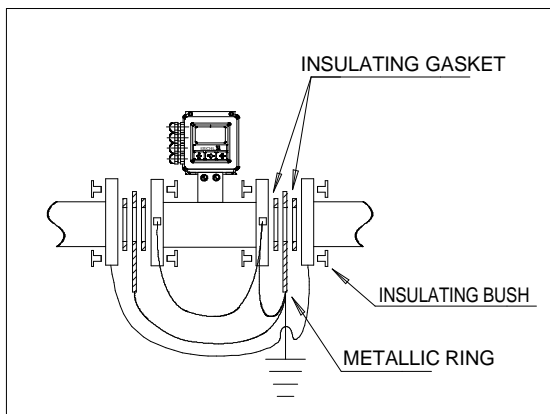
If the sensor must be install in the piping with a chatode protection, some precautions should be taken:
1) Grounding metallic rings should be provided to ground the liquid
2) the sensor should be insulated from the piping, using gasket between the rings and the sensor and insulating bushes for the tightening tie rods.
   The flanges pipe should be connected one to the other (by-passing the sensor) with a copper plait 6 mm^2 section.

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ELECTRICAL CONNECTIONS SENSOR-CONVERTER

SEPARATE VERSION
Max length of cable: 20 mt

Electrodes cable
C013

1	Electrode 1
2	Electrode 2
3	Common
4	Shield
11	Shield
12	Coil 1
13	Coil 2

C012
Coil cable
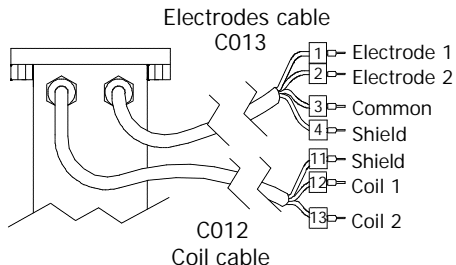
Sudden movements of the electrodes cable, can cause noises on measure

CONVERTER ML 200 – INTERNAL REAR VIEW-

Terminal block M1

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20

Dangerous voltage:
- 60Vdc max
- 250 V max commutation coil's circuit
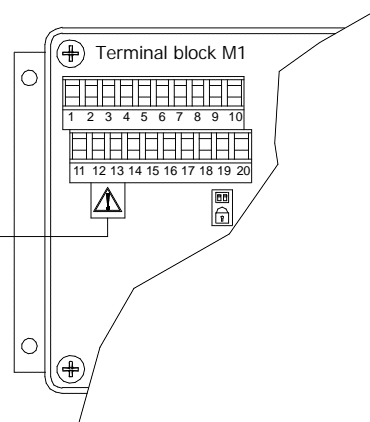
PRE-AMPLIFER VERSION
Max length of cable: 500 mt

From pin 6 to pin 10:
cable connected to the converter

Green (electrode 1)
Black (electrode 2)
White/black (common)
Red (coil 1)
Black (coil 2)
White
Black
Orange
Red
Blu

From pin 1 to pin 5:
cable connected to the sensor

Cable C014

Green	1	Electrode 1 (connecting terminal 1 M1)
Black	2	Electrode 2 (connecting terminal 2 M1)
Shield	4	Shield (connecting terminal 4 M1)
White / Black	3	Common (connecting terminal 3 M1)
Shield	11	Common (connecting terminal 11 M1)
Red	12	Coil 1 (connecting terminal 12 M1)
Black	13	Coil 2 (connecting terminal 13 M1)

CONVERTER POWER SUPPLY

REAR CONVERTER

Terminal M3

Power supply

Cover

L (-) N (+)
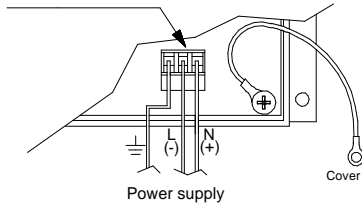
- before connecting the power supply, verify that the mains voltage falls between the limits indicated on the tag plate
- ATTENTION: the converters on dc power supply line (LLV version: 10-35 Vdc) they not protected against the inversions of polarity.
- For the wiring use only approved conductors, with fire-proof properties.
- The power supply line must be equipped with a external protection for current overload (fuse or automatic line breaker with limiting capacity not greater than 10 A).
- Provide in the proximity of the instrument a circuit breaker that must be easily accessible from the operator and clearly identified.
- from the operator, and clearly identified.

For information concern the characteristics of meter's power supply, see pag. 19 "technical characteristics"

IN/OUT
Terminal block M1 diagram

ELECTRODES				INPUT		RS485		4-20mA	
E1	E2	C	SC	+	-	B	A	+	-
1	2	3	4	5	6	7	8	9	10

11	12	13	14	15	16	17	18	19	20
SC	B1	B2	SC	+	CE	E	C	E	-
	COILS			24V	OUT1		OUT2		24V

INPUT OPERATION STAGE

WIRING INPUT
internal power supply

+24
(15)
(5)
10 K
(6)
(20)
0

INPUT WIRING
external power supply

10 K
3/40 Vdc (ON)
0/1,5 Vdc (OFF)
TERMINAL 5 (+)
TERMINAL 6 (-)
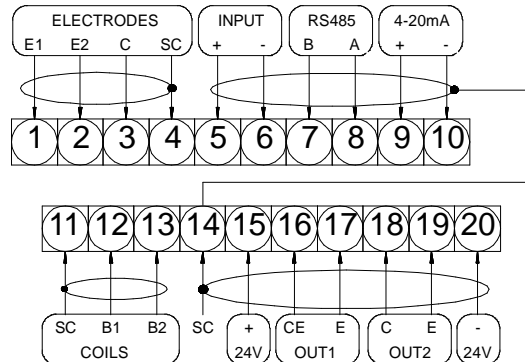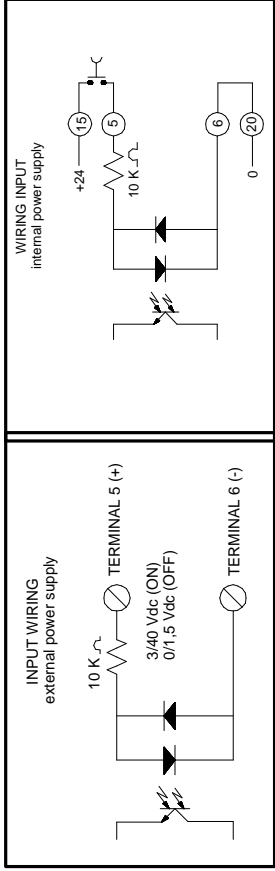
Auto-calibration from remote input

N.B.: withTmin<T<1sec. = auto-calibration
with T > 1 sec. = Autozero
(if active functions: 35 and batch OFF)

AUTO-CALIBRATION ON
AUTO-CALIBRATION OFF
3-40 V
0-1,5 V
T
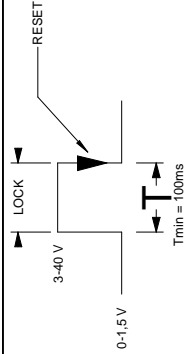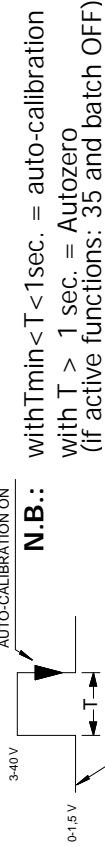
Totaliser reset from remote input
(if active functions: 30,31,32,33)

RESET
LOCK
3-40 V
0-1,5 V
T
Tmin = 100ms
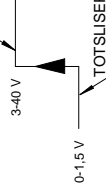
Totaliser lock from remote input
(if active function: 34)

LOCK TOTALISERS
TOTSLISER ACTIVE
3-40 V
0-1,5 V
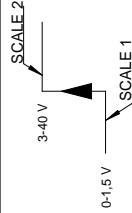
Range change from remote input
(if active function: 36)

SCALE 2
SCALE 1
3-40 V
0-1,5 V

Start/stop batch from remote input
(if actine function: 37)
"Annendix 1"

N.B.: with Tmin<T<1sec. = start/stop batch
with T >1 sec. =zero resetting batch In course

STOP BATCH
START BATCH
3-40 V
0-1,5 V
T
Tmin = 100ms
T
Tmin = 100ms
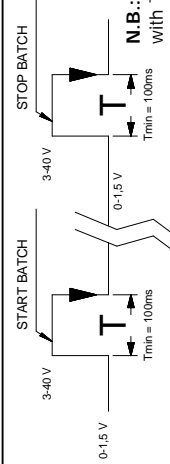
Speed rate	Tmin
10 Hz	220 ms
20 Hz	110 ms
50 Hz	45 ms
80 Hz	30 ms
150 Hz	15 ms

ATTENTION: the time T must be
? to Tmin

On/off outputs wiring(Up to 1250 HZ) (low frequency):
OUT 1/OUT 2 standard
OUT 3/OUT 4 with modules (page 24)

On/off outputs wiring(Up to 1250 HZ)
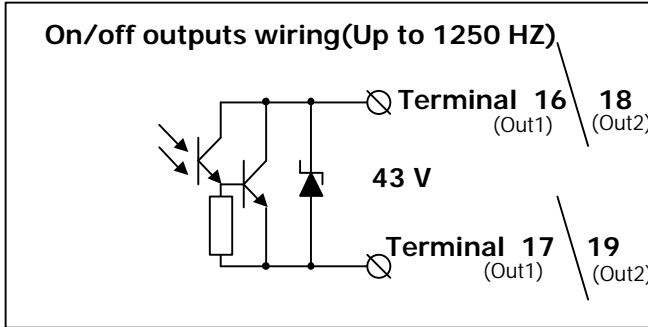
- Opto-insulated output with floating collector and emitter terminals freely connectable
- Maximum switching voltage: 40 Vdc
- Maximum switching current: 100mA
- Maximum saturation voltage between collector and emitter @100mA: 1,2V
- Maximum switching frequency (load on the collector or emitter, RL=470? , VOUT=24Vdc): 1250Hz
- Maximum revers current bearable on the input during and accidental polarity reversion (VEC): 100mA
- Insulation from other secondary circuits: 500 Vdc

On/off output wiring (Up to 12500 HZ) (high frequency): only with ME 201 module

On/off output wiring (Up to 12500 HZ)

- Opto-insualted output with floating collector and emitter terminals freely connectable. In order to get the maximum performances it is necessary to connect the emitter to the common terminal of the outputs (0V), while the load has to be on the collector. This output is internally connected to the power supply source 24 Vdc available on the terminal block.
- Maximum swithding voltage: 40Vdc
- Maximum swithding current: 100mA
- Maximum saturation voltage between collector and emitter @ 100mA, load on the collector and internal power supply: 0,3V
- Maximum saturation voltage between collector and emitter @ 100mA, load on the emitter and internal power supply: 3V
- Maximum switching frequency, load on the collector and internal power supply: (RL=470? , VOUT=24Vdc): 12500Hz
- Maximum switching frequency, load on the emitter or external power supply: (RL=470? , VOUT=24Vdc): 2500Hz
- Insulation from the other secondary circuits (except 24V and 4...20mA outputs): 500 Vdc

27

ME200: 2 programmable on/off outputs
ME201: 1 programmable on/off output + 1 high frequency output
ME202: 1 0/4...20mA output + 2 programmable on/off output
ME203: 1 RS232 port + 2 programmable on/off outputs
ME204: 1 RS232 port + 2 programmable on/off outputs + 1 0/4...20mA outpu
ME220: see the manual

ME205: 2 relay outputs with 1 NO contact + 1 NC contact each, 2A 60Vac, 60W/125Va

ME207: 2 relay outputs with 1 NO contact + 1 NC contact each, 2A 250Vac, 60W/125Va
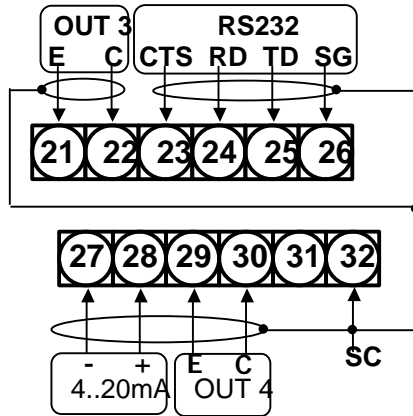
LEGEND:

SC: Cable shield, electrically connected to ground and to the casing
CTS: Input terminal of the signal "CLEAR TO SEND" of the RS232 port
RD: Input terminal of the signal "RECEIVE DATA" RS232 port
TD: Output terminal of the signal "TRASMIT DATA" of the RS 232 port
SG: Terminal "SIGNAL GROUND" common to all signals of the RS232 port
C: Terminal conncted with the MANIFOLD of the transistor of the on/off output
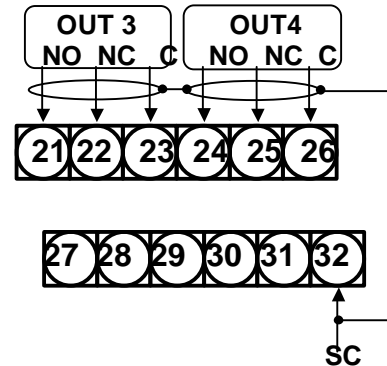
LEGEND:

SC: Cable shield, electrically connected to ground and to the casing
C: relay - common
NC: Normaly closed contact
NO: Normaly open contact

* The module name is visualized at the start of converter.

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ACCESS TO THE INSTRUMENT

KEY BOARD

The ML 200 programming keyboard is made up by three keys:

SHORT PRESSING (< 1 SECOND):
It increases the numeric figure or the parameter selected by the cursor
It goes to the previous subject on the menu
batch start/stop (when enabled)
LONG PRESSING (> 1 SECOND):
It decreases the numeric figure or the parameter selected by the cursor
It goes to the next subject on the menu

SHORT PRESSING (< 1 SECOND):
It moves the cursor rightward on the input field
It goes to the following subject of the menu
It change the display of the process data
LONG PRESSING (> 1 SECOND):
It moves the cursor leftward on the input field
It goes to the previous subject on the menu

SHORT PRESSING (< 1 SECOND):
It enter /leaves the selected function
It enables the main menu for the intrument configuration
It cancels the selected function under progress
LONG PRESSING (> 1 SECOND):
It leaves the current menu
It enables the totalizer reset request (when enabled)
It confirms the selected function

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flow rate value

% full scale

date time or allarm

revers totalizer

direct totalizer

Sampling rate

Flow rate value and graphic visualization

Alarm on signal
(meaning of flags page 61)

Scale (1 = low)
(2 = high)

```
1        +2.3829
dm³/s
 50          +47.66%
T+dm³     35805.339
P+dm³     35805.339
T-dm³          .000
P-dm³          .000
01/01/92  08:48
```

```
1        +2.3719
dm³/s
0----20----40----60----80----100--120
100                    100
 75                     75
 50                     50
 25                     25
% 0                    % 0
        60  s
```
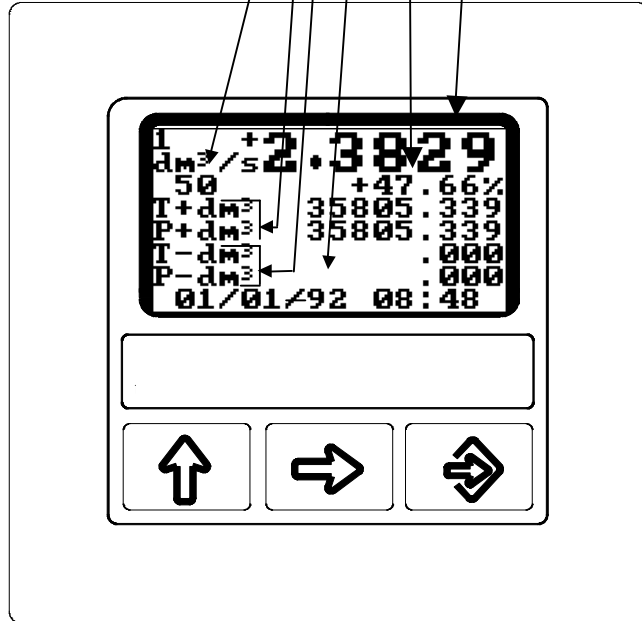
push

Visualization page "A"
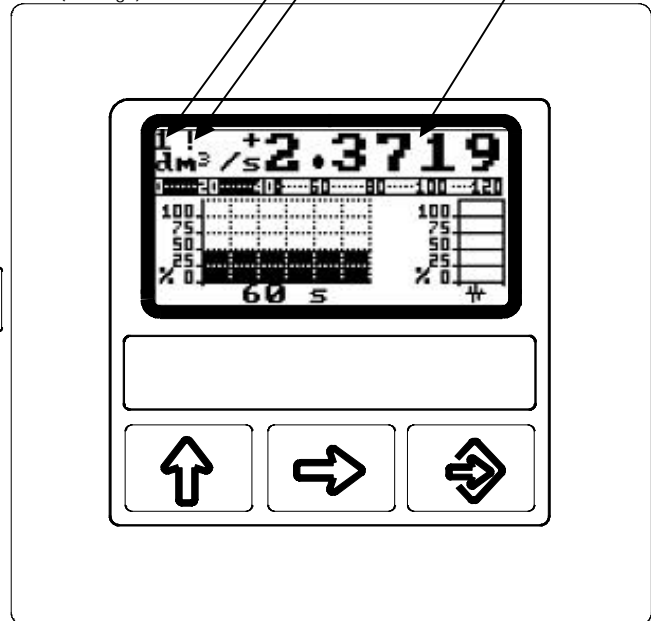
Visualization page "B"

N.B. Contrast set (see page 57 pos. 51)

flow rate value

scale in use

% full scale (bar grph)

unit of measure

flow direction
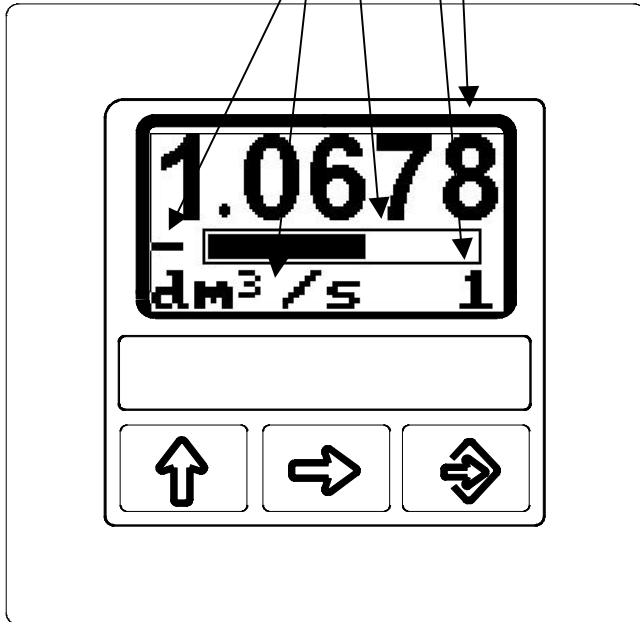
Time scale (see pos. 17)

Active scale

% full scale

1.0678

dm³/s   1

push

125

%

0

(1) 0   s   10

Visualization page "C"
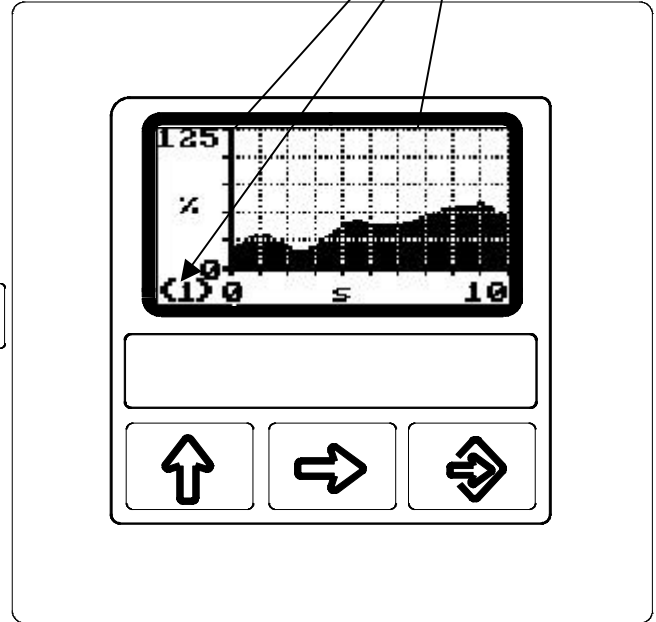
Visualization page "D"

MANUFACTURER PRE-SETTINGS

The converter is programmed and delivered according to the following STANDARD configuration:

> ??   Dip switch: ON (Switch positioned close to the lock symbol)
> ??   Security level: 3 (page 59 pos. 60)
> ??   Access code L" = 11111 (page 59 pos. 59)

With such a pre-setting, when powered on, the instrument will show one of the 4 visualisation pages (pict. A-B-C-D on pages 30-31). By pressing the button $\boxed{\Leftrightarrow}$ you can get to the "Quick start menu":

```
0-QUICK START
Fs1=dm³/s   0.0700
Pu1l=dm³    1.00000
TPu1l=ms    0070.00
Contrast=         1
Language=        EN
Main Menu
```

the visualisation page shown aside may contain different parameters from those shown on your instrument, depending on the pre-setting required by the customer

The "Quick start menu" may be set without entering any access code (see example 1 on page 35).

To enter the Main Menu, position the cursor on the word "Main menu" and press the button $\boxed{\Leftrightarrow}$; then enter the level 2 access code L" = 11111 and press the key $\boxed{\Leftrightarrow}$.
All the functions of the converter are now available, apart those reserved to the service (access code of higher level).

Dip switch

REAR CONVERTER

Power supply

Cover
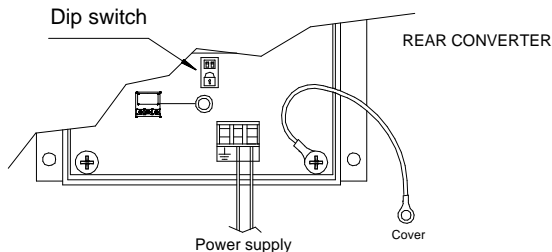
ACCESS CODES

The information of this manual are related to all the functions available with L2 security level.
All the functions available through access codes of higher level are protected and reserved to the service.

Access code description: L2 (menu "11 Internal Data, page 59 pos. 59)

A) **with code L2 = 11111** (with this code only) you access the "Quick start menu", and you can follow the programming procedure as described on page 28

B) **with code L2 = 22222** (with this code only) you disable the request of code L2 and you can proceed with the programming without entering any access code (up to L2 security level)
NOTE: the availability of the functions is related to the selected block (see page 34)

C) * with L2 customised (freely chosen by the user) you can proceed programming all the functions up to L2 security level, entering its code whenever you enter the Main menu

*ATTENTION: take note very carefully of the customised code you have chosen, since there is no way for the user to retrieve it is forgotten

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BLOCK LEVELS

If for several reasons you need to change the level of block of the instrument, follow the steps:
- ?? Set the dip switch on OFF position (opposite side than the lock symbol, see pict. On page 32)
- ?? Access the Main Menu (see page 32)
- ?? Press several times the key ⮕ , till you don't reach the menu "11: Internal data" and then press ◈
- ?? Press the key ⮕ and ◈ to enter the function "Block level"
- ?? Choose the desired level of block by pressing the key ⬆ and confirm the choice by pressing the key ◈

To enable the level of block you selected place back the DIP switch to the original ON position marked with a lock symbol (see pict. On page 32)

The available levels of block are the following:

Level 0: it completely disables the access to the functions. You can perform the following functions through the keyboard:
- ?? Changing the display mode
- ?? Dosing Start/stop (when such a function is enabled)
- ?? Data printing (when such a function is enabled)

Level 1: it enables the access to the following functions:
- ?? Totalisers re-setting
- ?? Dosing functions modifications

Level 2: it enables the access to the following functions:
- ?? Quick start menu (see code level 2 = 11111)
- ?? Scale (full enabling)
- ?? Display (partial enabling)
- ?? Diagnostics (partial enabling)

Livello 3: it enables the access to all the functions of level 2

When the Dip-switches are on OFF position, all the functions are enabled.

The functions requiring an access code higher than L2 are reserved to the service.

ACCESS CONFIGURATION MENU

From any visualizzation pages push this key: [⬥]

For choose a item of menu push: [⬆]

Per enter in a item of menu: [⬥]

EXAMPLES

EX. 1	EX. 2
Set full scale from "quick start menu"	**Set full scale from main menu**

EX. 1 — Set full scale from "quick start menu"

FROM VISUALIZATION PAGES PUSH:

[⬥]

| FS1 |

[⬥]

| choose the volume unit with the key: [⬆] dm³, dal, hl, m³, ml.... |

[⇨]

| choose the type of unit with the key: [⬆] metric volume units British or American volume units metric mass units British or American mass units |

[⇨]

| choose the time unit of measure with the key: [⬆] s, m, h, d, |

[⇨]

| Set the numeric value with the key: [⬆] Use the key: [⇨] for move in the numeric side |

[⬥]

EX. 2 — Set full scale from main menu

FROM VISUALIZATION PAGES PUSH:

[⬥]

| KEYCODE: 00000 |

[⇨]

[⬥]

| FS1 |

[⬥]

| choose the volume unit with the key: [⬆] dm³, dal, hl, m³, ml.... |

[⇨]

| choose the type of unit with the key: [⬆] metric volume units British or American volume units metric mass units British or American mass units |

[⇨]

| choose the time unit of measure with the key: [⬆] s, m, h, d, |

[⇨]

| Set the numeric value with the key: [⬆] Use the key: [⇨] for move in the numeric side |

[⬥]

1.SENSOR	1	ND	2	KA	3	KL	4	CABLE LEN.
	SET ND		SET KA		SET KL		SET CABLE LENGTH	

2.SCALES	8	FS1	9	FS1	10	IMP1	11	IMP2
	FULL SCALE 1 VALUE SET		FULL SCALE 2 VALUE SET		PULSE VALUE SET FOR CHANNEL 1		PULSE VALUE SET FOR CHANNEL 2	
	VOLUME UNIT		VOLUME UNIT		MISURE UNIT		MISURE UNIT	
	TYPE OF UNIT		TYPE OF UNIT		TYPE OF UNIT		TYPE OF UNIT	
	TIME UNIT OF MEASURE		TIME UNIT OF MEASURE		NUMERIC VALUE		NUMERIC VALUE	
	NUMERIC VALUE		NUMERIC VALUE					

3.MEASURE	17	T. CONST	18	SKIP THR	19	PEAK THR	20	CUT-OFF
	TIME CONTANT SET		ACCELERATION THRESHOLD SET		ANOMAL SIGNAL PICK CUT OFF THRESHOLD SET		LOW FLOW ZERO THRESHOLD SET	

4.ALARMS	24	MAX THR	25	MIN THR	26	HYST	27	E.P. THR
	MAXIMUM FLOW RATE VALUE ALARM SET		MINIMUM FLOW RATE VALUE ALARM SET		HYSTERESIS THRESHOLD		EMPTY PIPE DETECTION THRESHOLD SET	

5.INPUTS	30	T+ RESET	31	P+ RESET	32	T- RESET	33	P- RESET
	ENABLE RESE OF TOTAL DIRECT FLOW TOTALIS.		ENABLE RESE OF PARTIAL DIRECT FLOW TOTALIS.		ENABLE RESE OF TOTAL REVERSE FLOW TOTALIS.		ENABLE RESE OF PARTIAL REVERSE FLOW TOTALIS.	
	FUNCTION ACTIVE WITH INPUT IN VOLTAGE							

6.OUTPUTS	38	OUT.1	39	OUT.2	40	OUT.3	41	OUT.4 (FRQ. MAX 12.5KHz) (OPT.)
	SEE THE TAB REFER TO THE FUNCTIONS FOR OUTPUTS : MENU 6 "OUTPUT"							

7. COMUNICATION	44	ADDRESS	45	SPEED 1	46	SPEED 2	47	PRINT (OPT.)
	NETWORK ADDRESS SET		SPEED RS485 OUTPUT		VELOC. RS232 OUTPUT		ENABLE PRINT FUNCTION (ONLY WITH ME 203-204)	

8. DISPLAY	48	TOT DECIMALS	49	LANGUAGE	50	DISP. FR.	51	CONTRAST
	N° DECIMALI TOTALIZZATORI		E=ENGL. I=ITAL. F=FRENCH S=SPAGN.		REFRESH DISPLAY SET		CONTRAST SET	

9.DATA LOGGER	52	ACQUISITION	53	INTERV. (h)	54	DD/MM/YY 00:00	55	DISPLAY DATA
	AUTOMATIC DATA LOGGIN ENABLE		INTERVAL FOR DATA LOGGING FUNCTION		DATE AND TIME SET		DISPLAING DATA STORED	

10.DIAGNOSI	57	SELFTEST	58	SIMULATION				
	METER AUTOTEST FUNCTION		FLOW RATE SIMULATION ENABLE					

11.INTERNAL DATA	59	L2 KEYCODE	60	LOCK LEVEL	61	LOAD FACT. PRES.	62	LOAD USER PRES.
	LIVELL 2 ACCESS CODE ENTER		LOCK LEVEL SET		FACTORY VALUE RECALL		USER VALUE RECALL	

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ML 200

5 E.P. DETECT	6 AUTOZERO CAL.	7 E.P. CALIBR.
ON/OFF	START AUTOZERO CALIBRATION	START EMPTY PIPE CALIBRATION
ENABLE/DISABLE EMPTY PIPE TEST		

12 TPUL1	13 TPUL2	14 FRQ1	15 FRQ2	16 SW
DURATION OF THE PULSE CHANNEL 1	DURATION OF THE PULSE CHANNEL 2	FULL SCALE FREQUENCY SET CHAN. 1	FULL SCALE FREQUENCY SET CHAN. 2	SPECIFIC GRAVITY SET
	ACTIVE IF CHANNEL 2 IS ON PULSE	ACTIVE IF CHANNEL 1 IS ON FREQUENCY	ACTIVE IF CHANNEL 2 IS ON FREQUENCY	ACTIVE IF MASS UNIT HAS BEEN SELECTED

21 AUTOCAL.	22 ATORANGE	23 E. SAVING
ENAB./DISAB THE AUTOCALIB FUNCTION	ENAB./DISAB. THE AUTOMATIC CHANGE OF SCALE	AUTAMATIC ENERGY SAVING FUNCTION ENABLE

28 mA VAL.FAULT	29 Hz VAL.FAULT
4/20 mA CURRENT ALARM SET	FREQUENCY OUTPUT ALARM SET
	ONLY IF CHANNEL 1 OR 2 IN FREQUENCY MODE

34 COUNT LOCK	35 CALIBRATION	36 RANGE CHANGE	37 BATCH
LOCK TOTALISER	AUTOZERO CALIBR. EXTERNAL COMMAND ENAB.	RANGE CHANGE EXTERNAL COMMAND ENAB.	BATCH START/STOP EXTERNAL COMMAND ENABLE
FUNCTION ACTIVE WITH INPUT IN VOLTAGE			

42 OUT.mA1	43 OUT.mA2 (OPT.)
CHOOSE CURRENT VALUE OUTPU 1	CHOOSE CURRENT VALUE OUTPU 2
START/END RANGE (0/4-20/22 mA) AND FIELD (+,-,±,-0+)	

The opportune selection of the channel 1 and 2, allows to be on the 2 output on/off 2 separate signals of volume and/or frequency

56   CLEAR DATA
LOGGED DATA CANCEL FUNCTION

Some of the functions above suitable are visualised on the display only with the qualification of other functions or with the insertion of additional modules (sees details in the following chapters)

63   SAVE USER PRES.
USER VALUE SAVE

FUNCTION MENU

Synthetic description of the function

Menu visualized on the converter (from 1 to 11)

MENU 1.SENSOR

(POS. 5) Speed rate [S. RATE (Hz)=   XXXX)

Identification number of the function (not visualized on display)

Converter request
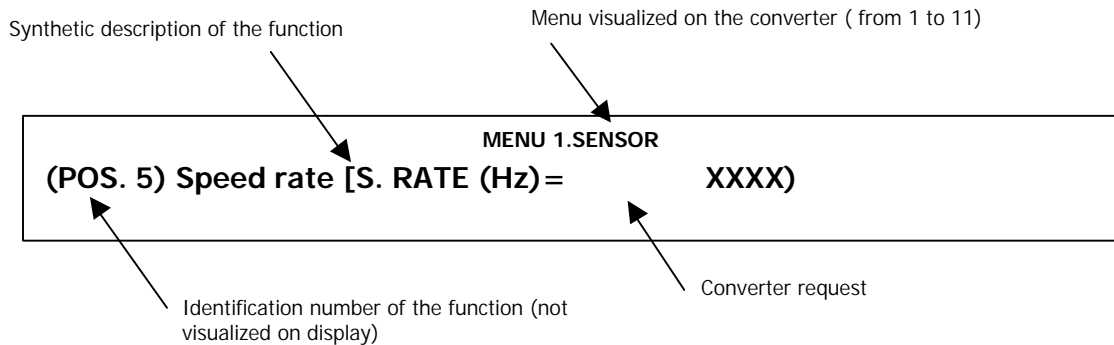
MENU 1.SENSOR

(POS. 1) Nominal diameter Sensor [ND=   XXXX]

Sensor nominal diameter. The value shown in the pate on the sensor must be entered.
Its value has to be within the range from 0 to 3000 mm.
IMPORTANT: if you want to know the speed of the liquid passing through the sensor, set this parameter at 0. The instrument will show the liquid speed expressed in meter per second (m/s). **Attention:** in this case all the totalised values will be expressed in metres (m) and will then be without any meaning

(POS. 2) Coefficient KA [KA=   ±X.XXXX]

Coefficient KA set. This parameter is calculated during the sensor calibration and stands for a signal amplification value. It has to be set at the value shown in the plate on the sensor.

(POS. 3) Coefficient KL [KL=   ±X.XXXX]

Coefficient KL set. Leave the value at default (+0,0000). Set a different value only if shown in the plate on the sensor.

(POS. 4) Length cable [CABLE LEN.=m   XXX]

Set the length of the cable connecting the sensor to the converter (measure unit: meters).
N.B.: the length must be set in multiple of 10m

(POS. 5) Test "empty pipe" [E.P. DETECT=   XXX]

This function enables/disables the empty pipe detection feature. Herewith we remind that in case of noise on the cable or on the electrodes this system may fail and therefore should be used carefully. To determine the empty/full pipe condition the signal is analysed within a one second time window. In case the pipe is detected to be empty, then the measure is lock. For a proper behaviour a calibration of this function should be performed in site as described below. Its value hat to be either ON or OFF.

(POS. 6) "Autozero" calibration [AUTOZERO CAL.]

This function enables/disables the automatic zero calibration system. It is necessary to perform this function at the first sensor installation or after a long period the sensor has been empty. To perform the sensor it is absolutely necessary the sensor is full of liquid and that the liquid is perfectly staying still. Even very small movement of the liquid may effect the result of this function, and, consequently, the accuracy of the system. Once you are sure the a.m. conditions are fulfilled (and when the percentage flow rate value is stable) press for more than one second the key ⬇. Check the percentage flow rate value goes to zero, otherwise repeat the operation again. When the value is stable at zero, then press ⊛ .

(POS. 7) "empty pipe" calibration [E.P. CALIBR.]

this function enables/disables the automatic calibration procedure of the empty pipe detection function. Before enabling this function, the Empty Pipe test should be enabled first as above described. Before performing this function, the sensor has to be completely filled in with the liquid so that both the lining and the electrodes are wetted. The sensor has then to be emptied again and then you should press the key ⊗ : the operation will have to be confirmed by pressing the key ⊗ or cancelled by pressing the key ◈. By this function the system sets the value of a parameter which could also be manually changed (see function "E.P.thr" within the menu 4-ALARMS).

<p align="center">MENU 2.SCALES</p>

(POS. 8) Full scale n° 1 [FS1=*dm³/S*   X.XXXX]

Full scale value set for range N.1. There are four fields to fill in order to set this parameter, from left to right: 1) volume unit of measure, 2) type of unit, 3) time unit of measure and 4) numeric value. The selection is made by positioning the cursor on the field to modify. To change the type of unit of measure (metric, British or American, mass or volume) the cursor has to be positioned on the symbol "/" (field N. 2). When the nominal diameter is set to zero it is possible to modify only the numeric field, since the unit of measure stays at m/sec.

The following tables show the units of measure available and the conversion factor by comparison with 1 dm^3 and 1 kg. The converter accepts any kind of combination of units of measure satisfying both the following conditions:

?? Numeric field value ? 99999

?? $^1/_{25}$ fs_{max} ? numeric field value ? fs_{max}.

where fs_{max} is the maximum full scale value corresponding to the sensor, equal to a 10 m/sec liquid speed. The units of measure are shown as appear on the display. The British and American units are diversified by using capital and small characters.

?? <u>Metric units of measure</u>

cm^3	0.001	Cubic centimetre
ml	0.001	Millilitre
l	1.000	Litre
dm^3	1.000	Cubic decimetre
dal	10.000	Decalitre
hl	100.000	Hectolitre
m^3	1000.000	Cubic metre

?? <u>British or American volume unit of measure</u>

in^3	0.0163871	Cubic inch
GAL	4.545771	British gallon
Gal	3.785333	American gallon
ft^3	28.31685	Cubic foot
Bbl	119.238	Standard barrel
BBL	158.984	Oil barrel
yd^3	764.555	Cubic yard

?? Metric mass units of measure

G	0.001	Gram
Kg	1.000	Kilogram
T	1000.000	Ton

?? British and American mass units of measure

Oz	0.028350	Ounce
Lb	0.453591	Pound
Ton	907.18	short tons

When a mass unit of measure is set, the specific gravity function is automatically enabled by the system. Please, note that the mass measure is heavily effected by the temperature and therefore with certain liquids this may cause significant measure errors.

The units of measure of time may be chosen among the following values: **s** = second, **m** = minute, **h** = hour, **d** = day.

(POS. 9) Full scale n. 2 [FS2=dm^3/s X.XXXX]

Full scale set for scale N.2. This function is identical to the previous one. Please, refer to the previous function as far as its description is concerned.

This function is enabled by the system only when the relevant input or output functions are enabled.

(POS.10) Pulse value channel 1 and unit of measure of the totalizers [IMP1=dm^3 X.XXXXX]

Setting of the volume corresponding to each pulse of channel 1 and totalizers unit of measure. There are three fields to fill in to set this parameter, from left to right: 1) unit of measure, 2) type of unit of measure and 3) numeric value. The selection is performed positioning the cursor on the field to modify. To change the type of unit of measure (metric, British or American, mass or volume) just position the cursor on the blank space between the unit of measure and the numeric value. Then the nominal diameter is set to zero, it is possible to modify only the numeric field since the unit of measure stays at metre (m). the possible units of measure are those above described.
This function is active only if the pulse emission on channel 1 has been set as enabled.

(POS.11) Pulse value channel 2 and unit of measure of the totalizers [IMP2=dm^3 X.XXXXX]

Setting of the volume corresponding to each pulse of channel 2 and totalizers unit of measure.
This function is identical to the previous one and is active only if the pulse emission on channel 2 has been set as enabled.

(POS.12) Pulse duration channel 1 [TPUL1=ms   XXXX.XX]

Setting of the duration of the pulse generated on channel 1. Its value is expressed in milliseconds and has to be between 0.4 and 9999.99. When the high frequency output is present, then the minimum value can go down to 0.04 milliseconds.
ATTENTION: since the instrument cannot detect which type of device it is connected to, it is up to the user to verify the set pulse duration is compatible with the external device processing such pulses. If, by example, an electro-mechanical pulse counter is connected, then two kind of problems may occur: if the pulse is too long than the totalizer coils may burn or, if it too short, the counter may not count, even damaging the converter output.
This function is active only when the pulse emission function on channel 1 is enabled.

(POS.13) Pulse duration channel 2 [TPUL2=ms   XXXX.XX]

Setting of the duration of the pulse generated on channel 2. Its value is expressed in milliseconds and has to be between 0.4 and 9999.99. When the high frequency output is present, then the minimum value can go down to 0.04 milliseconds.
ATTENTION: be careful to what mentioned in the previous function
This function is active only when the pulse emission function on channel 2 is enabled.

(POS.14) Full scale frequency channel 1 [FRQ1=Hz   XXXXX.X]

Full scale frequency set for channel 1.Its value is expressed in Hertz and is between 1.0 and 1000.0. When the high frequency output is present the maximum value may go up to 10000.0.
ATTENTION: be careful to what mentioned in the previous function.
This function is enabled only when the frequency generation mode on channel 1 is active.

(POS.15) Full scale frequency channel 2 [FRQ2=Hz   XXXXX.X]

Full scale frequency set for channel 2.Its value is expressed in Hertz and is between 1.0 and 1000.0. When the high frequency output is present the maximum value may go up to 10000.0.
ATTENTION: be careful to what mentioned in the previous function.
This function is enabled only when the frequency generation mode on channel 2 is active.

(POS. 16) Specific gravity [SW=Kg/dm³   XX.XXXX]

Specific gravity set. Its value is expressed in Kilogram per cubic decimetre and has to be within the range from 0.0001 to 99.9999.
This function is active only if a mass unit of measure has been selected.

(POS. 17) Time constant [TCONST=s   XXXX.X]

Time constant set. This parameter effects the integrating filter making the instrument response quicker or slower, according to the set value. A higher value corresponds to a more stable but slower measure, a smaller value the opposite. The most common values are from 1 to 5 seconds. The value of this parameter has to be within the range from 0 (integral filter disabled) to 6000.0 seconds. The following diagram shows the response of the instrument for a flow rate variation from 0 to 100% within the T time constant period:
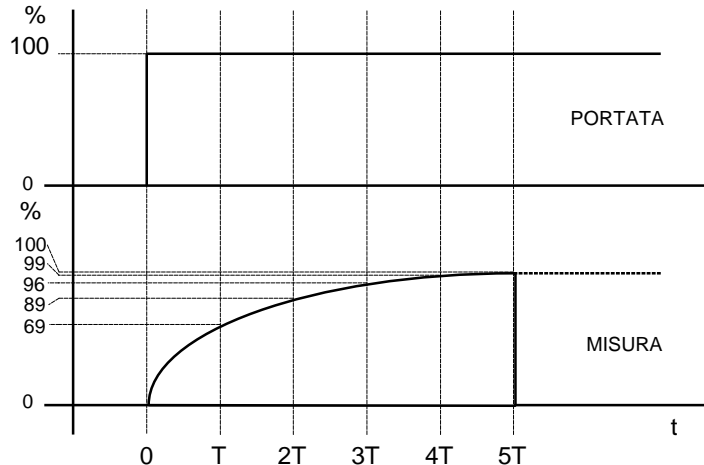
(POS. 18) Acceleration threshold [SKIP THR=%   XXX]

Acceleration threshold set. The acceleration threshold stands for the limit beyond which a flow rate variation determines an immediate response at the output, without being filtered by the time constant. This system allows the instrument to have an immediate response in case of big variations of the flow rate, filtering (and delaying) the response to small variations. The result of that is a very stable measure, ready to follow the process. The value is set as percentage of the full scale value from 0 to 125%. If such a value is set to zero any flow rate variation bigger than 0.5% of the full scale value will immediately effect the outputs.

The following diagram shows the instrument response in two cases: a flow rate variation from 0 to 10% completely absorbed by the time constant effect and a variation form 10% to 100% exceeding the acceleration threshold and then immediately sent to the output. In actual fact there is always a minimum time between the measure acquisition and the outputs update. For the ML190 and ML200 this time in the worst case is around 140 ms as far as the 0/4...20 mA output is concerned.
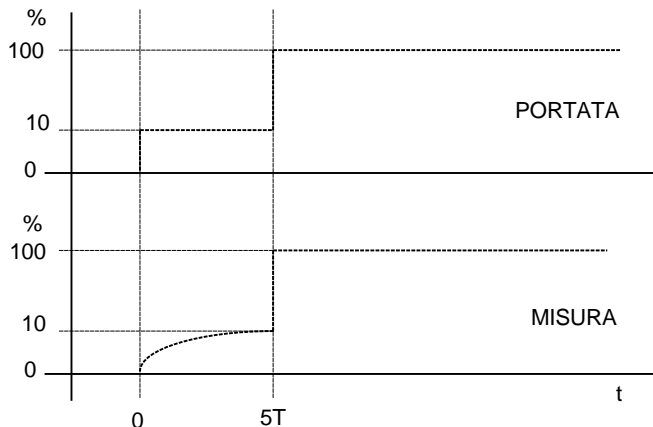
(POS. 19) Peak cut off threshold [PEAK THR=%   XXX]

Anomalous signal pick cut off threshold set. This parameter allows to set the maximum value of deviation of the actual measure sample by comparison with the average one. If the new value is higher than the set limit, than such a value is "cut" to the limit value. This function is used to make the meter less sensitive to big perturbations on the flow rate measure, as it may happen when there are solids in suspension in the liquid hitting against the electrodes determining a high electrical noise. The permitted values of this function go from 0 to 125 % and are referred to the full scale value. If this parameter is set to zero the peak detection function is disabled and any new measure ample will be accepted and processed as it is by the converter.

(POS. 20) Low flow zero threshold [CUT-OFF=%   XX.X]

Low flow zero threshold set. When the flow rate value falls below this parameter the flow rate is assumed to be zero and set to such a value by the converter. This parameter can be set from 0 to 25.0% of the full scale value. When this parameter is set to zero this function is disabled.

(POS. 21) Auto-calibration [AUTOCAL=   ON/OFF]

Enables/disables the auto-calibration function. When enabled the converter performs a calibration cycle once every hour. During such a cycle the measure is "frozen" at the latest measured value. The calibration lasts from 8 to 15 seconds from case to case and allow to remove completely the thermal derivation error effects on the measure. This function is recommended to be enabled is the instrument undergoes strong temperature variations during its working.

When the meter is used in batch applications and in any case you want to compensate temperature drift effects, then the automatic calibration procedure is recommended before any batch process enabling it via the external on/off input. This is because during the calibration cycle the meter does not register any flow rate variation.

Allowed values for this parameter: ON / OFF.

(POS. 22) Automatic scale change enable [AUTORANGE=   ON/OFF]

Enables/disables 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 range N.2 is bigger than N.1. When the flow rate increases and reaches the 100% of the full scale 1, then the meter automatically switches to scale N.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.
N.B.: the autorange doesn't allow to use the manual change of range (see pos. 36)

(POS. 23) Energy saving enable [E.SAVING=   ON/OFF]

Automatic energy saving function enable. This function is used when the instrument is powered by a battery or solar cells, allowing an energy saving up the 60-80. The energy consumption is controlled by the ratio between the measuring cycles powering the coils and the cycles without powering the coils. When the flow rate is stable the number of "off" cycles is higher than the "on" ones, so that the average consumption is strongly reduced. If the flow rate suddenly changes, then the meter switches on a higher number of measuring cycles, in order to get a higher response time, switching off the cycles as soon as the flow rate gets back to be stable. If the flow rate varies below of "acceleration threshold" percentage value, then the meter goes on with "off" cycles, but as soon as the flow rate value exceeds such a threshold, the meter switches on many measuring cycles again. The speed the meter switches on and off the excitation cycles is different: from a constant flow rate to a variable one it is a very fast process, while from variable flow rate to a stable one such a process is much slower.
Allowed values for this parameter: ON/OFF

N.B.: to optimize this function it is raccomended choose a value for the acceleration threshold within 10÷15

(POS. 24) Maximum flow rate threshold [MAX THR=%   XXX]

Maximum flow rate value alarm set. When the flow rate value exceeds such a threshold **as absolute magnitude (i.e. not considering the sign)**, then an alarm message is generated. The value of this parameter is expressed as percentage of the full scale value and may be set from 0 to 125%. To set this parameter to zero corresponds to disable the alarm generation.

(POS. 25) Minimum flow rate threshold [MIN THR=%   XXX]

Minimum flow rate value alarm set. When the flow rate value falls below such a threshold **as absolute magnitude (i.e. not considering the sign)**, then an alarm message is generated. The value of this parameter is expressed as percentage of the full scale value and may be set from 0 to 125%. To set this parameter to zero corresponds to disable the alarm generation.

(POS. 26) Hysteresis [HYST=%   XX]

Hysteresis threshold set for the minimum and maximum flow rate alarms.

(POS. 27) "Empty pipe" detection threshold [E.P.THR=   XXX]

Empty pipe detection threshold set. The value of this parameter is automatically set by the function "Empty pipe calibration" within the menu SENSOR.

(POS. 28) Current output value in case of failure [mA VAL.FAULT =%   XXX]

Setting of the value the 0/4...20 mA current output has to be in one of the following cases:
?? empty pipe
?? coils interrupted
?? ADC error

The allowed range is from 0 to 120% of the 0..20 mA scale, 120% corresponds to 24 mA and does not depend on the selected range (0...20 / 4...20 mA).

The NAMUR NE43 recommendations ask for a alarms signalling value for the current output lower than 3.6 mA (<18%) or bigger than 21 mA (>105%). It would then be preferable to set the value of this function at the 10%, so that the current value in case of the a.m. cases would be 2 mA, allowing the following diagnostics:

?? current < 2 mA - 5%: line interrupted, power supply failure or faulty converter;
?? 2 mA -5% ? current ? 2 mA + 5%: hardware alarm;
?? 4 mA ? current ? 20 mA: normal working range;
?? 20 mA < current ? 22 mA: out of range, measure above 100% f.s.

(POS. 29) Frequency output value in case of failure [Hz VAL.FAULT=%   XXX]

Setting of the value the frequency output has to be in one case of the following cases:

?? Empty pipe
?? Coils interrupted
?? ADC error

The allowed range is from 0 to 125% of the frequency full scale value.

Although there are not specific rules regulating cases like this one, 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.

This function is active only when one of the output channels is set as frequency.

MENU 5.INPUT

(POS. 30) Total Totaliser + reset enable [T+ RESET =   ON/OFF]

Total direct (positive) flow totalizer reset enable. When this function is active, the totalizer maybe reset applying a voltage on the on/off input or via the keyboard.

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(POS. 31) Partial + totalizer reset enable [P+ RESET =   ON/OFF]

Partial direct (positive) flow totalizer reset enable. See the previous function.

(POS. 32) Total – totalizer reset enable [T- RESET =   ON/OFF]

Total reverse (negative) flow totalizer reset enable. See the previous function.

(POS. 33) Partial – totalizer reset enable [P- RESET =   ON/OFF]

Partial reverse (negative) flow totalizer reset enable. See the previous function.

N.B.: For to make the reset of the totalizer from the key board, proceed with the following mode:
- From visualisation pages A-B (see pages 30-31) push for more than 2 sec. the key ◆ .
- Set the request L2 CODE and then push the key. ◆   The totaliser enabled for the zeroing will visualise the question "RESET TOTALIZ.?". Push for more than 2 sec, the key ◆   to proceed with the zeroing. Push any other key to cancel this operation.

(POS. 34) Totalisers counting lock enable [COUNT LOCK=   ON/OFF]

Totalisers counting lock command enable. When this function is active, applying a voltage on the on/off input terminals the system stops the totalizers no matter which is the flow rate. (see page 22).

(POS. 35) "Autozero" calibration external command enable [CALIBRATION= ON/OFF]

Autozero calibration external command enable. When this function is active, applying a voltage on the on/off input terminals the meter performs a autozero calibration cycle.

ATTENTION: if the voltage pulse is less 1 sec., the meter **performs a calibration cycle** for compensate possible thermal drifts.

if the voltage pulse is more 1 sec, the meter **performs a zero calibration of measure**. This function enables/disables the automatic zero calibration system. It is necessary to perform this function at the first sensor installation or after a long period the sensor has been empty. To perform the sensor it is absolutely necessary the sensor is full of liquid and

that the liquid is perfectly staying still. Even very small movement of the liquid may effect the result of this function, and, consequently, the accuracy of the system.

(POS. 36) Range change external command enable [RANGE CHANGE=   ON/OFF]

Range change external command enable. When this function is enabled, applying a voltage on the on/off input terminals the meter switches to the second measuring range (Fs2).
N.B.: the autorange doesn't allow to use the manual change range (see pos. 22)

(POS. 37) Batch start/stop external command enable [BATCH=   ON/OFF]

Batch start/stop external command enable. (see "BATCH FUNCTIONS")

MENU 6.OUTPUT

(POS. 38) Choice of the function corresponding to on/off output 1 [OUT1=   XXXXXX]

Choice of the function corresponding to digital Output 1. The functions are listed in the table at page 53.

(POS. 39) Choice of the function corresponding to on/off output 2 [OUT2=   XXXXXX]

Choice of the function corresponding to digital Output 2. The functions are listed in the table at page 53.

(POS. 40) Choice of the function corresponding to on/off output 3 [OUT3=   XXXXXX]

Choice of the function corresponding to digital Output 3. The functions are listed in the table at page 53.
Attention: Output 3 is Optional and is mounted on an optional add on module.

(POS. 41) Choice of the function corresponding to on/off output 3 [OUT4=   XXXXXX]

Choice of the function corresponding to digital Output 4. The functions are listed in the table below.
This is the only output which can reach a 12.5 KHz frequency.
<u>Attention</u>: Output 4 is Optional and is mounted on an optional add on module.

FUNCTION FOR OUTPUT 1, 2,3,4

OFF: DISABLED
#1PULS+: PULSE ON CHANNEL 1 FOR POSITIVE FLOW RATE
#1PULS-: PULSE ON CHANNEL 1 FOR NEGATIVE FLOW RATE
#1PULS±: PULSE ON CHANNEL 1 FOR POSITIVE AND NEGATIVE FLOW RATE
#2PULS+: PULSE ON CHANNEL 2 FOR POSITIVE FLOW RATE
#2PULS-: PULSE ON CHANNEL 2 FOR NEGATIVE FLOW RATE
#2PULS±: PULSE ON CHANNEL 2 FOR POSITIVE AND NEGATIVE FLOW RATE
#1FREQ+: FREQUENCY CHANNEL 1 FOR POSITIVE FLOW RATE
#1FREQ-: FREQUENCY CHANNEL 1 FOR NEGATIVE FLOW RATE
#1FREQ±: FREQUENCY CHANNEL 1 FOR POSITIVE AND NEGATIVE FLOW RATE
#2FREQ+: FREQUENCY CHANNEL 2 FOR POSITIVE FLOW RATE
#2FREQ-: FREQUENCY CHANNEL 2 FOR NEGATIVE FLOW RATE
#2FREQ±: FREQUENCY CHANNEL 2 FOR POSITIVE AND NEGATIVE FLOW RATE
SIGN: FLOW DIRECTION OUTPUT (ENERGISED = -)
RANGE: RANGE INDICATION OUTPUT (ENERGISED = SCALE 2)
MAX AL: MAX FLOW RATE OUTPUT(ENERGISED = AL. OFF)
MIN AL: MIN FLOW RATE OUTPUT(ENERGISED = AL. OFF)
MAX+MIN: MAX AND MIN FLOW RATE ALARM OUTPUT (ENERGISED = AL. OFF)
EMPTY PIPE: EMPTY PIPE ALARM OUTPUT (ENERGISED = FULL PIPE)
OVERFLOW.: OUT OF RANGE ALARM OUTPUT (ENERGISED = FLOW RATE OK)
HARDW.AL: CUMULATIVE ALARM OUTPUT (ENERGISED = NO ALARMS)
END BATCH: END BATCH OUTPUT (ENERGISED = BATCH IN PROGRESS)
PREBATCH: PREBATCH OUTPUT (ENERGISED = PREBATCH IN PROGRESS)

(POS. 42) Choice of the function and the range of current output n.1[OUT.mA1=X÷XX   ±]

Choice of the function and the range of current output N.1. The current output N.1 is **optional and it is** <u>mounted on the main board</u>. There are three field to modify for this function:

?? Scale zero: **4** or **0** mA
?? Full scale: **20** or **22** mA
?? Field: **+** = positive, **-** = negative, **?** = both, -0+ = central zero scale

The values corresponding to the scale points are shown in the follwing chart:

CURRENT VALUES IN mA ASSOCIATE TO THE % VALUE OF FULL SCALE					
POSSIBLE FIELD	REVERSE FLOW VALUE		ZERO	DIRECT FLOW VALUE	
	? -110%	-100%	0%	+100%	?+110%
OutmA = 0 ÷ 20 +	0	0	0	20	20
OutmA = 0 ÷ 22 +	0	0	0	20	22
OutmA = 4 ÷ 20 +	4	4	4	20	20
OutmA = 4 ÷ 22 +	4	4	4	20	21.6
OutmA = 0 ÷ 20 -	20	20	0	0	0
OutmA = 0 ÷ 22 -	22	20	0	0	0
OutmA = 4 ÷ 20 -	20	20	4	4	4
OutmA = 4 ÷ 22 -	21.6	20	4	4	4
OutmA = 0 ÷ 20 ±	20	20	0	20	20
OutmA = 0 ÷ 22 ±	22	20	0	20	22
OutmA = 4 ÷ 20 ±	20	20	4	20	20
OutmA = 4 ÷ 22 ±	21.6	20	4	20	21.6
OutmA = 0 ÷ 20 –0+	0	0	10	20	20
OutmA = 0 ÷ 22 –0+	0	1	11	21	22
OutmA = 4 ÷ 20 –0+	4	4	12	20	20
OutmA = 4 ÷ 22 –0+	4	4.8	12.8	20.8	21.6

Example 1 page 52 → (row OutmA = 4 ÷ 22 +)
Example 2 page 52 → (row OutmA = 4 ÷ 20 –0+)

In hardware alarm conditions (interrupt coils, empty pipe, measure error) the current value is programmed by the function "mA VALL. FAULT" (page 49 pos. 28) and it is expressed as percentage of a fixed current range, where: 0% = 0 mA e 110% = 22 mA.

Example 1: out 4÷22 +

I (mA)

21,6 mA

20 mA

4 mA

-110% full scale   -100% full scale   zero   -100% full scale   -110% full sclale

Example 2: out 4÷20 –0+

I (mA)

20 mA

12 mA

4 mA

-110% full scale   -100% full scale   zero   -100% full scale   -110% full scale
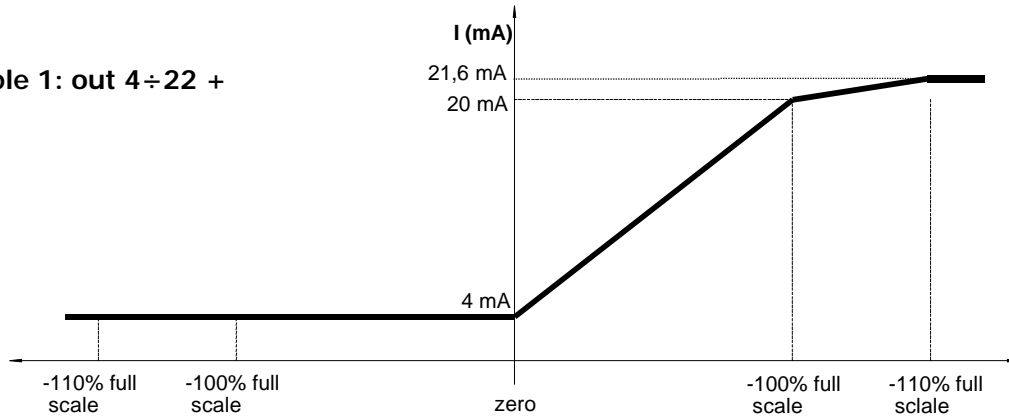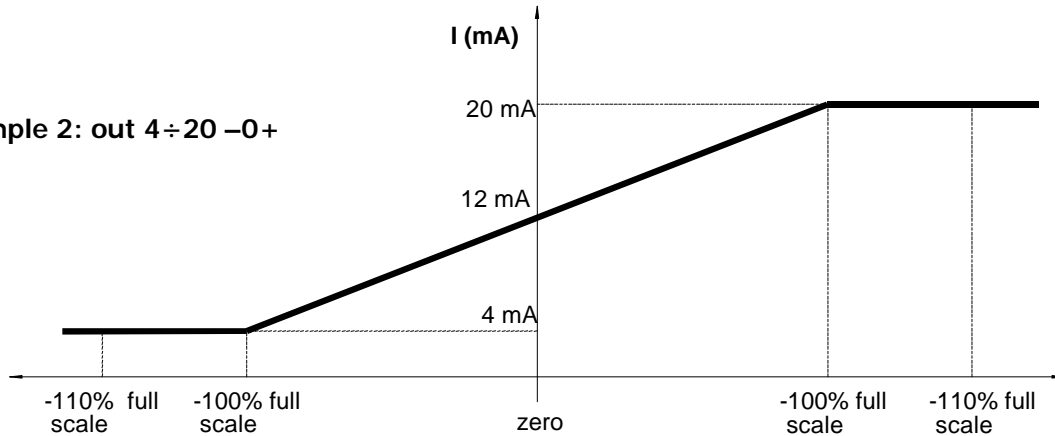
(POS. 43) Choice of the function and the range of current output n.2 [OUTmA2= X÷XX　±]

Choice of the function and the range of current output N.2. Please, refer to the previous function for the possible choices.
The current output N.2 is **optional and it is** mounted on the optional module.

MENU 7.COMMUNICATION

(POS. 44) Network address set [ADDRESS=　　　XXX]

Network address set. The address is to identify the instrument when connected via serial interface. The allowed values are from 0 to 255.

(POS. 45) RS485 serial interface communication speed [SPEED1=　　　XXXXX]

Serial interface communication speed for the RS485 output. This parameter may be set at one of the following values: 2400, 9600, 19200 and 38400 bps.

(POS. 46) RS232 serial interface communication speed / programming [SPEED2=　XXXXX]

Serial interface communication speed for the RS232 output. This parameter may be set at one of the following values:: 2400, 9600, 19200 and 38400 bps.
The RS232 port is **optional** and it is mounted on an optional module.

(POS.47) Print function enable [PRINT=　　　ON/OFF]

Print function enable. The print functions allow the automatic print once every programmed interval of the process data (flow rate, volumes, alarms, batch quantities, date and time). The printing may be got also manually on operator's request. This function is enable with out RS 232.

N.B.: for information on the protocols communications, refer to MI 200 manual.

(POS.47) Totalisers number of decimals set [TOT.DECIMALS=   X]

Totalisers number of decimal figures set. The allowed values are from 0 to 3.

(POS.49) Language [LANGUAGE=   XX]

Choice of the layout language. There are 4 languages available: **E** = english, **I** = Italian, **F** = French,
S = Spanish.

(POS. 50) Display refresh frequency set [DISP.FR(Hz)=   X]

Set of the frequency the data on the display are refreshed at. This parameter effects only the display layout and not the response time of the meter itself. The possible choices are: 0.1 – 0.2 – 0.5 – 1, 2, 5 e 10 Hz.

(POS. 51) Display contrast set [CONTRAST=   X]

Display visual contrast set. This function comes into operation only when leaving the function itself. The allowed values are from 0 to 15. **The contrast can change in relation to ambient temperature, for this reason the contrast set can be change from visualization pages (pag. 30-31 fig. A, B, C, D) pushing the key ⇨ for 8 second or more. In this way the contrast set that will be visualized at release of the key.**

MENU 9.DATA LOGGER

(POS. 52) Automatic data logging enable [ACQUISITION=   ON/OFF]

Automatic data logging enable for volume values. The data are sampled every time interval set on the following function.

(POS. 53) Data logging time interval set [INTERV.(h)=   X]

Sampling time interval for the data logging function and their printing. The allowed values are: 1, 2, 3, 6, 8, 12, 24, 48 hours.

(POS. 54) Date and time set [✍ =   dd/mm/yy hh:mm]

Date and time set. If ME 220 optional module is present, then the time setting is kept also when the power supply is off, otherwise it is frozen till the power supply is back. For example, if the power supply has been off for one hour, when switched on the instrument will be one hour late. **The calendar is valid till year 2091**.
N.B.: date and time are visualized on display only if the data logger is enable.

(POS. 55) Logged data display [DISPLAY DATA]

Displaying of the data stored in the data logger. With this function it is possible to scroll through the gathered data.

(POS. 56) Logged data cancel [CLEAR DATA]

Logged data cancel function. With this function the storage memory is completely emptied.

MENU 10.DIAGNOSTIC

(POS. 57) "Autotest" function enable [SELF TEST]

Meter autotest 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 select it, push key   , at the question: "EXECUTE?" push for more 1 second key ⬧ (for more 1 second) for start autotest, or any other key for delete operation. The result of the test is shown on the display. At the end of operation will have visualized one of visualization page. This function is automatically performed when switching the device on.

(POS. 58) Flow rate simulation enable [SIMULATION]

Flow rate simulation enable. With this function it is possible to enable the function generating an internal signal applied on the input terminals simulating the flow rate, allowing the outputs test and all the instruments connected.
After enable the simulation flow rate it could be:
- set: pushing for more 1 second the key ⏭ from one of four visualization pages
- start: pushing the key ✦ after set it
- finished: pushing for more 1 second the key ⏭ from visualization pages and then pushing for more 1 second the key ✦ .
N.B.: the enable of flow rate simulation disable the contrast regulation with the key ⏭ (Pos. 51) and yhe access to main menu.

MENU 11.INTERNAL DATA

(POS. 59) Level 2 access code set [L2 KEYCODE=   XXXXX]

Level 2 access code enter. This code is programmable by the user within the range 00001 - 65535. Setting such a value at 22222 the access code for levels lower than level 3 is disabled. (see pag.33)

(POS. 60) Block level [BLOCK LEVEL =X]

Block level function can be set from 0 to 3. Every level enables and disables the use of specific functions (see pag.34).
N.B.: the block levels are enabled only if the dip-switches on the back of converter are on (turn on the small levels towards the symbol of the padlock)

(POS. 61) Load factory pre-settings [LOAD FACT PRES.]

Loads the pre-set programming of the factory. Any previous programming is cancelled getting back to the manufacturer's standard values

(POS. 62) Load user pre-settings [LOAD USER PRES.]

This function recalls the values saved from the user.

(POS. 63) Save user pre-settings [SAVE USER PRES.]

This function saves the current programming as user pre-settings.

Alarm messages, causes and actions to be taken

Message	Cause	Action to take
MAX ALARM	The flow rate is higher than the maximum threshold set	Check the maximum flow rate threshold set and the process conditions
MIN ALARM	The flow rate is lower than the minimum threshold set	Check the minimum flow rate threshold set and the process conditions
FLOW RATE >FS	The flow rate is higher than the full scale value set on the instrument	Check the full scale value set on the instrument and the process conditions
PULSE/FREQ>FS	The pulse generation output of the device is saturated and cannot generate	Set a bigger unit of volume or, if the connected counting device allows it, reduce the pulse duration value
EMPTY PIPE	The measuring pipe is empty or the detection system has not been properly calibrated	Check whether the pipe is empty or perform again the empty pipe function calibration procedure
INPUT NOISY	The measure is strongly effected by external noise or the cable connected the converter to the sensor is broken	Check the status of the cables connecting the sensor to the converter, the grounding connections of the devices or the possible presence of strong and anomalous noise sources
EXCITATION FAIL	The coils or the cable connecting the sensor to the converter are interrupted	Check the status of the cables connecting the sensor to the converter

Anomalies codes, intrpretation flags

CODES	ANOMALIE DESCRIPTIONS	ACTION TO TAKE
0001	problem with watch-dog circuit	
0002	wrong configuration work data in eeprom	
0004	wrong configuration safety data in flash eeprom	
0008	defective eeprom	
0010	defective keyboard (one or more key are pushed during the test)	ADDRESSING TO SERVICE
0020	reference voltage out range	
0040	Power supply voltage (+13) is too low (<10V)	
0080	Power supply voltage (+13) it's too high (>14V)	
0100	initialization error ADC primary of system	
0200	timeout calibration input (input circuit is broken)	
0400	Gain input stage is out range	Check the status of the cables connecting the sensor to the converter, the grounding connections of the devices or the possible presence of strong and anomalous noise sources
0800	Interruption coils circuit	Check the status of the cables connecting the sensor to the converter

MEANING OF FLAG TO DISPLAY (see pag. 30)	
FLAG	**DESCRIZIONE**
M	Allarm max activated
m	Allarm min activated
!	- Interruption coils circuit - Segnal error - Empty pipe
C	Calibration active
S	Simulation active
⎍	Full output pulse

BATCH FUNCTION.

ENABLE BATCH

Enable one of the following functions to enable and program the batch on the converter:

Menu: 5.INPUT:
- BATCH (page 52 pos. 37)= **Enable this function (on)**

Menu   6.OUTPUT:
- OUT.1/OUT.2 (page 52 pos. 38-39) = **BATCH AND PRE-BATCH**

The value of batch (quantity batch) is setting from visualizzation page (see page 63)

Output for pre-batch:

6.Output: OUT.1=   END BATCH*/PREBATCH*
               OUT.2=   END BATCH*/PREBATCH*

END BATCH = output signal of end batch, PREBATCH = output signal of pre-batch

When the "batch outputs" are enable is possible to set the values of pre-batch and compensation:

VPRE=   pre-batch value: set the volume of liquid at which you want to enable the pre-batch.

At the pre-batch volume "V Pre" the output (if enabled) is de-energised.

This value is constant for all quantity to batch and must be set in current unit of measure of volume

The pre-batch function is useful when you need fast and accurate fillings.

VCOM=   Compensation value: set the volume dosed in excess because of system delays, like valve closure, pump stop, motor stop, etc.. It is recommended to run some test batch to learn this value.

N.B.: the output functions, for batch (batch and prebatch) can be also associate to the additonal module outputs

ML 200: VISUALIZATION PAGE WITH BATCH FUNCTION IN PROGRESS

Visualizzation:
1) batch off: n° batch effected
2) batch on: decreases safety timer
3) programming: programming safety timer max 6000 sec.
If timer = 0 timer disabled

Dosing in progress

Name product

Programming N° formula

```
1     +2.3829
dm³/s
        ↓ 65535
T+dm³  35805.339
P+dm³  35805.339
STdm³       .000
CTdm³       .000
 01/01/92  08:48
```

Programming qauntity batch

Visualizzation product batch

PROGRAMMING BATCH

N.B.: For each formula you can associate:
Product quantity
Product name
Maximum time for batch (safety time for each formula)

After activating the batch function (menu 5):
⬆ PUSH FOR 2 sec.

| CODE   L2:00000 | INPUT CODE

| ST 00 | CHOOSE THE FORMULA NUMBER FOR
ASSOCIATE QUANTITY BATCH (BETWEEN 00 AND 15)

➡

| 000.000 | INPUT QUANTITY PRODUCT FOR EACH BATCH

◆ PUSH FOR 2 sec.

| ⬜⬜⬜⬜⬜⬜⬜⬜ | INPUT PRODUCT NAME FOR BATCH (max 8 characters.):
(ese ⬆ key for choose the character, use ➡ key for advance)

➡

| S 0000.0 | INPUT MAXIMUM TIME FOR BATCH
If timer = 0, safety timer disabled
max time set = 6000 sec.

◆

START/STOP BATCH:

- From remote input (page 26)
- From key ⬆ on the keyboard.

The remote input and the button on the keyboard have the follwing function:

SHORT PRESSING/PULSE INPUT =

      START (on display appears the batch in progress symbol: ♣)

      STOP (on display disappears the batch in progress symbol: ♣)

After a stop during a batch, is possible:
- **Keyboard**
  Start the batch from interrupting point
 Reset the active batch: long pression of key ⬆ and key ◈

- **Remote input** (see page 26)

IMPORTANT NOTES

The start of the batch disables the following function:
- Reverse totalizer : visualization and pulse emission
- Reset reverse totalizer (page 51 pos. 32-33)
- Lock totalizer (page 51 pos. 34)
- Energy saving (page 48 pos. 23)
- Data logger (page 57 menu 9)
- Calibration (page 47 pos. 21, page 51 pos. 35)

To optimize the performances of meter used like a batch instrument, it is recommended to set them as close as possible to the of plant, choosing the opportune values of time constant (pos. 17) and acceleration threshold (pos. 18).

START UP AND MAINTENANCE OF THE INSTRUMENTS

BEFORE STARTING UP THE INSTRUMENT PLEASE VERIFY THE FOLLOWING :

- Power supply voltage must correspond to that specified in the name plate
- Electric connections must be done as described at page 24
- Ground connections must be done as described at page 22-23

VERIFY PERIODICALLY:
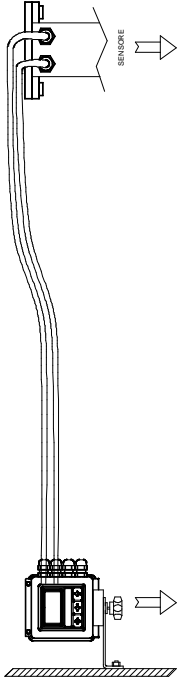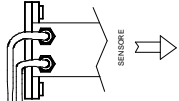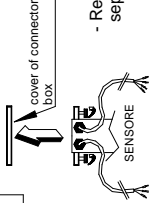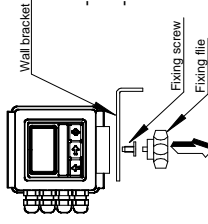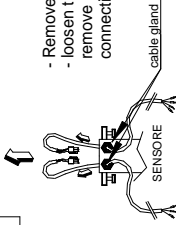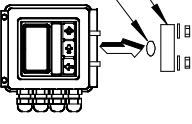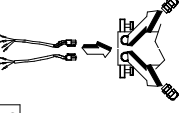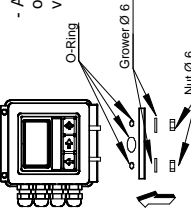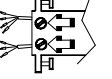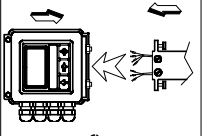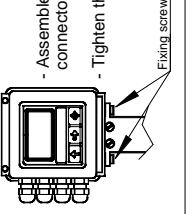
- The integrity of the power supply cables, wiring and other electrical parts connected
- The integrity of the instrument's housing (this must not have bruises or other damages that may compromises the hermetical sealing)
- The tightening of the sealing elements (cable glands, covers, etc.)
- The integrity of the front panel (display and keyboard), damages may compromise the sealing
- The mechanical fixing of the instrument on the pipe or on the wall stand

1

- Remuve the fixing screw and separate the sensor from converter by remuving the connectors

Connection box section

2

- Remuve the corcks

- Cover
- Power supply
- Disconnect the cable from terminal
- Unthread the cables from converter

Rear converter

3

Electrode connector (3 cavi)

Nut of cable gland

- Insert the cable in the connector box like in picture aside

Coil connector (2 cable)

- Uncrew the 6MA nuts and remuve the fixing plate for compact version

O-Ring

Grower Ø 6

6 MA nuts

4

- Insert the connectors in the connectors assemblate to the connectors plate
- Insert the cables in the connectors box and tighten nuts and cable gland

- Assemble the fixing plate for separate version like in picture aside

O-Ring 2056
Fixing plate
Grower Ø 6
6 MA nuts

5

- Insert the I'O-Ring in the appropriate seating

- Assemble the cover to the connection box by screwing the fixing screw

cover of connection box

O-RING 155

- Tighten the fixing screw

- Screw the fixing file

Wall bracket

Fixing screw (tighten strongly)

Fixing file

6

- Make the electric connections following the indication listed in section: "Electrical connection" of meter operative manual

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TRASFORMATION CONVERTER FROM SEPARATE VERSION TO COMPACT VERSION

IT019

CONVERTITORI
ML 190
ML 200
ML 201
ML 202

SENSORI
MS 500
MS 1000
MS 2400
MS 2500
MS 3700
MS 3770

SENSORE

1
- Disconnect the cables from terminal
- Remove the cable from the converter

Cover
Rear converter

cover of connector box
SENSORE

- Remuve the cover of separate version

2
- Unscrew the fixing flie
- Unscrew the fixing screw

Wall bracket
Fixing screw
Fixing flie

- Remove the connector
- loosen the cable gland and remove the cable from connection box

cable gland
SENSORE

3
- Uncrew the nut and unthread the fixing plate of separate version

O-Ring 2056
Fixing plate

- Insert the connector of compact version nei connettori femmina (polarized connector)
- Remove the cable gland

4
- Assemble the fixing plate of compact version like visualized in pic. 1

O-Ring
Grower Ø 6
Nut Ø 6

- Insert the corcks PG 9 inclusive in the kit and tighten the corks with the appropriate nuts

5
- Insert the cable in the hole of box converter

- Assemble the box converter to connector box
- Tighten the fixing screw

Fixing screw

N.B.: For the connections of cables to the converter see section: "Electrical connections" of operative manual

C:\UFFICIO TECNICO\MANUALI\ML200\ML200 INGLESE\

APPENDIX 2

ND	MEASURING RANGE	
	min. 0….. 0,4 m/s	max. 0….. 10 m/s
3	0...................................10l/h	0................................250l/h
6	0...................................40l/h	0..............................1000l/h
10	0.................................120l/h	0..............................3000l/h
15	0.................................240l/h	0..............................6000l/h
20	0.................................500l/h	0............................12500l/h
25	0..............................0,72m³/h	0................................18m³/h
32	0..............................1,60m³/h	0................................29m³/h
40	0..............................1,80m³/h	0................................45m³/h
50	0..............................2,88m³/h	0................................72m³/h
65	0..............................4,80m³/h	0..............................120m³/h
80	0..............................7,20m³/h	0..............................180m³/h
100	0............................11,20m³/h	0..............................280m³/h
125	0............................17,67m³/h	0..............................442m³/h
150	0............................25,60m³/h	0..............................640m³/h
200	0............................45,20m³/h	0............................1130m³/h
250	0............................70,80m³/h	0............................1770m³/h
300	0..........................100,80m³/h	0............................2520m³/h
350	0..........................138,00m³/h	0............................3450m³/h
400	0..........................180,00m³/h	0............................4500m³/h
450	0..........................228,80m³/h	0............................5720m³/h
500	0..........................284,00m³/h	0............................7100m³/h
600	0..........................408,00m³/h	0..........................10200m³/h
700	0..........................560,00m³/h	0..........................14000m³/h
800	0..........................720,00m³/h	0..........................18000m³/h
900	0..........................920,00m³/h	0..........................23000m³/h
1000	0........................1140,00m³/h	0..........................28500m³/h
1200	0........................1600,00m³/h	0..........................40000m³/h
1400	0........................2200,00m³/h	0..........................55000m³/h
1600	0........................2880,00m³/h	0..........................72000m³/h
1800	0........................3640,00m³/h	0..........................91000m³/h
2000	0........................4520,00m³/h	0........................113000m³/h

ND SELECTION

The suitable nominal diameter can be determine by means of the tables aside. The flow velocity is also determined by the fluid properties:

- for "acqueous" solutions, full scale velocity within: 0,4÷10 m/s
- for fluids tending to form deposits within the measuring section, should be above 2 m/s
- for abrasive fluids, the velocity must be less than 2 m/s

If there isn't any specific full scale indication, the intrument is calibrated at a f.s. flow rate corresponding to a 3 m/s liquid speed

INTERNAL DIAMETER OF SENSORS

SENSOR	ND	PTFE LINING
MS 500	3	3
	6	6
	10	10
	15	15
	20	19
MS 2400	25	23
	32	36
	40	36
	50	48
	65	61
	80	74
	100	99

SENSOR	ND	LINING		
		PP	PTFE	EBONITE
MS 1000	25	22	23	
	32	30	30	
	40	34	37	
	50	45	48	
	65	62	61	
	80	74	75	
	100	96	99	
	125	122	122	
	150	150	150	
	200		203	203
	250		257	257
	300		308	308
	350		340	340
	400		390	390

SENSOR	ND	LINING													
		PP	PTFE						EBONITE						
			PN 10	PN 16	PN 25	PN 40	ANSI 150	ANSI 300	PN 10	PN 16	PN 25	PN 40	PN 64	ANSI 150	ANSI 300
MS 2500	25	22		23		23	23	23							
	32	30		30		30	30	30							
	40	34		37		37	37	37							
	50	45		48		48	48	48							
	65	62		61		61	61	61							
	80	74		75		75	75	75							
	100	96		99		99	99	99							
	125	122		122		122	122	120							
	150	150		150		150	150	148							
	200		203	203	199	197	203	195	203	203	199	197	193	203	195
	250		257	257	253	251	257	249	257	257	253	251	228	257	249
	300		308	308	304	298	308	300	308	308	304	298	271	308	300
	350		340	340	334	330	340	325	340	340	334	330	300	340	325
	400		390	390	384	376	390	372	390	390	384	376	344	390	372
	450		439	437			439	423	439	437				439	423
	500		490	488			490	468	490	488				490	468
	600		590	590			590	560	590	590				590	560
	650						642							642	
	700		691	685					691	685					
	800		778						778						
	900		892						892						
	1000		990						990						

N.B.: The tollerance on this values is ± 10%

APPENDIX 3

ERROR CURVE WITH CONVERTER ML 200

C:\UFFICIO TECNICO\MANUALI\ML200\ML200 INGLESE\
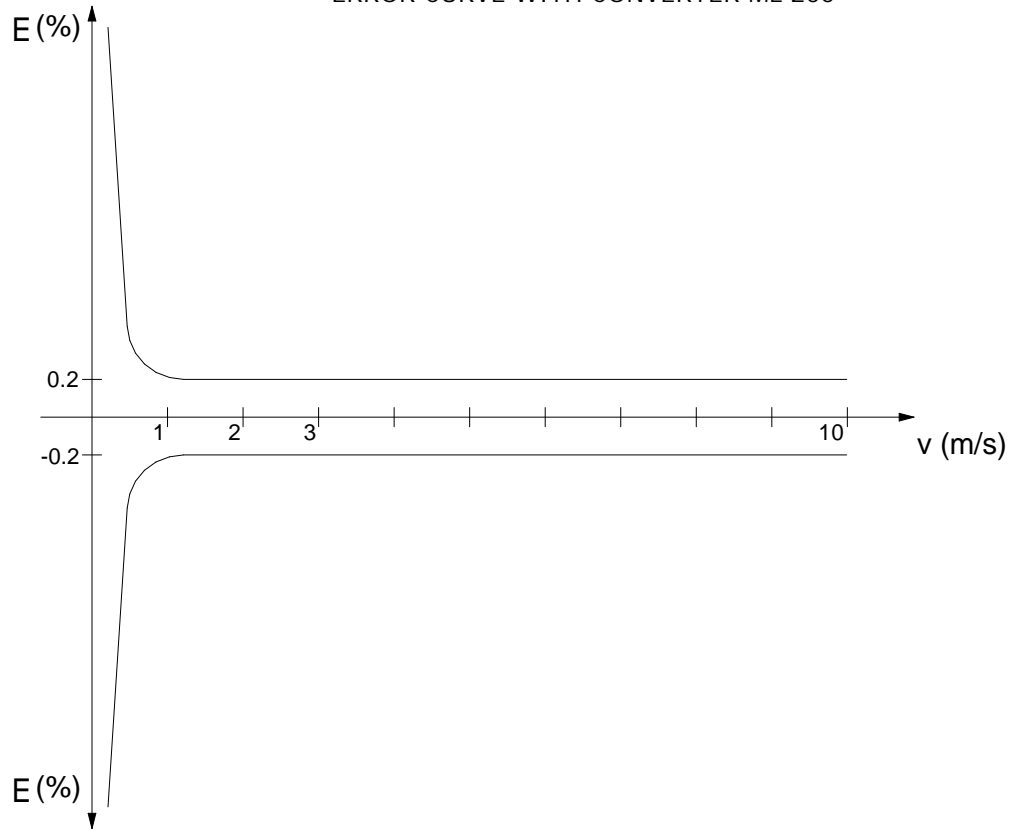
DECLARATION OF CONFORMITY
according to ISO / IEC Guide 22 and EN 45014

ISOIL S.p.A.
Via F.lli Gracchi n° 27
20092 Cinisello Balsamo MI ITALY

Product's name: **Converter for electromagnetic flow meter**
Model: **ML 190 - ML 200 – ML201 – ML 202 (HV, LV, LLV versions)**
Option: **ALL applicable**

ISOIL S.p.A. declares that the above mentioned products satisfy the following requirements:

Safety: **EN61010**, dielectric strength = 4 kV, installation category II, IP67

EMC: **EN55011** (150 kHz – 30 MHz): Group 1, class **B**
        EN55011 (30 MHz – 1GHz): Group 1, class **B**
        IEC 1000-4-2: **6 kV** CD, **8 kV** AD
        IEC 1000-4-3 (f = 80 MHz – 1 GHz, antenna at 3 m, AM modulation 1kHz 80%): **10 V/m**
        IEC 1000-4-3 (f = 900MHz, antenna at 3 m, AM modulation 200 Hz 100%): **10 V/m**
        IEC 1000-4-4: **4 kV** on all ports
        IEC 1000-4-5: (**2kV** differential / 4kV common mode) on main supply port
        IEC 1000-4-6 (f = 150 kHz – 80 MHz, AM modulation 1 kHz 80%): **10 V**
        IEC 1000-4-11