Electromagnetic flowmeters

MAG 5000/6000 19“ & safety barrier Ex e ia

Operating Instructions • 07/2010

SITRANS F

SIEMENS

Contents

1. Introduction

1. Introduction

⚠ For safety reasons it is important that the following points, especially the points marked with a warning sign, are read and understood before the system is being installed:

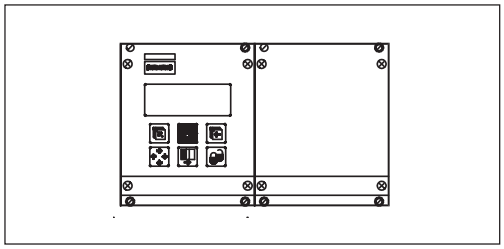
- Installation, connection, commissioning and service must be carried out by personnel who are qualified and authorized to do so.
- It is very important that the same people have read and understood the instructions and directions provided in this manual and that they follow the instructions and directions before putting the equipment into use!
- People who are authorized and trained by the owner of the equipment may operate the equipment.
- The installation must ensure that the measuring system is correctly connected and is in accordance with the connection diagram. The transmitter has to be earthed by means of 4 mm^2 potential equalising conductor.
- In applications where the operating pressure or media can be hazardous in the event of a pipe failure, we recommend that special precautions are taken during the installation of the sensor, such as sensor location, guarding or the use of a pressure relief valve.
- Siemens Flow Instruments can provide assistance with the selection of sensor parts in contact with the media. However, the full responsibility for the selection rests with the customer and Siemens Flow Instruments can take no responsibility for any failure due to material incompatibility.
- Equipment used in hazardous areas must be Ex-approved and marked ⟨Ex⟩ .

  It is required that the "Special Conditions for Safe Use" provided in the manual and in the Ex certificate must be followed!
- Installation of the equipment must comply with national regulations.
  Example EN 60079-14 for the European Community.
- Repair and service can be done by approved Siemens Flow Instruments personnel only.

2. Installation

2.1 Installation of transmitter MAG 5000/6000 19"

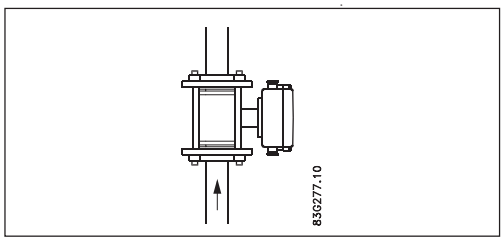
⚠ *Safe area only!*



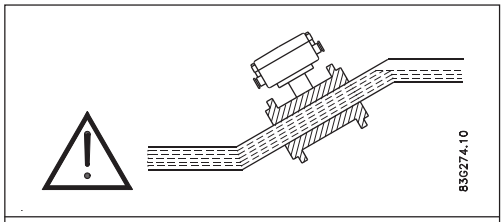
Transmitter MAG 5000/6000 19" must be installed in the **safe area only!**

2.2 Installation of sensor

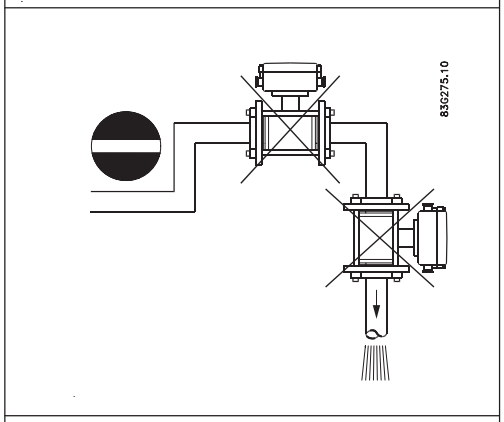
⚠ *Hazardous area*



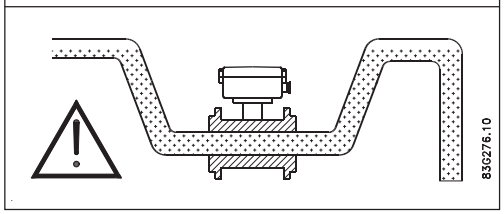
Category 2 equipment
Sensors may be installed in zone 1 and zone 2.



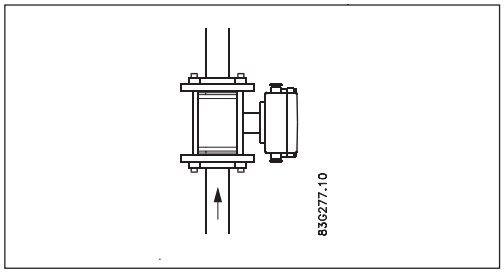
The sensor must always be completely full with liquid.



Therefore avoid:
- Installation at the highest point in the pipe system
- Installation in vertical pipes with free outlet

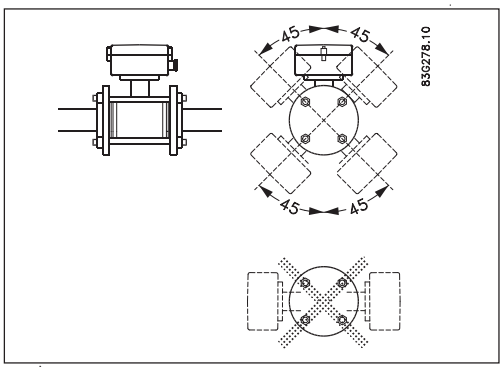


For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-tube.

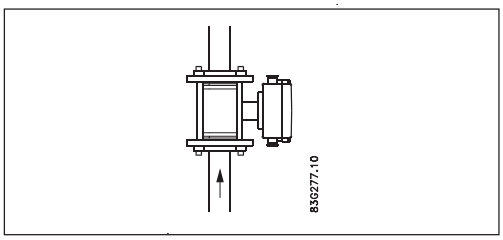


Installation in vertical pipes
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.

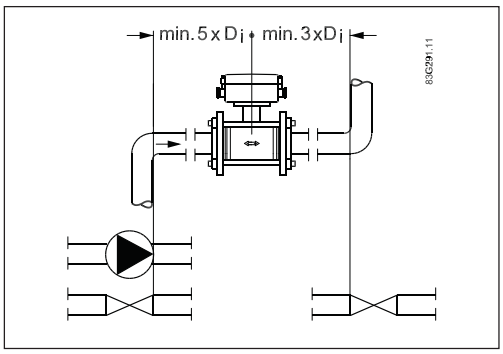
2.2 Installation of sensor *(continued)*



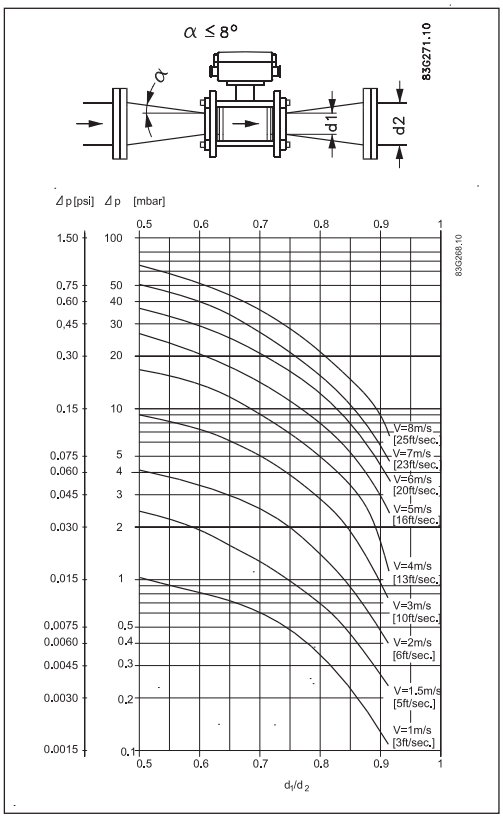
Installation in horizontal pipes
The sensor must be mounted as shown in the upper figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.
If using empty pipe detection the sensor can be tilted 45°, as shown in the upper figure.



Measuring abrasive liquids and liquids containing particles
Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



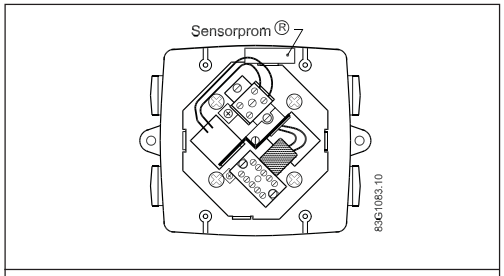
Inlet and outlet conditions
To achieve accurate flow measurement it is essential to have straight lengths of inlet and outlet pipes and a certain distance between pumps and valves.
It is also important to centre the flowmeter in relation to pipe flanges and gaskets.



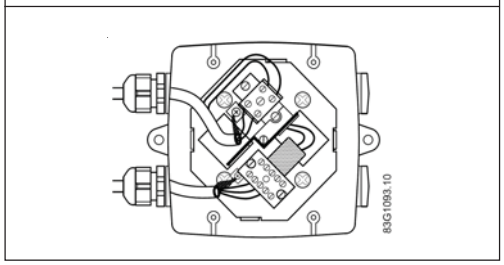
Installation in large pipes
The flowmeter can be installed between two reducers (e.g. DIN 28545). Assuming that at 8° the following pressure drop curve applies. The curves are applicable to water.

Example:
A flow velocity of 3 m/s (V) in a sensor with a diameter reduction from DN 100 to DN 80 ($d_1/d_2 = 0.8$) gives a pressure drop of 2.9 mbar.

2.3.1 Remote installation - *At the sensor*

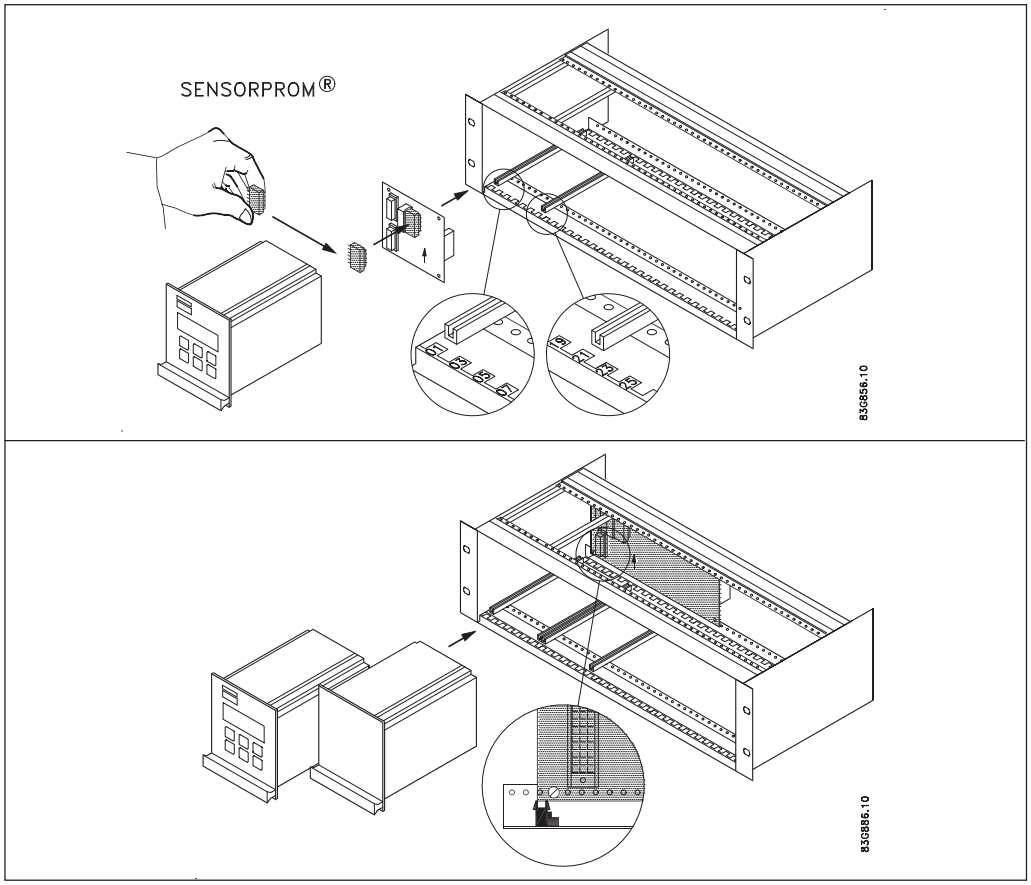


Remove the SENSORPROM® unit from the sensor and mount it on the connection plate in the transmitter.



Fit and connect the electrode and coil cables as shown in “Electrical connections” in the handbook.
The unscreened cable ends must be kept as short as possible.
The electrode cable and the coil cable must be kept separate to prevent interference. Wire insulation must extend to within 0,5mm of the conductor clamps in the coil terminal block.
Tighten the cable glands well to obtain optimum sealing.

2.3.2 Remote installation - *Transmitter in 19" insert*



1. Fit the SENSORPROM® memory unit on the connection board supplied with the transmitter. The SENSORPROM® unit is supplied with the sensor in the terminal box.
2. Mount the guide rails into the rack system as shown. Distance between guide rails is 20 TE. Guide rails are supplied with the rack system and not with the transmitter.
3. Mount the connection board as shown.
4. Connect the cables as shown under "Electrical connection", in the handbook.
5. Insert the transmitter into the rack system.

2.4 Ex survey according to Directive 94/9/EC (ATEX)

as an example: **II | 2G | | Ex | d | IIC | T3-T6**

Directive 94/9/EC (ATEX)

Instrument groups

I	Applies to instruments used in underground mining operations, as well as their above ground operations, which can be endangered by mine gas and/or flammable dusts.
II	Applies to instruments used in the remaining areas which can be endangered by a potentially explosive atmosphere.

Instrument category

Labelling with gases	*Labelling with dusts*	*Definition*
1G (0)	**1D** (20)	Instruments of this category are for use in areas where ignitable atmospheres, caused by a mixture of air and gasses, vapours or mists or by dust/air mixtures, can exist all of the time or for long periods of time or else frequently.
2G (1)	**2D** (21)	Instruments of this category are for use in areas where ignitable atmospheres caused, by a mixture of air and gasses, vapours or mists or by dust/air mixtures, can exist some of the time.
3G (2)	**3D** (22)	Instruments of this category are for use in areas where ignitable atmospheres, caused by a mixture of air and gasses, vapours or mists or by dust/air mixtures, are not likely to exist. However, if they do occur then in all probability, only seldom or for short periods of time.

(The figures in brackets refer to IEC)

EN/IEC 60079-10

Explosion protected electrial equipment = Ex

Type of protection

Ex protection labelling in square brackets refers to "Associated electrical equipment"

o	Oil encapsulated	i	Intrinsic safety (ia, ib)
p	Pressurized apparatus	n	Non-incentive equipment
q	Powder filling	m	Encapsulation
d	Flameproof enclosure	s	Special protection
e	Increased safety		

Explosion groups

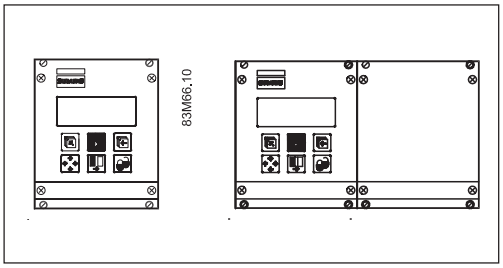
Gases and vapours (examples)	*Minimum ignition energy [mJ]*	*EN/ IEC*
• Ammonia	-	IIA
• Acetone, aircraft fuel, benzine, crude oil, diesel oil, ethane, ethanoic acid, ether, gasolines, heating oil, hexane, methane, propane	0.18	IIA
• Ethylene, isoprene, town gas	0.06	IIB
• Acetylene, carbon disulphide, hydrogen	0.02	IIC

Ignition temperature

Maximum surface temperature		*EN / IEC*
450°C	842°F	T1
300°C	572°F	T2
200°C	392°F	T3
135°C	275°F	T4
100°C	212°F	T5
85°C	185°F	T6

2.5 Overview and intrinsically safe data

⚠ ***MAG 5000/6000 19" IP 20 & IP 65***



Can ***only*** be installed in **safe area!**

Specifications:
Supply: 115-230 V or 24 V

Ambient temperature: –20 to 50°C
Enclosure: IP 20 or IP 65

Terminals **82-83**

IS data transmitter

MAG barriers	ia electrode
U_o	9.3 V
I_o	40 mA
P_o	0.4 W
L_o	23 mH
C_o	500 nF

MAG 1100 Ex & MAG 3100 Ex

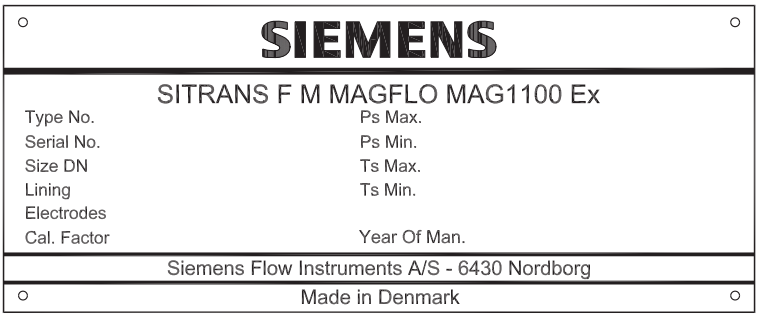
All MAG 1100 Ex and MAG 3100 Ex sensors have the following ratings and input parameters:

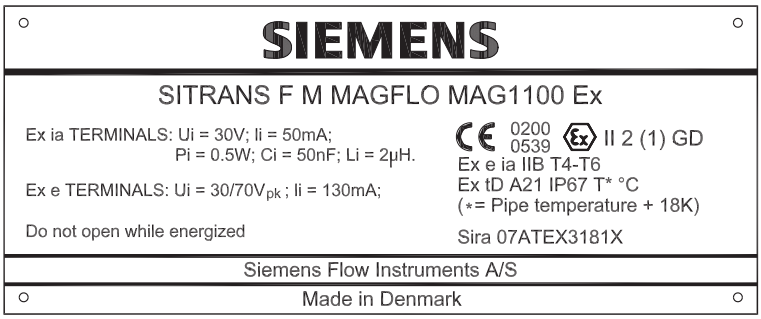
Category 2 equipment
Sensors may be installed in zone 1 and zone 2.

Sensors intrinsically safe data

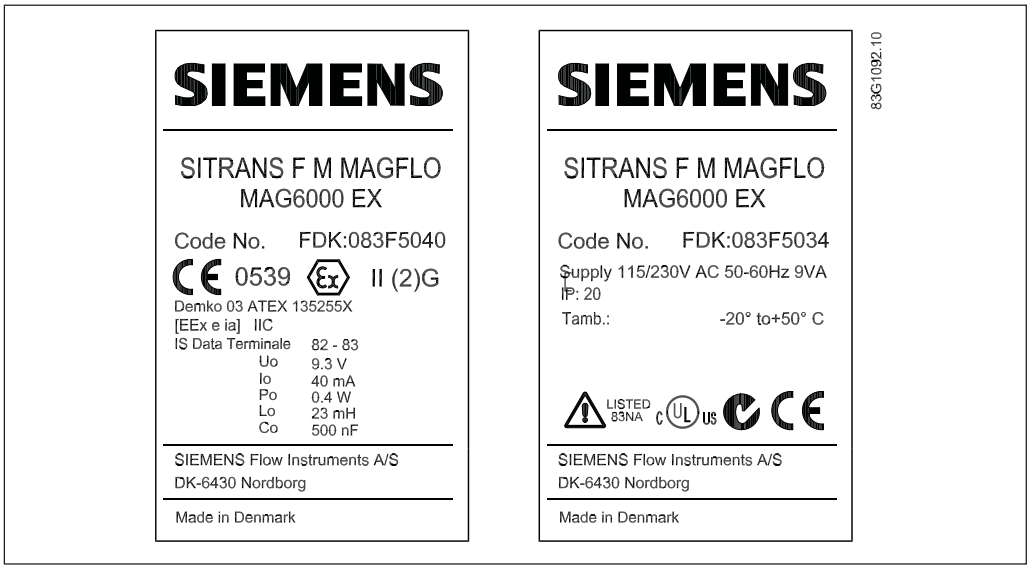
Terminals MAG sensor	85-86 coil	82-83 electrode
U_i	30/70 Vpk	30 V
I_i	130 mA	50 mA
P_i	-	0.5 W
L_i	-	2 µH
C_i	-	50 nF

2.6 Device identification examples (MAG 1100 Ex labels shown)





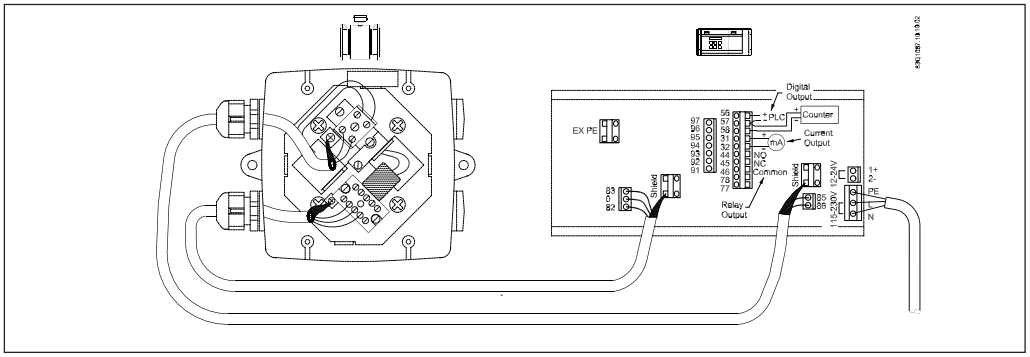
Example
Transmitter
MAG 5000/6000 19" IP 20
and IP 65 label



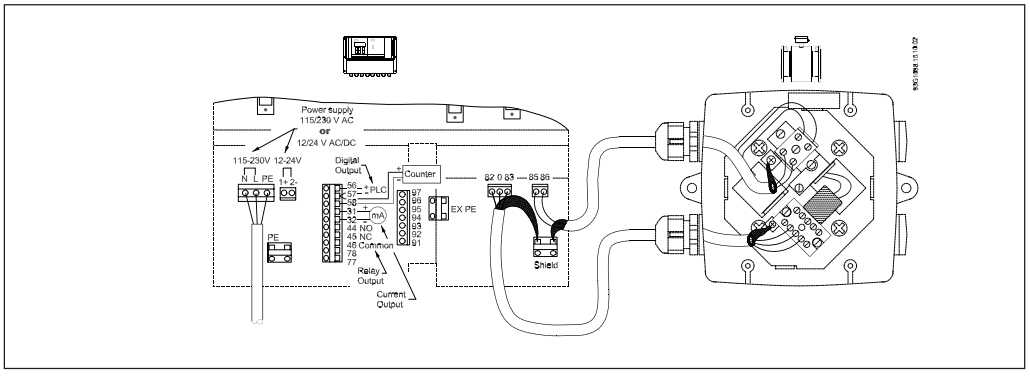
3. Electrical connection

3. Electrical connection

3.1.1 19” IP 20 version Ex e (ia)



3.1.2 19” IP 66 version Ex e (ia)



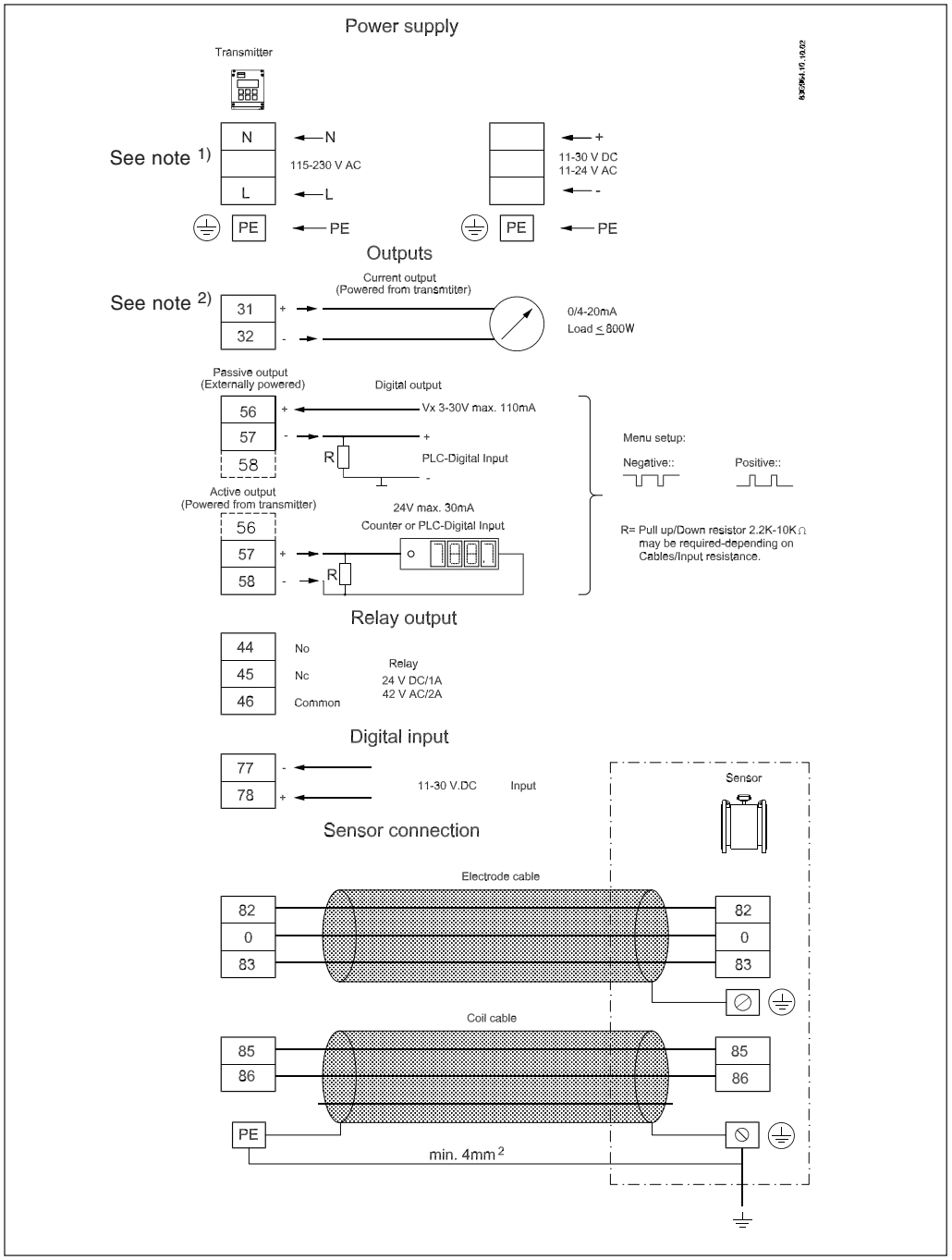
1. **Connection terminals to:**
   - Power supply
   - In- and output
2. **Connection terminals to:**
   Sensors

⚠ Intrinsically safe terminals!

It is an absolute requirement that the terminations of intrinsically safe circuits should be separated by at least 50 mm from any other bare conductor.

Incoming cables should be segregated and kept as short as possible.
The Ex "e" (coil) connections should be stripped such that conductor insulation is within 0.5 mm of cable clamps in the terminal block.

3.2 Transmitter MAG 5000/6000 19"



Installation

⚠ 1) Mains supply 115 to 230 V AC from building installation Class II. A switch or circuit-breaker (max. 15 A) shall be included in the building installation. It must be in close proximity to the equipment and within easy reach of the OPERATOR, and it shall be marked as the disconnecting device for the equipment.

⏚ 2) Protective conductor terminal. Required cable min. AGW16 or 1.5□ Cu.
The insulation between the connected mains supply and 24 V AC/DC supply for the flowmeters, models 24 V AC/DC shall at least be rated with double or reinforced insulation at mains voltage.

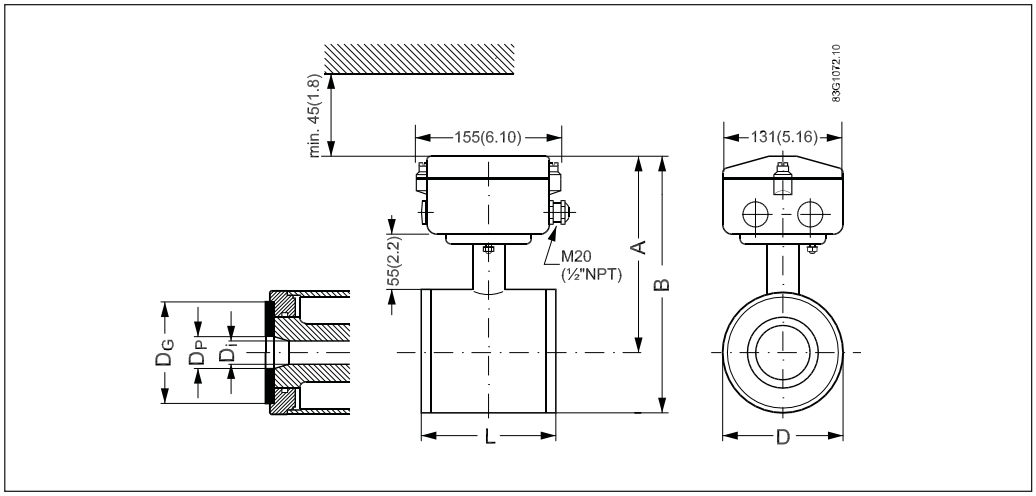
For field wiring installation **National Installation Code** shall be met of the country, where the flowmeters are installed.

Digital output
If the internal resistance of the loads exceeds 10KΩ, it is recommended to connect an external 10KΩ load resistor in parallel to the load.

4. Technical data

4.1.1 Dimensions and weight MAG 1100 Ex

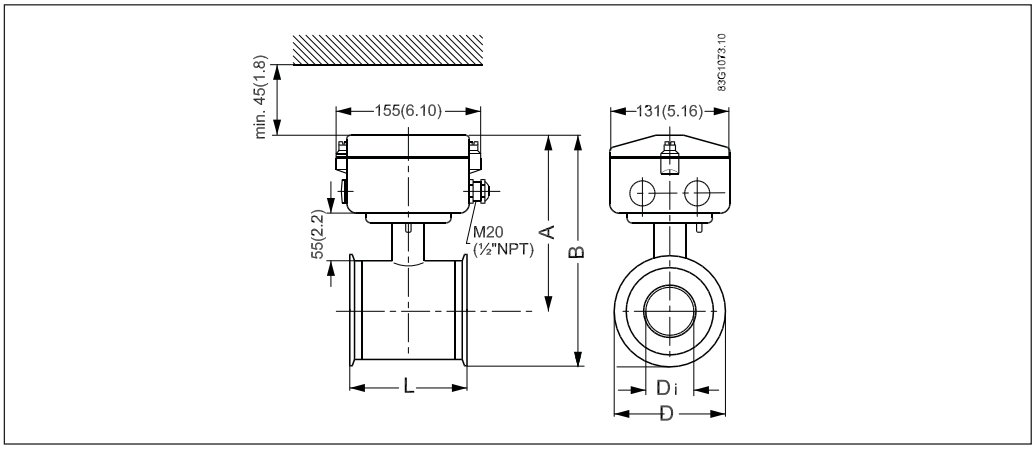
MAG 1100 Ex



DN	A [mm]	B [mm]	D [mm]	D_i [mm]	D_p [mm]	D_G Ceramic [mm]	Weight [kg]
2	148	173	48.3	2	17.3	34	2.2
3	148	173	48.3	3	17.3	34	2.2
6	148	173	48.3	6	17.3	34	2.2
10	148	173	48.3	10	17.3	34	2.2
15	148	173	48.3	15	17.3	40	2.2
25	156	188	63.4	25	28.5	56	2.7
40	168	210	84.0	40	43.4	75	3.4
50	176	227	101.6	50	54.5	90	4.2
65	186	246	120.0	65	62.5	112	5.5
80	192	258	133.0	80	82.5	124	7.0
100	205	284	159.0	100	107.1	150	10.0

4.1.2 Dimensions and weight MAG 1100 FOOD Ex

MAG 1100 FOOD Ex



DN	L [mm]	A [mm]	B [mm]	D [mm]	D_i Ceramic [mm]	Weight [kg]
10	64	148	180.0	64.0	10	2.2
15	64	148	180.0	64.0	15	2.2
25	79	156	194.8	77.5	25	2.7
40	94	168	213.5	91.0	40	3.4
50	104	176	235.5	119.0	50	4.2
65	131	186	251.0	130.0	65	5.5
80	156	192	269.5	155.0	80	7.0
100	186	205	296.5	183.0	100	10.0

4.1.3 Sensor MAG 1100 Ex

Version	**MAG 1100 Ex**	**MAG 1100 HT Ex** (High temperature)
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency	DN 2...65 (1/12“ … 2½”): 12.5 Hz DN 80, 100 (3”, 4”): 6.25 Hz	DN 15...50 (1“ … 2”): 12.5 Hz DN 80, 100 (3”, 4”): 6.25 Hz
Process connection		
Nominal size		
MAG 1100 (Ceramic)	DN 2…DN 100 (1/12"…4")	DN 15…DN 100 (½”…4")
Mating flanges	EN 1092-1 (DIN 2501), ANSI B16.5 class 150 and 300 or equivalent	EN 1092-1 (DIN 2501), ANSI B16.5 class 150 and 300 or equivalent
	Option: DN 2...10 (1/12”...3/8”): G½”/NPT ½” pipe connection adapters	
Rated operating conditions		
Ambient conditions		
Ambient temperature		
• Sensor	-20…+60°C (-4…+140°F)	-20…+60°C (-4…+140°F)[1)]
Temperature of medium		
• MAG 1100 (Ceramic)	-20…+150°C (-4…+300°F)	-20…+180°C (-4…+356°F)
Temperature shock		
• MAG 1100 (Ceramic)		
Duration ≤ 1 min, followed by 10 min rest	DN 2, 3 (1/12”, 1/8”) No limitations	
	DN 6, 10, 15, 25: Max. ΔT ≤ 80°C/min (¼”, 3/8”, ½”, 1”: Max. ΔT ≤ 80 K/min)	DN 15, 25: Max. ΔT ≤ 80°C/min (½”, 1”: Max. ΔT ≤ 80 K/min)
	DN 40, 50, 65: Max. ΔT ≤ 70°C/min (1½”, 2”, 2½”: Max. ΔT ≤ 70 K/min)	DN 40, 50: Max. ΔT ≤ 70°C/min (1½”, 2”: Max. ΔT ≤ 70 K/min)
	DN 80, 100: Max. ΔT ≤ 60°C/min (3”, 4”: Max. ΔT ≤ 60 K/min)	DN 80, 100: Max. ΔT ≤ 60°C/min (3”, 4”: Max. ΔT ≤ 60 K/min)
Operating pressure		
• MAG 1100 (Ceramic)	DN 2...65: 40 bar (1/12”…2½”: 580 psi)	DN 15...50: 40 bar (½”…2”: 580 psi)
	DN 80: 37.5 bar (3”: 540 psi)	DN 80: 37.5 bar (3”: 540 psi)
	DN 100: 30 bar (4”: 435 psi)	DN 100: 30 bar (4”: 435 psi)
	Vacuum: $1x10^{-6}$ bar ($1.5x10^{-5}$ psi)	Vacuum: $1x10^{-6}$ bar ($1.5x10^{-5}$ psi)
Mechanical load	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36
	Sensor: 3.17 grms	Sensor: 3.17 grms
Enclosure rating		
Standard	IP67 to EN 60529 (NEMA 4X/6), 1 mH_2O for 30 min	IP67 to EN 60529 (NEMA 4X/6), 1 mH_2O for 30 min
EMC	89/336EEC	89/336EEC
Design		
Weight	See dimensional drawings	See dimensional drawings
Material		
Enclosure MAG 1100	Stainless steel AISI 316L (1.4404)	- Stainless steel AISI 316L (1.4404)
Terminal box	Stainless steel AISI 316 (1.4436)	Stainless steel AISI 316 (1.4436)
Fixing studs	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001
Gaskets - Standard	EPDM (max. 150°C, PN 40 (max. 300°F, 600 psi)	Graphite (max. 200°C, PN 40 (max. 390°F, 600 psi)
- Option	Graphite (max. 200°C, PN 40 (max. 390°F, 600 psi)	
	PTFE (max. 130°C, PN 25 (max. 270°F, 300 psi)	
Pipe connection adapters: DN 2, 3, 6 and 10 (1/12“, 1/8“, ¼”, 3/8”)	- Stainless steel, AISI 316 - Hastelloy - PVDF	

[1)] Up to medium temperature of 150ºC (300ºF).
For medium temperature of 150 to 180ºC (300 to 356ºF) -20 to +50ºC (-4 to +122ºF)

4.1.3 Sensor MAG 1100 Ex *(continued)*

Version	**MAG 1100 Ex**	**MAG 1100 HT Ex** (High temperature)
Liner		
• MAG 1100 (Ceramic)	DN 2, 3 (1/12“, 1/8“): Zirconium oxide (ZrO_2) (ceramic)	DN 15...100 (½“... 4“): Aluminium oxide Al_2O_3
	DN 6 ... 100 (¼“ ... 4“): Aluminium oxide Al_2O_3	
Electrodes		
• MAG 1100 (Ceramic)	DN 10 ...100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy	Platinum with gold / Titanium brazing alloy
	DN 2 ... 6 (1/12“ ... ¼”): Platinium	
Cable entries	Remote installation 2 x M20	Remote installation 2 x M20
Certificates and approvals		
Conforms to	PED – 97/23EC	PED – 97/23EC
Ex approvals		
• MAG 1100 (Ceramic) ATEX sensor	ATEX 2G D sensor Ex d e ia IIB T3 - T6	ATEX 2G D sensor Ex d e ia IIB T3 - T6

4.1.4 Sensor MAG 1100 Ex FOOD

Measuring principle	Electromagnetic induction
Excitation frequency	DN 10...65 (¼"…2½"): 12.5 Hz
	DN 80...100 (3", 4"): 6.25 Hz
Process connection	
Nominal size	DN 10…DN 100 (3/8"…4")
Process connection	Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting
Rated operating conditions	
Ambient conditions	
Ambient temperature[1)]	
• Sensor	-20...+60 C°(-4...+140°F)
Temperature of medium	
• MAG 1100 Food (Ceramic)	-20…+150°C (-4…+300°F) Suitable for steam sterilization
Temperature shock	
• MAG 1100 Food	
Duration ≤ 1 min, followed by 10 min rest	DN 10, 15, 25: Max. ΔT ≤ 80°C/min (3/8", ½", 1": Max. ΔT ≤ 80 K/min)
	DN 40, 50, 65: Max. ΔT ≤ 70°C/min (1½", 2", 2½": Max. ΔT ≤ 70 K/min)
	DN 80, 100: Max. ΔT ≤ 60°C/min (3", 4": Max. ΔT ≤ 60 K/min)
Operating pressure	
• MAG 1100 Food (Ceramic)	DN 10...65: 40 bar (3/8"…2½": 580 psi)
	DN 80: 37.5 bar (3": 540 psi)
	DN 100: 30 bar (4": 435 psi)
	Vacuum: $1x10^{-6}$ bar (1.5×10^{-5} psi) abs
Mechanical load	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36
	Sensor: 3.17 grms
Enclosure rating	
Standard	IP67 to EN 60529 (NEMA 4X), 1 mH_2O for 30 min
EMC	89/336EEC
Design	
Weight	See dimensional drawings
Material	
Enclosure	
Ex ATEX (remote version only)	Stainless steel AISI 316 (1.4436)
Liner	
• MAG 1100 Food (Ceramic)	Aluminium oxide Al_2O_3 (ceramics)
Electrodes	
• MAG 1100 Food (Ceramic)	Platinum with gold / Titanium brazing alloy
Cable entries	Remote installation 2 x M20
Certificates and approvals	
• MAG 1100 Food (Ceramic)	
Ex ATEX approvals for sensor or compact with MAG 6000 I Ex	ATEX 2G D sensor Ex d e ia IIB T3 - T6
Sensor	FM Class 1 div 2
Conforms to	PED – 97/23/EC and CRN (PFA) FDA

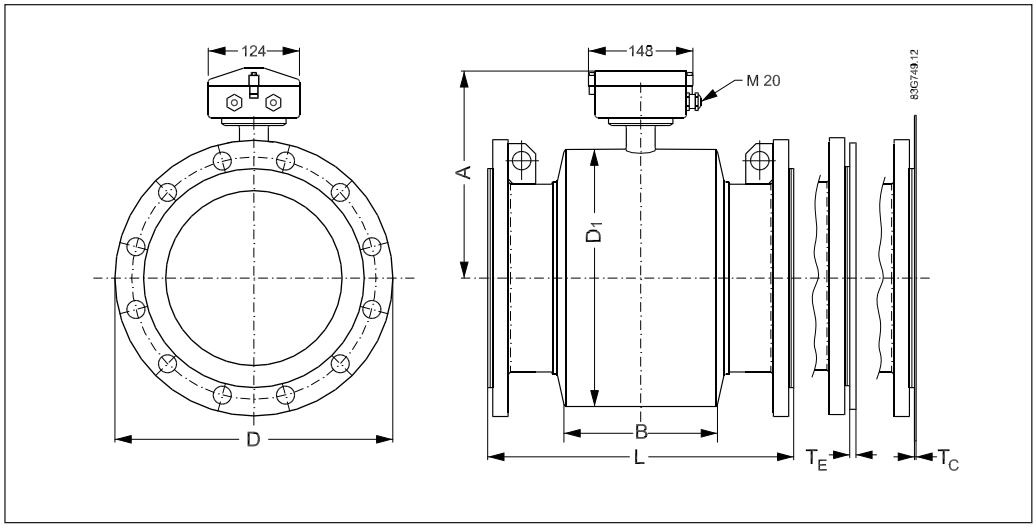
4.1.4 Sensor MAG 1100 Ex FOOD *(continued)*

Accessories	
Weld-in adapter	
Adapter for welding onto dairy pipe	Tri-Clover ISP 2037, DIN 11850, SMS 3008, BS 4825-1
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", ½", 1", 1½", 2", 2½" and 3")	PN 40 (600 psi)
• DN 100 (4")	PN 25 (350 psi)
Clamp adapter	Tri-Clamp ISP2852, DIN32676, SMS3016, BS4825-3
• DN 10, 15, 25, 40 and 50 (3/8", ½", 1", 1½", and 2")	PN 16 (200 psi)
DN 65, 80 and 100 (2½", 3" and 4")	PN 10 (150 psi)
Thread adapter	
DIN 11851	
• DN 10, 15, 25, and 40 (3/8", ½", 1", and 1½")	PN 40 (600 psi)
• DN 50, 65, 80 and 100 (2", 2½", 3" and 4")	PN 25 (350 psi)
ISO 2853, SS3351, BS4825-4	
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", ½", 1", 1½", 2", 2½ and 3")	PN 16 (200 psi)
SMS 1145	
• DN 25, 40, 50, 65 and 80 (1", 1½", 2", 2½" and 3")	PN 6 (80 psi)
Design	
Material	
Adapter	Stainless steel AISI 316/Stainless steel AISI 304 (ISO 2852)
Gasket	
• Standard	EPDM (-20...+150°C (-4...+302°F))
• Option	NBR (-20...+100°C (-4...+212°F))

Note: When combined sensor and adapter, the operating pressure is the lower rated of the pair.

4.2.1 Dimensions and weight MAG 3100 Ex

MAG 3100 Ex



Nominal size		A	B	D_1	L[1]								AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D	T_C [2]	T_E [2]	Weight [3]
					EN 1092-1-2001						ANSI 16.5						
					PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300					
[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	½	174	59	104	-	-	-	200	-	-	200	200	200	-	-	6	4
25	1	174	59	104	-	-	-	200	-	260	200	200	200	-	1.2	6	5
40	1½	184	82	124	-	-	-	200	-	280	200	200	200	-	1.2	6	8
50	2	192	72	139	-	-	-	200	276	300	200	200	200	-	1.2	6	9
65	2½	199	72	154	200	200/-	-	200	320	350	200	272	200	-	1.2	6	11
80	3	209	72	174	200	200/-	-	272	323	340	272	272	200[4]	-	1.2	6	12
100	4	229	85	214	250	250/-	-	250	380	400	250	310	250	-	1.2	6	16
125	5	242	85	239	250	250/-	-	250	420	450	250	335	250	-	1.2	6	19
150	6	263	85	282	300	300/-	-	300	415	450	300	300	300	-	1.2	6	27
200	8	291	137	338	350	350/-	350	350	480	530	350	350	350	-	1.2	8	40
250	10	319	157	393	450	450/-	450	450	550	620	450	450	450	-	1.2	8	60
300	12	344	157	444	500	500/-	500	500	600	680	500	500	500	-	1.6	8	80
350	14	349	270	451	550	550/-	550	550	-	-	550	550	550	-	1.6	8	110
400	16	374	270	502	600	600/-	600	600	-	-	600	600	600	-	1.6	10	125
450	18	405	310	563	600	600/-	600	600	-	-	600	600	600	-	1.6	10	175
500	20	430	350	614	600	600/-	625	680	-	-	600	730	600[5]	-	1.6	10	200
600	24	481	430	715	600	600/-	750	800	-	-	600	860	600[6]	-	1.6	10	287
700	28	531	500	816	700	875/700	-	-	-	-	-	-	700	700	2.0	-	330
750	30	558	556	869	-	-/-	-	-	-	-	-	-	750	750	2.0	-	360
800	32	593	560	927	800	1000/800	-	-	-	-	-	-	800	800	2.0	-	450
900	36	640	630	1032	900	1125/900	-	-	-	-	-	-	900	900	2.0	-	530
1000	40	691	670	1136	1000	1250/1000	-	-	-	-	-	-	1000	1000	2.0	-	660
1100	44	742	770	1238	-	-/-	-	-	-	-	-	-	1100	1100	2.0	-	1140
1200	48	797	792	1348	1200	1500/1200	-	-	-	-	-	-	1200	1200	2.0	-	1180
1400	56	912	1000	1675	1400	-/1400	-	-	-	-	-	-	-	1400	3.0	-	1600
1500	50	959	1020	1672	1500	-/1500	-	-	-	-	-	-	-	1500	3.0	-	2460
1600	64	1012	1130	1915	1600	-/1600	-	-	-	-	-	-	-	1600	3.0	-	2140
1800	72	1110	1250	1974	1800	-/1800	-	-	-	-	-	-	-	1800	3.0	-	2930
2000	78	1210	1375	2174	2000	-/2000	-	-	-	-	-	-	-	2000	3.0	-	3665

[1]) When earthing flanges are used, the thickness of the earthing flange must be added to the build-in length
[2]) T_C = Type C grounding ring
[3]) Weights are approx. and for PN 16
[4]) PN 35 DN 80 = 272 mm
[5]) PN 35 DN 500 = 680 mm
[6]) PN 35 DN 600 = 750 mm

- Not available
D = Outside diameter of flange, see flange tables

4.2.2 Sensor MAG 3100 Ex

Version	MAG 3100 Ex	MAG 3100 HT Ex (High Temperature)	MAG 3100 P Ex
Rated operation conditions			
Ambient temperature (conditions also dependent on liner characteristiques)			
Sensor (ATEX)	-20…+60 °C (-4…+140 °F)	-20…+60 °C (-4…+140 °F) [1])	-20…+60 °C (-4…+140 °F)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	Neoprene 0.01...100 bar (0.15...1450 psi) EPDM 0.01...40 bar (0.15...580 psi) Linatex® 0.01...40 bar (0.15...580 psi) Ebonite 0.01...100 bar (0.15...1450 psi) PTFE (DN ≤ 300, PN ≤ 50 bar/ ≤ 12“, PN ≤ 725 psi) PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar/14“ ≤ DN ≤ 24“, PN ≤ 580 psi) PFA DN 25...100 (1“...4”): 0.01... 50 bar (0.15...725 psi))	PTFE Teflon DN 15...300 (½“…12”) (130/180°C) (266 °F/ 356°F): 0.3...50 bar (4...725 psi) (180°C (356°F) PTFE has factory mounted grounding SS rings type E & SS terminal box) PFA DN 25...100 (1“…4”): 0.01...50 bar (0.15...725 psi)	PTFE Teflon DN 15...300 (½“…12”): 0.3...50 bar (4...725 psi) PFA DN 15...100 (1“…4”): 0.01...50 bar (0.15...725 psi)
Enclosure rating	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min
Pressure drop at 3 m/s	As straight pipe		
Test pressure	1.5 x PN (where applicable)		
Mechanical load	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms
Temperature of medium	Neoprene 0...+70 °C (32...158 °F) EPDM -10...+70 °C (14...158 °F) Linatex® (rubber) -40...+70 °C (-40...+158 °F) (for temperatures below -20°C (15°F) AISI 304 or 316 flanges must be used) Ebonite 0 ...95 °C (32...203 °F) PTFE -20...+100 °C (-4...+212 °F) PFA -20 ...+100 °C (-4...+212 °F)	PTFE -20...+130 °C (-4...+266 °F) PFA -20...+150 °C (-4...+300 °F) PTFE -20...+180 °C (-4...+356 °F)	PTFE -20...+130 °C (-4...+266 °F) PFA -20...+150 °C (-4...+300 °F)
EMC	89/336 ECC	89/336 ECC	89/336 ECC

[1]) Up to medium temperature of 150ºC (300ºF).
For medium temperature of 150 to 180ºC (300 to 356ºF) -20 to +50ºC (-4 to +122ºF)

4.2.2 Sensor MAG 3100 Ex *(continued)*

Version	MAG 3100 Ex	MAG 3100 HT Ex (High Temperature)	MAG 3100 P Ex
Rated operation conditions			
Ambient temperature (conditions also dependent on liner characteristiques)			
Sensor (ATEX)	-20…+60 °C (-4…+140 °F)	-20…+60 °C (-4…+140 °F) [1]	-20…+60 °C (-4…+140 °F)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	Neoprene 0.01...100 bar (0.15...1450 psi)	PTFE Teflon DN 15...300 (½"…12") (130/180°C) (266 °F/ 356°F): 0.3...50 bar (4...725 psi) (180°C (356°F) PTFE has factory mounted grounding SS rings type E & SS terminal box)	PTFE Teflon DN 15...300 (½"…12"): 0.3...50 bar (4...725 psi)
	EPDM 0.01...40 bar (0.15...580 psi)		PFA DN 15...100 (1"…4"): 0.01...50 bar (0.15...725 psi)
	Linatex® 0.01...40 bar (0.15...580 psi)		
	Ebonite 0.01...100 bar (0.15...1450 psi)		
	PTFE (DN ≤ 300, PN ≤ 50 bar/ ≤ 12", PN ≤ 725 psi) PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar/14" ≤ DN ≤ 24", PN ≤ 580 psi)	PFA DN 25...100 (1"…4"): 0.01...50 bar (0.15...725 psi)	
	PFA DN 25...100 (1"...4"): 0.01... 50 bar (0.15...725 psi))		
Enclosure rating	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min	IP67/NEMA 4X/6 to EN 60529, 1mH_2O for 30 min
Pressure drop at 3 m/s	As straight pipe		
Test pressure	1.5 x PN (where applicable)		
Mechanical load	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36	18...1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36
	Sensor: 3.17 grms	Sensor: 3.17 grms	Sensor: 3.17 grms
Temperature of medium	Neoprene 0...+70 °C (32...158 °F)	PTFE -20...+130 °C (-4...+266 °F)	PTFE -20...+130 °C (-4...+266 °F)
	EPDM -10...+70 °C (14...158 °F)	PFA -20...+150 °C (-4...+300 °F)	PFA -20...+150 °C (-4...+300 °F)
	Linatex® (rubber) -40...+70 °C (-40...+158 °F) (for temperatures below -20°C (15°F) AISI 304 or 316 flanges must be used)	PTFE -20...+180 °C (-4...+356 °F)	
	Ebonite 0 ...95 °C (32...203 °F)		
	PTFE -20...+100 °C (-4...+212 °F)		
	PFA -20 ...+100 °C (-4...+212 °F)		
EMC	89/336 ECC	89/336 ECC	89/336 ECC

[1]) Up to medium temperature of 150ºC (300ºF).
For medium temperature of 150 to 180ºC (300 to 356ºF) -20 to +50ºC (-4 to +122ºF)

4.2.2 Sensor MAG 3100 Ex *(continued)*

Version	MAG 3100 Ex	MAG 3100 HT Ex (High Temperature)	MAG 3100 P Ex
Design			
Weight	See dimensional drawings		
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) **or** AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) **or** AISI 316 L (1.4404) flanges and houing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) **or** AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) **or** AISI 316 L (1.4404) flanges and houing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm)
Measuring pipe material	AISI 304 (1.4301)	AISI 304 (1.4301)	AISI 304 (1.4301)
Electrode material	AISI 316 Ti (1.4571)	AISI 316 Ti (1.4571)	Hastelloy C276 (PFA C22)
	Hastelloy C276 (PFA C22)	Hastelloy C276 (PFA C22)	
	Platinum/Iridium	Platinum/Iridium	
	Titanium	Titanium	
	Tantalum	Tantalum	
Grounding electrode material	Material as measuring electrodes: Exceptions - see ordering data	No grounding electrodes:	No grounding electrodes
Terminal box (remote version only)	Ex ATEX Stainless steel AISI 316 (1.4436)	Ex ATEX Stainless steel AISI 316 (1.4436)	Ex ATEX Stainless steel AISI 316 (1.4436)
Cable entries	2 x M20 (for supply/ output)		2 x M20 (for supply/ output)
Certificates and approvals Conforms to	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN
Material certificate EN 10204 3.1	On request	On request	Pipe and flange certificate available as option
Ex approvals	ATEX 2G D sensor	ATEX 2G D sensor	ATEX 2G D sensor
	DN 15...300: Ex d e ia IIC T3 - T6	DN 15...300: Ex d e ia IIC T3 - T6	DN 15...300: Ex d e ia IIC T3 - T6
	DN 350...2000 Ex e ia IIC T3 - T6		
Drinking water approvals	EPDM lining:		
	NSF61 (Cold water, US)		
	WRAS (WRc, BS6920 cold water, GB)		
	ACS listed (F)		
	DVGW W270 (D)		
	Belaqua (B)		

4.3 Transmitter MAG 5000/6000 19" *Accuracy 0.5/0.25%*

Current output		
	Current	0-20 mA, 4-20 mA or 4-20 mA + alarm
	Load	< 800 ohm
	Time constant	0.1-30 s adjustable
Digital output		
	Frequency	0-10 kHz, 50% duty cycle
	Time constant	0.1-30 s adjustable
	Active	24 V DC, 30 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ, short-circuit-protected
	Passive	3-30 V DC, max. 110 mA, 200 Ω ≤ R_{load} ≤ 10 KΩ
Relay		
	Time constant	Changeover relay, time constant same as current time constant
	Load	42 V AC/2 A, 24 V DC/1A
Digital input		11-30 V DC, R_i = 4.4 KΩ
	Activation time	50 ms
	Current	$I_{11\ V\ DC}$ = 2.5 mA, $I_{30\ V\ DC}$ = 7 mA
Functions		Flow rate, 2 totalizers, low flow cut-off, empty pipe cut-off, flow direction, error system, operating time, uni/bidirectional flow, limit switches, pulse output, control for cleaning unit and batch
Galvanic isolation		All inputs and outputs are galvanically isolated
Cut-off		
	Low flow	0-9.9% of maximum flow
Totalizer		Two eight-digit counters for forward, net or reverse flow
Display		Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults
		Reverse flow indicated by negative sign
	Time constant	Time constant as current output time constant
Zero point adjustment		Automatic
Electrode input impedance		> 1 x 10^{14} Ω
Excitation frequency		Sensor size depending pulsating DC current (125 mA)
Ambient temperature		Display version during operation: –20 to +50°C
		Blind version during operation: –20 to +60°C
		During storage: –40 to +70°C (RH max. 95%)
Communication		
	Standard	Prepared for client mounted add-on modules
	Optional	HART, Profibus PA as add-on module
19" insert		
	Enclosure material	Standard 19" insert of aluminium/steel (DIN 41494)
		Width: 21 TE
		Height: 3 HE
	Enclosure rating	IP 20 to EN 60529 and DIN 40050
	Mechanical load	Version: 1 G, 1-800 Hz sinusoidal in all directions to EN 60068-2-36
EMC performance		EN 61326
Supply voltage		115-230 V AC +10% to –15%, 50-60 Hz
		11-30 V DC or 11-24 V AC
Power consumption		230 V AC: 17 VA
		24 V DC: 9 W, I_N = 380 mA, I_{ST} = 8A (30 ms)
		12 V DC: 11 W, I_N = 920 mA, I_{ST} = 4A (250 ms)

[1]) Special cable required in separate mounted installation

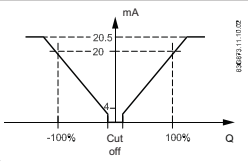
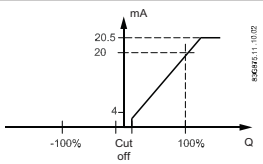
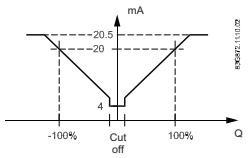
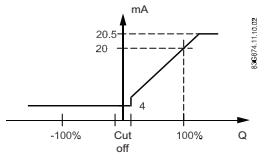
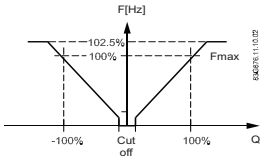
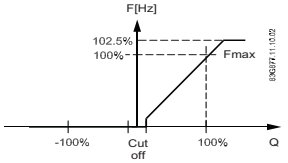
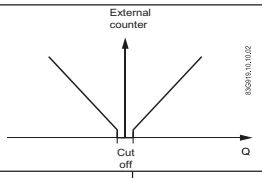
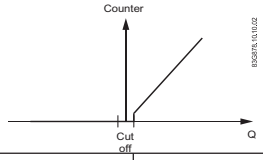
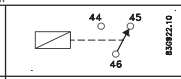
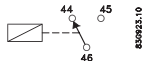
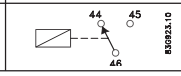
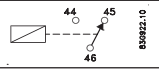
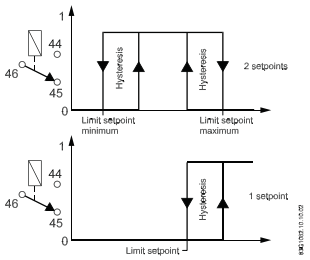
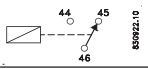
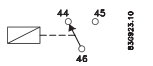
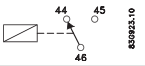
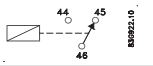
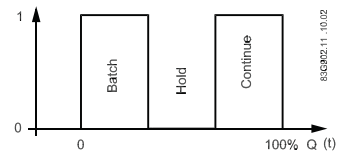
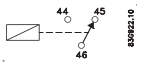
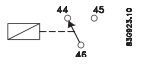
4.4 Safety barrier (ia)

Application	For use with MAG 5000/6000 19" and MAG 1100 Ex or MAG 3100 Ex sensor
Ex approval	See certificates
Ambient temperature	During operation: –20 to +50°C
	During storage: –20 to +70°C
19" insert	
Enclosure material	Standard 19" insert in aluminium/steel (DIN 41494)
	Width: 21 TE
	Height: 3 HE
Enclosure rating	IP 20 to EN 60529 and DIN 40050
Mechanical load	1 G, 1-800 Hz sinusoidal in all directions to EN 60068-2-36
EMC performance	EN 61326

IS data transmitter

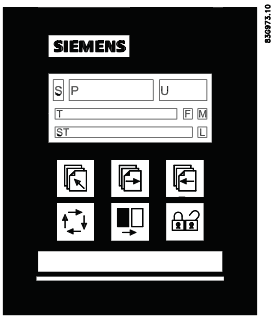
Terminals MAG barriers	**82-83 ia electrode**
U_o	9.3 V
I_o	40 mA
P_o	0.4 W
L_o	23 mH
C_o	500 nF

4.5 Output characteristics MAG 5000/6000 19"

Output characteristics	Bidirectional mode		Unidirectional mode	
0-20 mA				
4-20 mA				
Frequency				
Pulse output				
Relay	Power down		Active	
Error relay	No error		Error	
Limit switch or direction switch				
	Low flow (Reverse flow)		Intermediate flow	
	High flow (Forward flow)		High flow/ Low flow	
Batch on digital output				
Batch on relay	Hold		Batch	

5. Commissioning

5.1 Keypad and display layout



Keypad

The keypad is used to set the flowmeter. The function of the keys is as follows:

TOP UP KEY		This key (hold 2 sec.) is used to switch between operator menu and setup menu. In the transmitter setup menu, a short press will cause a return to the previous menu.
FORWARD KEY		This key is used to step forward through the menus. It is the only key normally used by the operator.
BACKWARD KEY		This key is used to step backward through the menus.
CHANGE KEY		This key changes the settings or numerical values.
SELECT KEY		This key selects the figures to be changed.
LOCK/UNLOCK KEY access		This key allows the operator to change settings and gives to submenus.

Display

The display is alphanumerical and indicates flow values, flowmeter settings and error messages.

The upper line is for primary flow readings and will always show either flow rate, totalizer 1 or totalizer 2. The line is divided into 3 fields.

S: Sign field
P: Primary field for numerical value
U: Unit field

The centre line is the title line (T) with individual information according to the selected operator or setup menu.

The lowest line is the subtitle line (ST) which either will add information to the title line or keep individual information independent of the title line.

F: The alarm field.  Two flashing triangles will appear by a fault condition.

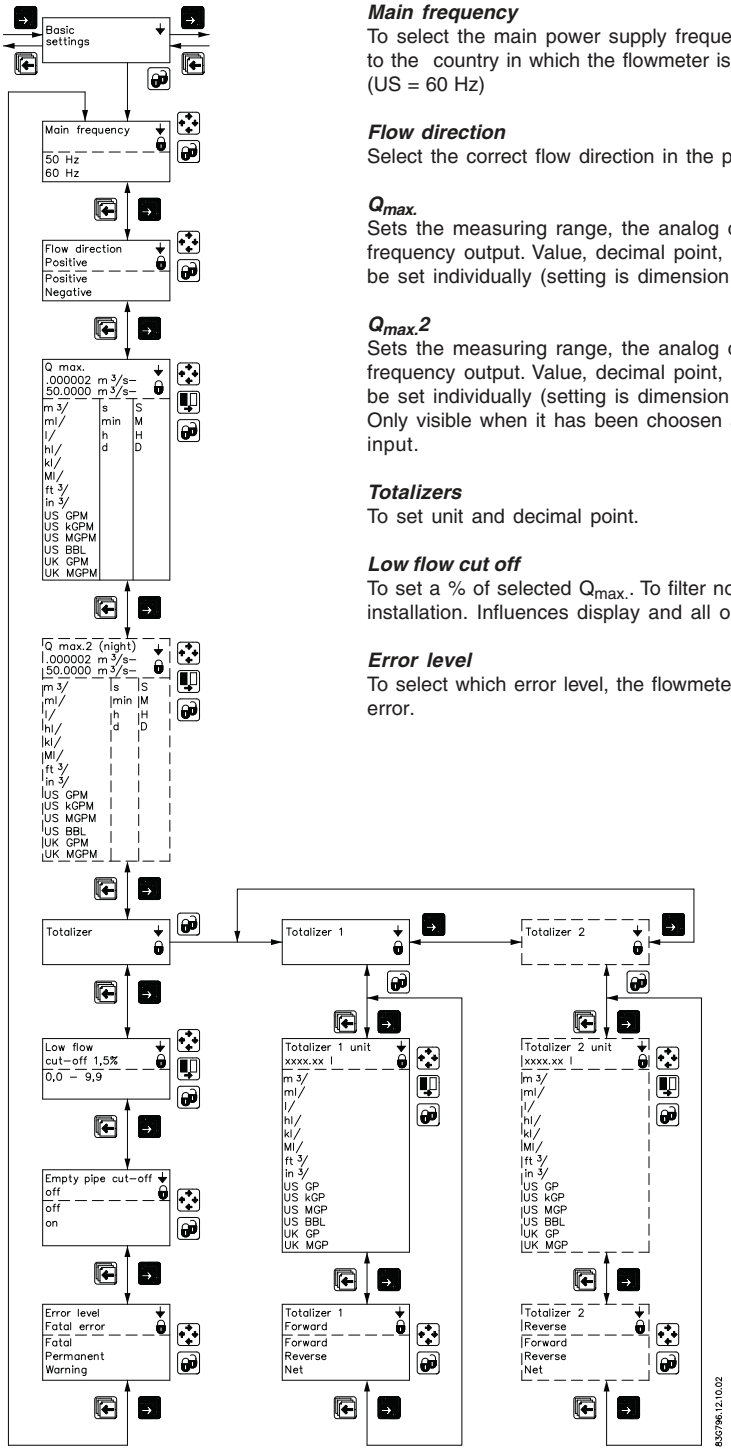
M: The mode field. The symbols indicate the following.

 Communication mode	 Basic settings	 Operator active
 Service mode	 Output	 Operator inactive
 Operator menu	 External input	
 Product identity	 Sensor characteristics	
 Language mode	 Reset mode	

L: The lock field. Indicates the function of the lock key.

 Ready for change	 Access to submenu
 Value locked	 RESET MODE: Zero setting of totalizers and initialization of setting

5.2.1 Basic settings



Main frequency
To select the main power supply frequency corresponding to the country in which the flowmeter is installed.
(US = 60 Hz)

Flow direction
Select the correct flow direction in the pipe.

$Q_{max.}$
Sets the measuring range, the analog outputs and the frequency output. Value, decimal point, unit and time can be set individually (setting is dimension dependent).

$Q_{max.}2$
Sets the measuring range, the analog outputs and the frequency output. Value, decimal point, unit and time can be set individually (setting is dimension dependent).
Only visible when it has been choosen as external digital input.

Totalizers
To set unit and decimal point.

Low flow cut off
To set a % of selected $Q_{max.}$. To filter noise in the installation. Influences display and all outputs.

Error level
To select which error level, the flowmeter will detect an error.

Comma for flow rate, totalizer 1 and totalizer 2 can be individually positioned.

- open the respective window.
- ensure that the cursor is positioned below the comma. Use the SELECT KEY .
- move the comma to the requested position. Use the CHANGE KEY .

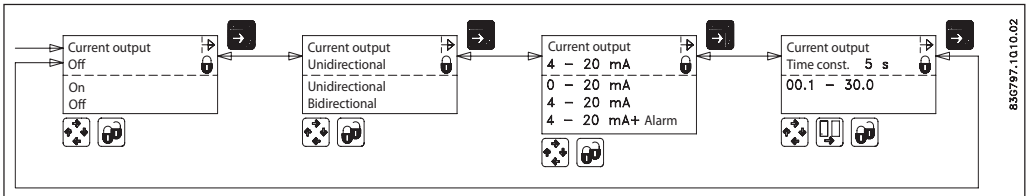
Units are changed by means of the CHANGE KEY with the cursor placed below the unit selected. Select units (cursor moved) by means of the SELECT KEY .

Totalizer 2 is not visible when batch is selected as digital output.

$Q_{max.}$ 2 - is only visible when it has been choosen as external input.

5.2.2 Outputs

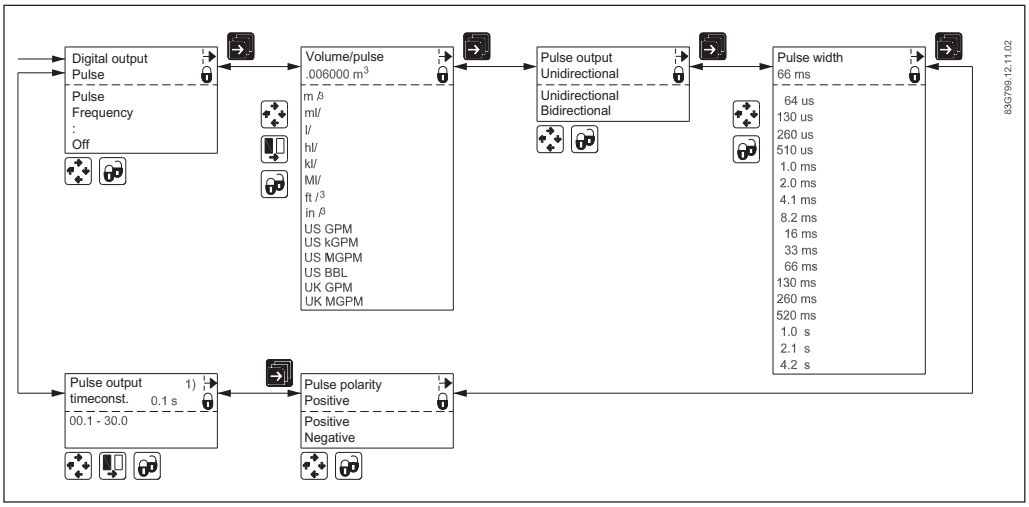
Current output Proportional to flowrate (Terminal 31 and 32)



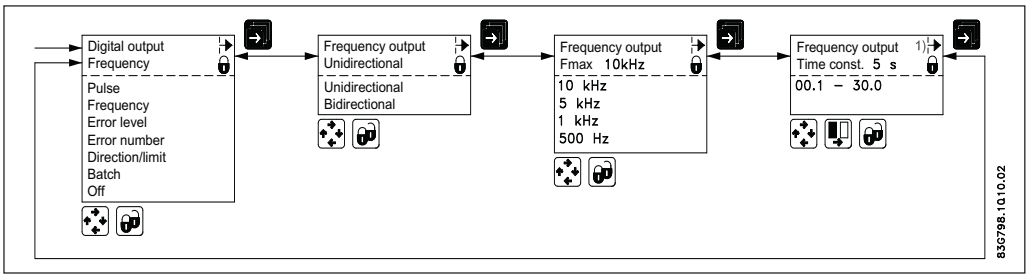
4 - 20 mA + alarm:
Current output gives the following mA, depending on what is selected as error level in basic settings.
Fatal: 1 mA, permanent: 2 mA, warning: 3 mA

The current output must be set off when not used.

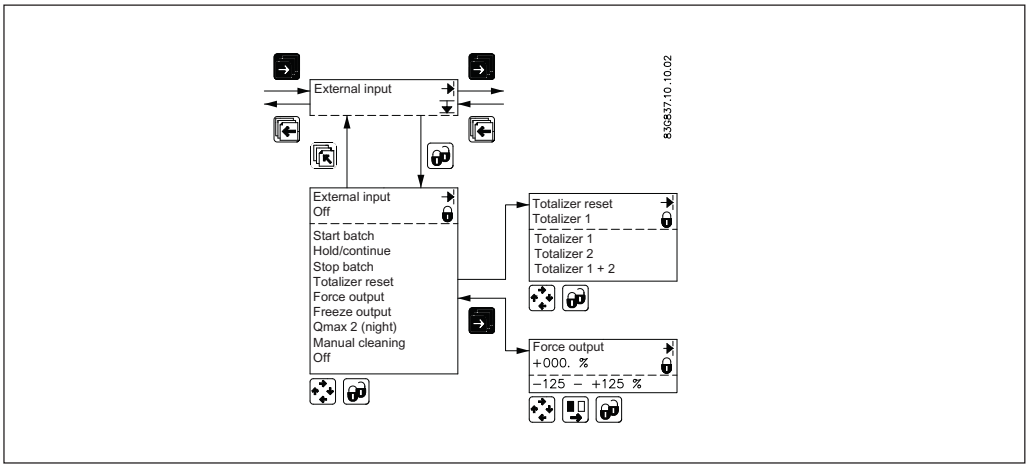
Digital output Pulse/volume (Terminal 56, 57, 58)



Digital output Frequency Proportional to flowrate (Terminal 56, 57, 58)

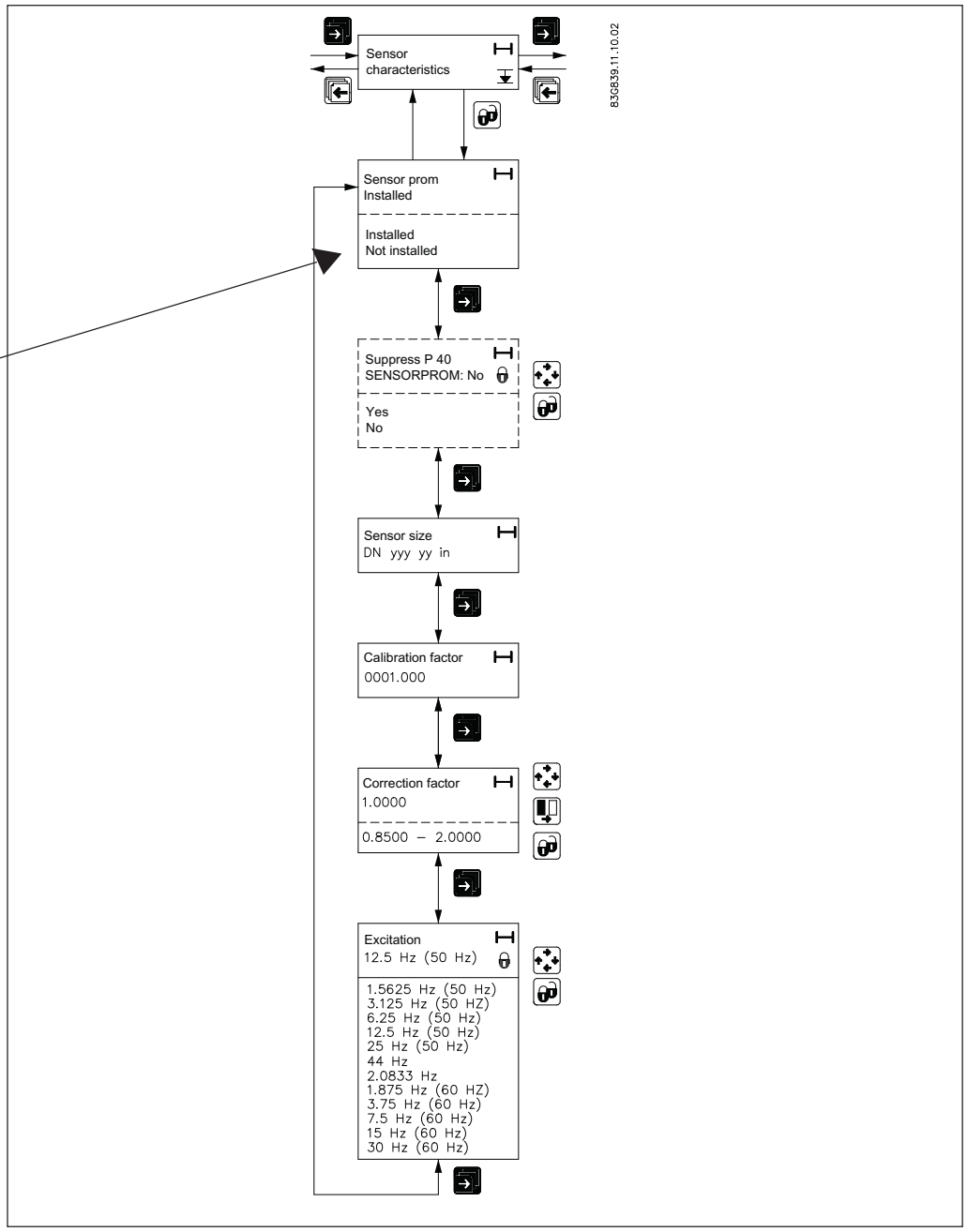


5.2.3 External input

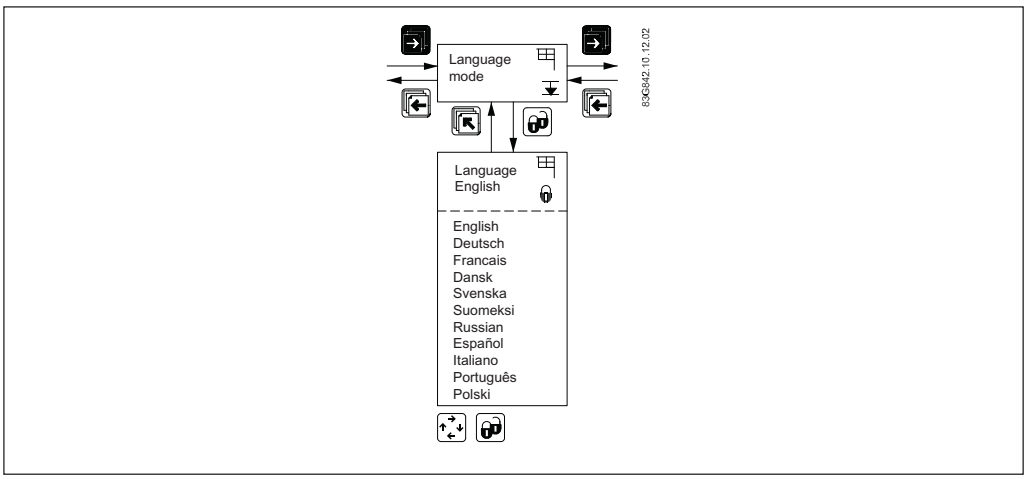


5.2.4 Sensor characteristics

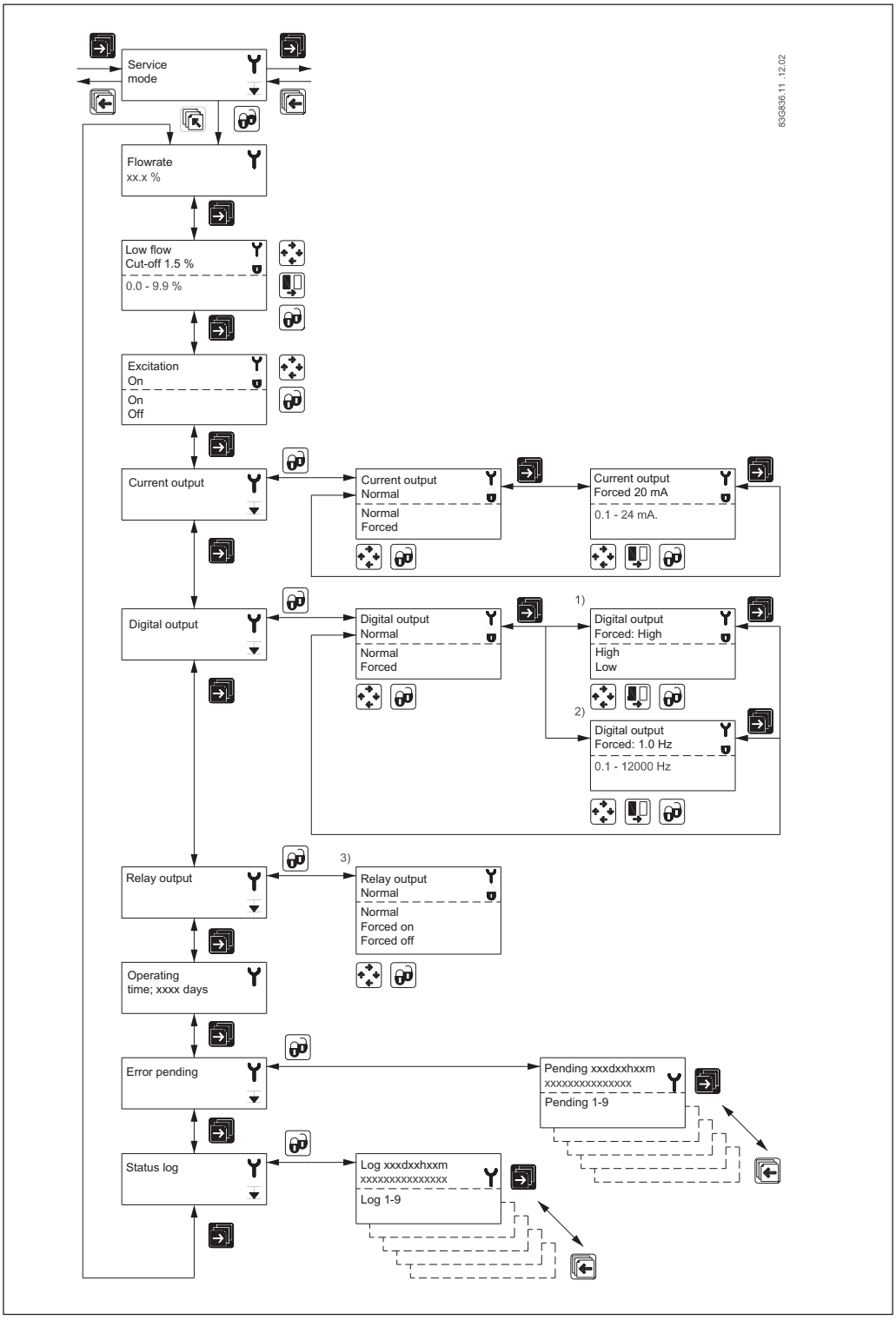
If “SENSORPROM not installed” is shown, refer to the handbook (depending on type of mounting configuration).



5.2.5 Language mode



5.2.6 Service mode



All previous settings are reinitialised when service mode is exited using the top up key.

The error system
The error system is divided into an error pending list and a status log list. Time is gained as days, minutes and hours since the error has occurred.

The first 9 standing errors are stored in error pending. When an error is removed it is removed from error pending.

The latest 9 errors are stored in the status log. When an error is removed it is still kept in status log. Errors in status log is stored for 180 days.

Error pending and status log are accessible when enabled in the operator menu.

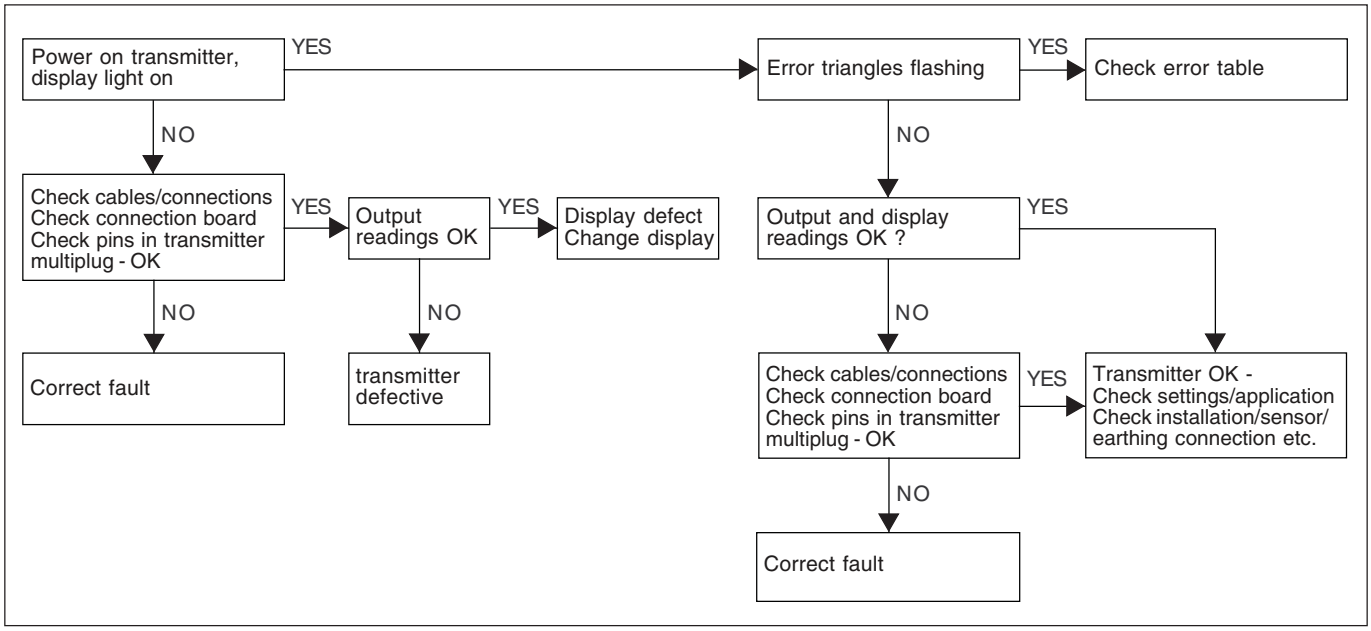
6. Service

Often problems with unstable/wrong measurements occur due to insufficient/wrong earthing or potential equalization. Please check this connection. If OK, the SITRANS F M MAGFLO transmitter can be checked as described in the handbook.

6.1 Transmitter check list

When checking SITRANS F M MAGFLO installations for malfunction the easiest method to check the transmitter is to replace it with another MAG 5000/6000 transmitter with a similar power supply.
A replacement can easily be done as all settings are stored in and downloaded from the SENSORPROM unit - no extra settings need to be made.

If no spare transmitter is available - then check transmitter according to check table.



6.2 Trouble shooting MAG transmitter

Symptom	Output signals	Error code	Cause	Remedy
Empty display	Minimum		1. No power supply	Power supply Check MAG 5000/6000 for bended pins on the connector
			2. MAG 5000/6000 defective	Replace MAG 5000/6000
No flow signal	Minimum		1. Current output disabled	Turn on current output
			2. Digital output disabled	Turn on digital output
			3. Reverse flow direction	Change direction
		F70	Incorrect or no coil current	Check cables/connections
		W31	Measuring pipe empty	Ensure that the measuring pipe is full
		F60	Internal error	Replace MAG 5000/6000
	Undefined	P42	1. No load on current output	Check cables/connections
			2. MAG 5000/6000 defective	Replace MAG 5000/6000
		P41	Initializing error	Switch off MAG 5000/6000, wait 5 s and switch on again
Indicates flow with no flow in pipe	Undefined		Measuring pipe empty	Select empty pipe cut-off
			Empty pipe cut-off is OFF	Ensure that the measuring pipe is full
			Electrode connection missing/ electrode cable is insufficiently screened	Ensure that electrode cable is connected and sufficiently screened
Unstable flow signal	Unstable		1. Pulsating flow	Increase time constant
			2. Conductivity of medium too low	Use special electrode cable
			3. Electrical noise potential between medium and sensor	Ensure sufficient potential equalization
			4. Air bubbles in medium	Ensure medium does not contain air bubbles
			5. High concentration of particles or fibres	Increase time constant
Measuring error	Undefined		Incorrect installation	Check installation
		P40	No SENSORPROM unit	Install SENSORPROM unit
		F61	Deficient SENSORPROM unit	Replace SENSORPROM unit
		F62	Wrong type of SENSORPROM unit	Replace SENSORPROM unit
		F63	Deficient SENSORPROM unit	Replace SENSORPROM unit
		F71	Loss of internal data	Replace MAG 5000/6000
	Maximum	W30	Flow exceeds 100% of $Q_{max.}$	Check $Q_{max.}$ (Basic Settings)
		W21	Pulse overflow • Volume/pulse too small • Pulse width too large	 Change volume/pulse Change pulse width
Measuring approx. 50%			Missing one electrode connection	Check cables
Loss of totalizer data	OK	W20	Initializing error	Reset totalizer manually
##### Signs in display	OK		Totalizer roll over	Reset totalizer or increase totalizer unit

7. Ordering

Please use online PIA Selector to get latest updates.
PIA selector link:

www.pia-selector.automation.siemens.com

8.1 EC-declaration of conformity

Please note the following certificates are incomplete for the full version please refer to **http://siemens.com/flow**

SIEMENS

EC Declaration of Conformity
EG-Konformitätserklärung

CE

No. 083R3044-03

Manufacturer: *Hersteller:*	Siemens Flow Instruments A/S
Address: *Anschrift:*	Nordborgvej 81, DK-6430 Nordborg Denmark
Product description: *Produktbezeichnung*	Flow transmitter / Durchfluß meßumformer SITRANS F M Type/Typ MAG5000,MAG6000, MAG6000CT, with option modules, used with sensors MAG1100, MAG1100Ex, MAG3100, MAG3100Ex and MAG5100

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:
Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:

89/336/EEC EMC	Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.(amended by 91/263/EEC, 92/31/EEC and 93/68/EEC) *Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit.(geändert durch 91/263/EWG, 92/31/EWG und 93/68/EWG).*
2006/95/EC LVD	Directive of the European Parliament and of the Council on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits. *Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.*
94/9/EC ATEX	Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres. *Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.*
97/23/EC PED	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States concerning pressure equipment. *Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Druckgeräte*
2004/22/EC MID	Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment intended for Legal Metrological Measuring systems. *Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten für Geräte zur bestimmungsgemäßen Verwendung in Legale Metrologische Messsysteme.*

Annex A is integral part of this declaration.
Anhang A ist integraler Bestandteil dieser Erklärung.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

SIEMENS

EG-Konformitätserklärung
EC Declaration of Conformity

No. 083R3044-03

Nordborg, 10.01.2008

Siemens Flow Instruments A/S

Jen Parkum, R&D		Ove Kirk Andersen , Quality	
Name, function *Name, Funktion*	signatur *Unterschrift*	Name, function *Name, Funktion*	signatur *Unterschrift*

Anhang A ist integraler Bestandteil dieser Erklärung
Annex A is integral part of this declaration Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

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SIEMENS

Annex A to the EC Declaration of Conformity
Anhang A zur EG-Konformitätserklärung

No. 083R3044-03

Product description: *Produktbezeichnung*
Flow transmitter / Durchfluß meßumformer
SITRANS F M
Type/Typ MAG5000,MAG6000, MAG6000CT, with option modules, used with sensors MAG1100, MAG1100Ex, MAG3100, MAG3100Ex and MAG5100

Conformity to the Directives indicated on page 1 is assured through the application of the following standards (depending on versions):
Die Konformität mit den auf Blatt 1 angeführten Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen (variantenabhängig):

Direktive *Richtlinie*	Standard / Reference number *Norm / Referenznummer*	Edition *Ausgabe datum*	MAG 5000/6000	MAG 6000CT	MAG 1100	MAG 1100Ex	MAG 3100	MAG 3100Ex	MAG 3100PFA	MAG 3100PTFE	MAG 5100
2006/95/EC	EN61010-1	2001	x		x	x	x	x	x	x	
89/336/EEC	EN 61326-1 *	2006	x		x	x	x	x	X	x	
89/336/EEC	EN 61326-2-5	2006	x		x	x	x	x	X	x	
94/9/EC	EN 50014 + A1 and A2	1997	x								
94/9/EC	EN 50020	2002	x								
94/9/EC	EN 1127-1	1998				x					
94/9/EC	EN 60079-0	2006				x	x				
94/9/EC	EN 60079-1	2004					x				
94/9/EC	EN 60079-7	2007				x	x				
94/9/EC	EN 60079-11	2007				x	x				
94/9/EC	EN 61241-0	2006				x	x				
94/9/EC	EN 61241-1	2004				x	x				
97/23/EC	Modul H	2001			x	x					
97/23/EC	Modul B	2001								x	
97/23/EC	Modul E1	2001					x	x	x		
2004/22/EC	OIML R49	2006		X							x

* all environments included

Certificates *Zertifikate*	MAG 5000/6000	MAG 6000CT	MAG 1100	MAG 1100Ex	MAG 3100	MAG 3100Ex	MAG 3100PFA	MAG 3100PTFE	MAG 5100
SIRA 07 ATEX 1182X						x			
SIRA 07 ATEX 3161X				x					
DEMKO 03 ATEX 135255X	x								
SIRA 03 ATEX 3339X						x			
FORCE DK 0200-4.853/03			x	x					
BSI CE 67317								x	
BSI CE 56993					x	x	x	x	
DK-0200-MI005		X							x

Inspection / Surveillance:
Kontrolle / Überwachung:

Directive *Richtlinie*		Notified Body Product Quality Assurance *Benannte Stelle Qualitätssicherung Produktion*		No.:
94/9/EC	ATEX	SIRA Certification Service	(Stonehouse, UK)	0518
94/9/EC	ATEX	UL International Demko	(Nordborg, DK)	0539
27/23/EC	PED	British Standards Institution	(Stonehouse, UK)	0086
27/23/EC	PED	FORCE - Dantest CERT	(Nordborg, DK)	0200
2004/22/EC	MID	FORCE – Dantest CERT		0200

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8.2 EC type examination certificate

Please note the following certificates are incomplete for the full version please refer to **http://siemens.com/flow**

sira CERTIFICATION

1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 07ATEX1182X** Issue: **2**

4 Equipment: **Remote version: SITRANS F M MAGFLO MAG3100Ex DN15 to DN300**
Compact configuration: SITRANS F M MAGFLO MAG6000 INDUSTRY

5 Applicant: **Siemens Flow Instruments A/S** **Siemens Flow Instruments Ltd**

6 Address: Nordborgveg 81
Nordborg 6430
Denmark

Magflo House
Ebley Road
Stonehouse
Gloucestershire GL10 2LU
UK

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2006	EN 60079-1:2004	EN 60079-7:2007
EN 60079-11:2007	EN 61241-0:2006	EN 61241-1:2004

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

Remote version:

II 2(1) GD	Ta = -20°C to +60°C (with process temperatures equal to or less than +150°C)
Ex d e ia IIC T3-T6	Ta = -20°C to +50°C (with process temperatures equal to or less than +180°C)
Ex tD A21 IP67 T*°C	(* pipe temperature +13 K)

Compact Configuration (This marking is shown on the transmitter label, the flowmeter is not separately marked)**:**

II 2(1)(2) GD	Ta = -10°C to +60°C (with process temperatures equal to or less than +150°C)
Ex d [ia] [ib] ia IIC T3-T6	Ta = -10°C to +50°C (with process temperatures equal to or less than +180°C)
Ex tD A21 IP67 T*°C	(* pipe temperature +13 K, but not less than 85°C)

Note: Siemens label will mark "Ta: (Refer to user instructions)"

Project Number 52A17771
C. Index 12

C Ellaby
Certification Officer

This certificate and its schedules may only be reproduced in its entirety and without change.

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Form 9400 Issue 1

Sira Certification Service
Rake Lane, Eccleston, Chester, CH4 9JN, England
Tel: +44 (0) 1244 670900
Fax: +44 (0) 1244 681330
Email: info@siracertification.com
Web: www.siracertification.com

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX1182X**
Issue 2

13 **DESCRIPTION OF EQUIPMENT**

The SITRANS F M MAGFLO MAG 3100Ex Flowmeters comprises a cylindrical carbon steel enclosure with a stainless steel tube passing through it creating an internal cavity. The tube has a flange at each end such as to allow mounting into process pipe work. Two electrodes are internally fitted to the Flowmeter, which project into the process tube from the internal cavity. Additionally the Flowmeter is fitted with sensing coils in the internal cavity, which are mounted to the pipe body.

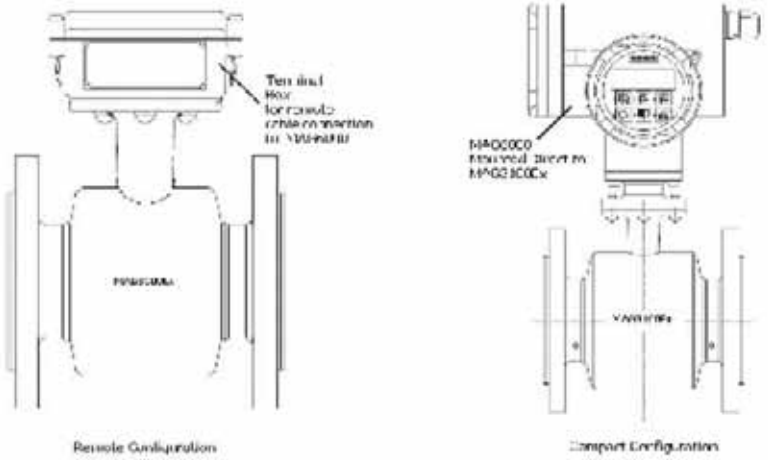
Cables enter the enclosure via an extension on the body and through a silicone compression seal. The seal is compressed by means of a central threaded element and is retained by a circlip arrangement. A terminal box is mounted on the extension to enable termination of the intrinsically safe and increased safety 'e' cabling. The whole Flowmeter is considered Ex 'd' up to the terminal box (up to internal flameproof 'silicone compression seal') at which point the field and factory wiring is considered protected by Ex 'ia' and Ex 'e' protection principles.

Design Variations/Options

The SITRANS F M MAGFLO MAG3100Ex Flowmeters are available in three size ranges (pipe bore):

- DN15 to DN25
- DN40 to DN300
- DN50 to DN300 (High Pressure Type)

Additionally the MAG3100Ex is either configured as a Remote or Compact type sensor. The Remote version has the MAG3100Ex Flowsensor installed independently with cable connections made via the terminal box to the MAG6000 transmitter located in a separate location. The Compact type configuration has the MAG6000 (Sira 05ATEX2072X) mounted directly to the MAG3100Ex Sensor in place of the terminal box. The diagram below shows the two configuration types.



Remote Configuration Compact Configuration

Sira Certification Service
Rake Lane, Eccleston, Chester, CH4 9JN, England
Tel: +44 (0) 1244 670900
Fax: +44 (0) 1244 681330
Email: info@siracertification.com
Web: www.siracertification.com

sira CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX1182X**
Issue 2

The parameters for the SITRANS F M MAGFLO MAG3100Ex Flowmeter are as follows:

Remote version:

Terminals 0, 81, 82,83,84 (Ex ia)	Ui = 30 V Ii = 50 mA Pi = 0.5 W Ci = 50 nF Li = 2 µH
Terminals 85, 86 (Ex e)	Ui = 30/70 V_{pk} Ii = 130 mA

Compact version:

Refer to certificate number Sira 05ATEX2072X.

Variation 1 - This variation introduced the following changes:

i. The modification of the mounting arrangement for the divider separating the Ex 'e' and the Ex 'ia' terminals.

Variation 2 - This variation introduced the following changes:

i. The ambient temperature specification relative to process temperatures to be reviewed; this is the result of the upper process temperature limit being raised from 150°C up to a maximum of 180°C. The special condition for safe use appertaining to the temperature limits, temperature classes and maximum surface temperatures for dust is also modified and the marking has been amended so that the user/installer is advised to refer to the instructions for this information.

14 **DESCRIPTIVE DOCUMENTS**

14.1 **Drawings**

Refer to Certificate Annexe.

14.2 **Associated Sira Reports and Certificate History**

Issue	Date	Report no.	Comment
0	1 October 2007	R52A16921A	The release of the prime certificate.
1	29 January 2008	R52A17771A	The introduction of Variation 1.
2	5 February 2008	R52A17771A	The introduction of Variation 2.

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sira CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX1182X**
Issue 2

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

15.1 The surface temperature of the equipment depends on the temperature of the process fluid.

Maximum process fluid temperature (°C)	Temperature class (for gases)
72°C	T6 (85°C)
87°C	T5 (100°C)
122°C	T4 (135°C)
180°C[1]	T3 (200°C)

[1] The maximum ambient temperature allowed at this process temperature is +50°C. Process temperatures up to and including 150°C may have a maximum ambient temperature of +60°C.

For dust protection, the surface temperature is equal to the process fluid temperature +13 K when configured in the Remote version and process fluid temperature +13 K but not less than +85°C in the compact configuration.

15.2 In operation, the output is earthed through the conductive medium being measured and therefore potential equalisation is necessary throughout the hazardous area. The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.

15.3 The external connections to the Ex 'e' Terminals of the Remote version shall comply with the following:

15.3.1 The wire conductors shall have a cross-sectional area between 0.5 mm^2 and 4 mm^2.

15.3.2 No more than one single or multiple strand wire conductor shall normally be connected to each of the terminals. If multiple conductors are required, these shall be joined in a suitable manner, e.g. two conductors into a single insulated crimped boot lace ferrule.

15.3.3 The insulation on the wire conductors shall extend to within 1mm of the metal of the terminal throat.

15.3.4 The terminal screws shall be tightened down with a torque between 0.5 Nm and 0.7 Nm.

15.3.5 The terminals shall never be exposed to temperatures outside of the range –50°C to +130°C; in addition, they shall only be installed and wired with cable in an ambient temperature of -10°C to +80°C. Furthermore, in the event of there being a process temperatures of +180°C in conjunction with an upper ambient temperature of +50°C the terminal strips should not be installed or wired with cable.

15.4 The terminal box shall not be opened when an explosive gas or dust atmosphere may be present.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX1182X**
Issue 2

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 Each enclosure, including cast pedestal when used, shall be subject to a routine pressure test for at least 10 s as required by clause 16.1 of EN 60079-1:2004 (see table below). There shall be no damage or permanent deformation as a result of the tests.

Description	Minimum test pressure
≥DN 15 ≤DN 25	10 Bar
>DN 25 ≤DN 300	14 Bar

17.4 When used in 'Compact' configuration, the conditions imposed by certificate Sira 05ATEX2072X apply to the assembly.

17.5 Dielectric strength test required as per Clause 7.1 of EN 60079-7:2007

17.6 The Remote Version of the equipment, as supplied, shall only be connected to another item of certified Ex ia associated apparatus or Ex e equipment (e.g. an electro-magnetic transmitter).

17.7 This certificate relies on the following previously certified products. When used as part of the SITRANS F M MAGFLO MAG3100 Ex Flowsensor, the key attributes are listed in the table below and shall still be maintained by their original certificate.

Product	Certificate number	Key attributes
Weidmuller BK2/E Terminal	Sira 01ATEX3247U	EEx e II
Hawke type PET5 Pillar Earth Terminal	BAS 01ATEX2247U	EEx e II

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Certificate Annexe

Certificate Number: Sira 07ATEX1182X

Equipment: SITRANS F M MAGFLO MAG3100Ex
DN15 to DN300
SITRANS F M MAGFLO MAG6000 INDUSTRY

Applicants: Siemens Flow Instruments A/S
Siemens Flow Instruments Ltd

Issue 0

Number	Sheet	Rev.	Date (Sira stamp)	Description
A5E01211108A	1 of 1	01	28 Sep 07	Certification DRG. for MAG3100Ex DN15 – DN300 with MAG6000 Industry (SIRA)
A5E01211109A	1 of 1	01	28 Sep 07	Terminal Box DN15 – DN2000 Certification Drawing MAG3100Ex Sensor
A5E01211110A	1 of 1	01	28 Sep 07	Certification Drawing DN15 – DN25 MAG3100Ex Flowsensor
A5E01211111A	1 of 1	01	28 Sep 07	Certification Drawing DN40 – DN300 MAG3100Ex Flowsensor
A5E01214561A	1 of 1	04	28 Sep 07	Certification Drawing for DN50 – DN300 High Pressure MAG3100Ex Flowsensor
A5E01215897A	1 of 1	01	28 Sep 07	Certification DRG. for MAG3100Ex MAG6000i ASSY (SIRA)
A5E01263817A	1 of 1	01	28 Sep 07	Certification Label MAG3100Ex DN15-300 / MAG6000 Industry (Compact)
083A0275	1 of 1	05	28 Sep 07	Data Label DN15 – DN2000 MAG3100Ex Flowsensor
083A0285	1 of 1	01	28 Sep 07	Certification Label DN15 – DN300 MAG3100Ex Flowsensor
083Z3043	1 of 1	03	28 Sep 07	ST.ST Ferrule MAG3100 Flowsensor
083Z3042	1 of 1	04	28 Sep 07	Ferrule/Glass Seal ASSY MAG3100 Flowsensor

Issue 1

Number	Sheet	Rev.	Date (Sira stamp)	Description
A5E01211109A	1 of 1	03	28 Jan 08	Terminal Box DN15 - DN2000 Certification Drawing MAG3100Ex Sensors

Issue 2

Number	Sheet	Rev.	Date (Sira stamp)	Description
083A0285	1 of 1	02	04 Feb 08	Certification Label DN15 – DN300 MAG3100Ex Flowsensor
A5E01263817A	1 of 1	02	04 Feb 08	Appro. Label DN≤300 MAG6000I + MAG3100

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Form 9400 Issue 1

sira CERTIFICATION

1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 07ATEX3181X** Issue: **1**

4 Equipment: **SITRANS F M MAGFLO MAG1100Ex DN2 to DN100**

5 Applicant: **Siemens Flow Instruments A/S**

6 Address: Nordborgveg 81
Nordborg 6430
Denmark

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2006	EN 60079-7:2007	EN 60079-11:2007
EN 61241-0:2006	EN 61241-1:2004	EN 1127:1998

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

Remote version:

II 2(1) GD	Ta = -20°C to +60°C (with process temperatures equal to or less than +150°C)
Ex e ia IIB T3-T6	Ta = -20°C to +50°C (with process temperatures equal to or less than +180°C)
Ex tD A21 IP67 T*°C	(* pipe temperature +18 K)

Compact Configuration (This marking is shown on the transmitter label, the flowmeter is not separately marked):

II 2(1)(2) GD	Ta = -10°C to +60°C (with process temperatures equal to or less than +150°C)
Ex d [ia] [ib] ia IIB T3-T6	Ta = -10°C to +50°C (with process temperatures equal to or less than +180°C)
Ex tD A21 IP67 T*°C	(* pipe temperature +18 K, but not less than 85°C)

Note: Siemens label will mark "Ta: (Refer to user instructions)".

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sira CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX3181X**
Issue 1

13 **DESCRIPTION OF EQUIPMENT**

Each of the MAG1100Ex Flowmeters comprises two concentric cylindrical tubes with welded end caps. The outer tube is stainless steel and the inner is ceramic. The end caps are machined such as to allow mounting into process pipe work, the process fluid passing through the inner ceramic tube. 'O' ring seals are fitted between the tubes to prevent the ingress of process fluid. The enclosure contains energising coils with sensing electrodes.

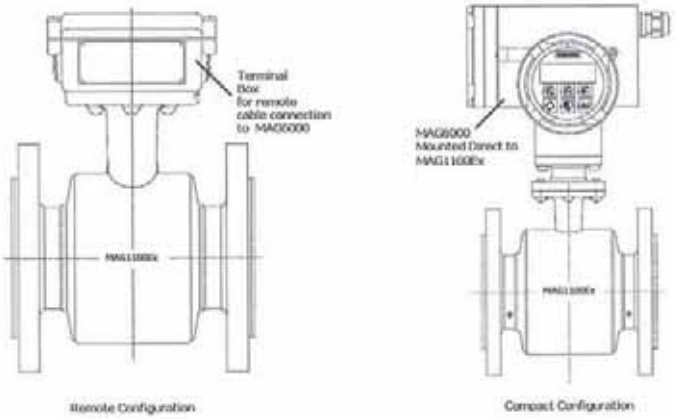
Cables enter the enclosure via an extension on the body and through a silicone compression seal. The seal is compressed by means of a central threaded element and is retained by a circlip arrangement. A terminal box is mounted on the extension to enable termination of the intrinsically safe and increased safety 'e' cabling. The whole Flowmeter is considered Ex 'd' up to the terminal box (up to internal flameproof 'silicone compression seal') at which point the field and factory wiring is considered protected by Ex 'ia' and Ex 'e' protection principles.

Design Variations/Options

The SITRANS F M MAGFLO MAG1100Ex Flowmeters are available in size ranges (pipe bore):

- DN2 to DN6 (Zirconium Ceramic)
- DN6 to DN100 (Alumina Ceramic)

Additionally the MAG1100Ex is either configured as a Remote or Compact type sensor. The Remote version has the MAG1100Ex Flowsensor installed independently with cable connections made via the terminal box to the MAG6000 transmitter located in a separate location. The Compact type configuration has the MAG6000 (Sira 05ATEX2072X) mounted directly to the MAG1100Ex Sensor in place of the terminal box. The diagram below shows the two configuration types.



Note: The diagram above is representative of a MAG1100 Flowsensor and is only presented to depict the configuration of either the terminal box or MAG6000Ex to the Flowsensor.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX3181X**
Issue 1

The parameters for the SITRANS F M MAGFLO MAG1100Ex Flowmeter are as follows:

Remote version:

Terminals 0, 81, 82,83,84 (Ex ia)	Ui = 30 V Ii = 50 mA	Pi = 0.5 W Ci = 50 nF Li = 2 µH
Terminals 85, 86 (Ex e)	Ui = 30/70 V_{pk} Ii = 130 mA	

Compact version:

Refer to certificate number Sira 05ATEX2072X.

Variation 1 - This variation introduced the following changes:

i. The ambient temperature specification relative to process temperatures was reviewed; this is the result of the upper process temperature limit being raised from 150°C up to a maximum of 180°C. The special condition for safe use appertaining to the temperature limits, temperature classes and maximum surface temperatures for dust are also modified and the marking has been amended so that the user/installer is advised to refer to the instructions for this information.

14 **DESCRIPTIVE DOCUMENTS**

14.1 **Drawings**

Refer to Certificate Annexe.

14.2 **Associated Sira Reports and Certificate History**

Issue	Date	Report no.	Comment
0	1 October 2007	R52A16937A	The release of the prime certificate.
1	5 February 2008	R52A17771A	The introduction of Variation 1.

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

15.1 The surface temperature of the equipment depends on the temperature of the process fluid.

Maximum process fluid temperature	Temperature class (for gases)
67°C	T6 (85°C)
82°C	T5 (100°C)
117°C	T4 (135°C)
180°C[1]	T3 (200°C)

[1] The maximum ambient temperature allowed at this process temperature is +50°C. Process temperatures up to and including 150°C may have a maximum ambient temperature of +60°C.

For dust protection, the surface temperature is equal to the process fluid temperature +18 K when configured in the Remote version and process fluid temperature +18 K but not less than +85°C in the compact configuration.

15.2 In operation, the output is earthed through the conductive medium being measured and therefore potential equalisation is necessary throughout the hazardous area. The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX3181X**
Issue 1

15.3 The external connections to the Ex 'e' Terminals of the Remote version shall comply with the following:

15.3.1 The wire conductors shall have a cross-sectional area between 0.5 mm^2 and 4 mm^2.

15.3.2 No more than one single or multiple strand wire conductor shall normally be connected to each of the terminals. If multiple conductors are required, these shall be joined in a suitable manner, e.g. two conductors into a single insulated crimped boot lace ferrule.

15.3.3 The insulation on the wire conductors shall extend to within 1mm of the metal of the terminal throat.

15.3.4 The terminal screws shall be tightened down with a torque between 0.5 Nm and 0.7 Nm.

15.3.5 The terminals shall never be exposed to temperatures outside of the range –50°C to +130°C; in addition, they shall only be installed and wired with cable in an ambient temperature of -10°C to +80°C. Furthermore, in the event of there being a process temperatures of +180°C in conjunction with an upper ambient temperature of +50°C the terminal strips should not be installed or wired with cable.

15.4 The terminal box shall not be opened when an explosive gas or dust atmosphere may be present.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 Each enclosure, including cast pedestal when fitted, shall be subjected to a routine pressure test of 8.85 bar for at least 10 s as required by clause 16.1 of EN 60079-1:2004. There shall be no damage or permanent deformation as a result of the tests.

17.4 When used in 'Compact' configuration, the conditions imposed by certificate Sira 05ATEX2072X apply to the assembly.

17.5 Dielectric strength test required as per Clause 7.1 of EN 60079-7:2007

17.6 The Remote Version of the equipment, as supplied, shall only be connected to another item of certified Ex ia associated apparatus or Ex e equipment (e.g. an electro-magnetic transmitter).

17.7 This certificate relies on the following previously certified products. When used as part of the SITRANS F M MAGFLO MAG3100 Ex Flowsensor, the key attributes are listed in the table below and shall still be maintained by their original certificate.

Product	Certificate number	Key attributes
Weidmuller BK2/E terminal	Sira 01ATEX3247U	EEx e II

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Certificate Annexe

Certificate Number: Sira 07ATEX3181X

Equipment: SITRANS F M MAGFLO MAG1100Ex DN2 to DN100

Applicant: Siemens Flow Instruments A/S

sira CERTIFICATION

Issue 0

Number	Sheet	Rev.	Date (Sira stamp)	Description
083A0280	1 of 1	5	28 Sep 07	Skilt Plate
A5E01263820A	1 of 1	1	28 Sep 07	Appro. label MAG1100 DN2-100
A5E01263812A	1 of 1	1	28 Sep 07	Appro. label MAG6000I + MAG1100
A5E01409195A	1 of 1	1	28 Sep 07	Terminal box DN6-DN100 certification drawing MAG1100Ex sensors
A5E01409379A	1 of 1	1	28 Sep 07	Terminal box DN2-DN6 (Zirconium) certification drawing MAG1100Ex sensors
A5E01409438A	1 of 1	1	28 Sep 07	Certification drawing MAG1100 Ex DN2 to DN6 Zr02
A5E01409518A	1 of 1	1	28 Sep 07	Certification drawing MAG1100 Ex DN6 to DN100 Al oxide
A5E01409569A	1 of 1	1	28 Sep 07	Certification drawing MAG1100 Ex food
A5E01409614A	1 of 1	1	28 Sep 07	Certification DRG for MAG1100Ex DN2-DN100 with MAG6000 Industry (SIRA)

Issue 1

Number	Sheet	Rev.	Date (Sira stamp)	Description
A5E01263820A	1 of 1	03	04 Feb 08	Appro. Label MAG1100 DN2-100
A5E01263812A	1 of 1	02	04 Feb 08	Appro. Label MAG6000I + MAG1100

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sira CERTIFICATION

1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 03ATEX3339X** Issue: **7**

4 Equipment: **SITRANS F M MAGFLO MAG3100 Ex**

5 Applicant: **Siemens Flow Instruments**

6 Address: Magflo house
Ebley Road
Stonehouse
Gloucestershire GL10 2LU
UK

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 50014:1997 (A1 and A2) EN 50019:2000 EN 50020:2002 EN 50281-1-1:1998

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

II 2 G D
EEx e ia IIC T3 to T6

'Compact' arrangement marked 'MAG6000 INDUSTRY'

II 2(1)(2) GD T85°C
EEx de [ia] ia [ib] IIC T3-T6 (Ta -10°C to +60°C)

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Form 9400 Issue 1

sira CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 03ATEX3339X**
Issue 7

13 **DESCRIPTION OF EQUIPMENT**

The SITRANS F M MAGFLO MAG3100 Ex flowsensor comprises a pair of increased safety windings and intrinsically safe magnetic sensing circuit electrodes that are mounted on a pipe body. The size range covered is DN350 to DN2000. The windings are rated at 30 V d.c. and the sensing circuit is rated at 9.3 V, 40 mA.

The pipe body is fitted with clips, which secure the increased safety windings, and pipe flanges for installation to the process pipework. Two diametrically opposed tubes are welded to the sides of the pipe and these contain intrinsically safe electrodes that pass through the wall of the pipe into the bore. An outer casing manufactured from steel encloses the windings and wiring, but the diametrically opposed tubes pass through this outer casing and the open ends are sealed by tamperproof plugs. The interior of the tubes is filled with gel encapsulant.

The increased safety windings are manufactured from self-bonding insulated copper winding wire and are connected in series. The connection leads from the windings and the electrodes are taken back to a junction box which is mounted on a tube welded to the outer casing. The leads pass through the tube and enter the rear of the enclosure where they are terminated on terminal blocks. The junction box meets IP67 ingress protection.

The sensing circuit leads are screened, with a single core, with the screens terminated on an earth terminal near the intrinsically safe terminal block.

Additional earthing electrodes fitted through the wall of the pipe may be provided. The earthing electrodes are fitted into holes in the sensor tube and are secured by a continuous weld. Alternatively the electrodes may be screwed in and Loctite applied to the threads to seal them.

Variation 1 - This variation introduced the following changes:

i. The Special Condition For Safe Use, clause 15.3 in the original certificate, was deleted as the equipment cannot be used with a flow of metallic powder.
ii. The replacement of drawing 083A0274 with drawing 083A0284, this reflects changes to the rating of the intrinsically safe sensing circuit as follows:

Ui = 30 V Li = 2 µH

Variation 2 - This variation introduced the following changes:

i. The correction of a ferrule specification drawing.

Variation 3 - This variation introduced the following changes:

i. The introduction of a strengthening sleeve welded over the existing pedestal.

Variation 4 - This variation introduced the following changes:

i. The removal of the terminal box and the fitting of interface components, this allows the Sitrans F M Magflo MAG6000 industry transmitter, Certificate Number Sira 05ATEX2072X, to be mounted directly onto the flowmeter, this combined transmitter/sensor arrangement being designated the 'Compact' arrangement and being marked 'MAG6000 INDUSTRY'; see clause 12 for applicable marking.
ii. The introduction of an alternative method of joining the coil wire to the leads.
iii. The use of an alternative terminal box base plate and intrinsically safe separation shield was permitted.
iv. The use of alternative cable glands into the terminal box was permitted.
v. The use of an alternative electrode pin through the existing glass ferrule was permitted.

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EC TYPE-EXAMINATION CERTIFICATE **Sira 03ATEX3339X**
Issue 7

Variation 5 - This variation introduced the following changes:

i. The fabricated pedestal was substituted by a cast steel version.

Variation 6 - This variation introduced the following changes:

i. The terminal box arrangement used on the MAG3100 (DN15 – DN300) under Sira certificate 07ATEX1182X may be used on this version of the MAG3100, sizes DN350 to DN2000; new drawing A5E01211109A refers.
ii. The label material was changed from "adhesive backed polyester, temp range -20 to +140 Deg C" to "MP50 Metallised Polyester, Permanent Adhesive Backed" (to bring into line with other label materials), in addition, tolerance +/-2 mm was added to dimensions.
iii. A reference to Sira 07ATEX1182X was included on Drawing 083Z3042.

Variation 7 - This variation introduced the following changes:

i. The modification of the mounting arrangement for the divider separating the Ex 'e' and the Ex 'ia' terminals.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report no.	Comment	
0	29 August 2003	R52V10518A	The release of the prime certificate.	
1	25 May 2004	R53V11823V	The introduction of Variation 1.	
2	4 April 2005	R51V13265A	The introduction of Variation 2.	
3	13 March 2007	R51A16396A	The introduction of Variation 3.	
4	16 August 2007	R51M15493A	The introduction of Variation 4.	(Both of these Variations were re-issued on 11 September 2007 to change the order of issue thereby restoring the natural progression of the design changes)
5	16 July 2007	R51M16470A	The introduction of Variation 5.	
6	7 December 2007	R52A17346A	This Issue covers the following changes: • All previously issued certification was rationalised into a single certificate, Issue 6, Issues 0 to 5 referenced above are only intended to reflect the history of the previous certification and have not been issued as documents in this format. • The introduction of Variation 6.	
7	29 January 2008	R52A17771A	This Issue covers the following changes: • The introduction of Variation 7. • Special Condition for Safe Use, clause 15.3, was removed, refer to Variation 1. • The Certificate History was corrected and clarified. • The marking in clause 12 was extended to include that associated with the compact in Variation 4.	

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Form 9400 Issue1

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 03ATEX3339X
Issue 7

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

15.1 The surface temperature of the equipment depends on the temperature of the process fluid:

Process fluid temperature	**Temperature class** (for gases)
<75°C	T6
<90°C	T5
<125°C	T4
<190°C	T3

For dust protection, the surface temperature is equal to the process fluid temperature plus 5°C.

15.2 In operation, the output is earthed through the conductive medium being measured and therefore potential equalisation is necessary throughout the hazardous area. The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 This certificate relies on the following previously certified products. When used as part of the SITRANS F M MAGFLO MAG3100 Ex flowsensor, the key attributes listed in the table below shall still be maintained by their original certificate.

Product	**Certificate number**	**Key attributes**
Weidmuller BK2/E terminal	Sira 01ATEX3247U	EEx e II
Hawke type PET5 Pillar earth terminal	BAS 01ATEX2247U	EEx e II

Sira Certification Service
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Web: www.siracertification.com

Certificate Annexe

Certificate Number: Sira 03ATEX3339X
Equipment: SITRANS F M MAGFLO MAG3100 Ex
Applicant: Siemens Flow Instruments

sira CERTIFICATION

Issue 0

Drawing	Sheet	Rev.	Date	Title
083A0275	1 of 1	2	11 Aug 03	Data label MAG 3100Ex Flowsensor
083A0266	1 of 1	4	11 Aug 03	Intrinsically Safe Electrode Terminals Label MAG3100Ex Flowsensor
083A0274	1 of 1	3	12 Aug 03	Certification Label DN350 to DN2000 MAG3100Ex Sensors
083A0245	1 of 1	4	12 Aug 03	Safety Label MAG3100Ex Flowsensor
083C0233	1 of 1	7	12 Aug 03	Internal Wiring Diagram EEx e ia DN350-DN2000 incl MAG3100Ex Sensors
083Z0151	1 of 1	4	12 Aug 03	Ferrule Glass Seal Assy. MAG3100Ex flowsensor
083Z9542	1 of 1	6	28 Apr 03	Coil winding DN350 – DN2000 MAG3100Ex sensors
083Z9544	1 of 1	4	12 Aug 03	Terminal Box DN350-DN2000 Certification Drawing Mag3100Ex Sensors
083Z9545	1 of 1	4	12 Aug 03	Certification Drawing EEx e ia IIC Specification MAG3100Ex DN350-DN2000
083Z9546	1 of 1	4	12 Aug 03	Certification Drawing Coil and Electrode Assembly MAG3100Ex DN350-DN2000
083Z9555	1 of 1	2	12 Aug 03	Certification Drawing Fixing Earthing Electrode MAG3100Ex DN350-DN2000
083R0208	1 of 1	3	12 Aug 03	Joining Coil Wire to Flying Lead MAG3100Ex Flowsensor

Issue 1

Drawing	Sheet	Rev.	Date	Description
083A0284	1 of 1	1	04 May 04	Certification Label

Issue 2

Drawing	Sheet	Rev.	Date	Description
083Z0151	1 of 1	5	27 Nov 03	Ferrule Glass Seal Assy. MAG3100Ex Flowsensor

Issue 3

Drawing	Sheet	Rev.	Date (Sira stamp)	Description
083R1633	1 of 1	3	13 Mar 07	Pedestal Support Sleeve MAG3100 / MAG3100EX

Issue 4

Drawing	Sheet	Rev.	Date	Description
083Z9610	1 of 1	01	29 Sep 06	MAG3100Ex 'Compact' – < DN350
083Z9609	1 of 1	02	10 Aug 06	MAG3100Ex 'Compact' – >DN 350
083Z9544	1 of 1	05	09 Aug 06	Modified Terminal Box Arrangement
083Z3042	1 of 1	03	09 Aug 06	Modified Electrode Arrangement
083R0207	1 of 1	02	01 May 03	Coil Wire Jointing Method
A5E00713575A	1 of 1	05	07 Aug 07	Amalgamated Label Drawing

Issue 5

Drawing	Sheet	Rev.	Date	Description
083Z9545	1 of 1	05	25 Sep 06	Certification Drawing EEx e ia IIC Specification MAG3100Ex DN350-DN2000
083Z9609	1 of 1	03	13 Feb 07	MAG3100Ex 'Compact' – >DN 350
083Z9610	1 of 1	03	09 Feb 07	MAG3100Ex 'Compact' – DN15-2000

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Form 9400 Issue 1

Certificate Annexe

Certificate Number: Sira 03ATEX3339X
Equipment: SITRANS F M MAGFLO MAG3100 Ex
Applicant: Siemens Flow Instruments

sira CERTIFICATION

Issue 6

Drawing	Sheet	Rev.	Date	Description
A5E01211109A	1 of 1	01	05 Sep 07	Terminal Box DN15-DN2000 Certification Drawing MAG3100Ex Sensors
083A0245	1 of 1	05	06 Oct 05	MP50 metalised polyester permanent adhesive backed.
083Z3042	1 of 1	04	12 Sep 07	Ferrule/Glass Seal Assy MAG3100 Flowsensor.
083Z9546	1 of 1	05	30 Nov 07	Certification Drawing Coil & Electrode Assembly MAG3100Ex DN350 – DN2000

Issue 7

Drawing	Sheet	Rev.	Date	Description
A5E01211109A	1 of 1	03	28 Jan 08	Terminal Box DN15-DN2000 Certification Drawing MAG3100Ex Sensors

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Form 9400 Issue 1

[1] # EC-TYPE EXAMINATION CERTIFICATE

[2] Equipment or Protective System intended for use
in Potentially Explosive Atmospheres
Directive 94/9/EC

[3] EC-Type Examination Certificate Number: **DEMKO 03 ATEX 135254X**

[4] Equipment or Protective System: **SITRANS F M MAGFLO Safety Barrier Type FDK:083F50_ _**

[5] Manufacturer: **Siemens Flow Instruments A/S.**

[6] Address: **Nordborgvej 81, DK-6430 Nordborg, Denmark.**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 135254.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 50014: 1997 E Amds. A1+A2 **EN 50020 2002 E**

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:

Ex II (2)G [EEx ia] IIC

On behalf of UL International Demko A/S Herlev, 2003-09-01

Karina Christiansen
Certification Manager

UL International Demko A/S
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Telephone: +45 44856565
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[13] # Schedule

[14] EC-TYPE EXAMINATION CERTIFICATE No.
DEMKO 03 ATEX 135254X

[15] Description of Equipment or protective system.

The **SITRANS F M MAGFLO Safety Barrier Type FDK:083F50_ _** is associated apparatus and comprises a Stahl zener barrier type 9002/22-093-040-00 mounted on a printed circuit board and enclosed in an enclosure with an ingress protection rating of not less than IP 20.

Nomenclature for type FDK:083F5034

Electrical data

Non Intrinsic safety circuits: U_m : 250 V

Intrinsically safe specifications:

ia output (terminal no.: 82 – 83):
Linear characteristic:

U_o : 9,3 V
I_o : 40 mA
P_o : 0,4 W
L_o : 23 mH
C_o : 500 nF

Installation instructions and mounting instructions
According to manufacture Instruction Manual.

Routine tests
Routine tests according to EN 50020 §11.1 shall be done by the manufacture.

[16] Report No.

Project Report No.: 135254-01; 135254-03 (Hazardous Location Testing)

Drawings:

Number	Date	Description
083R3089_DS01	2006-05-02	R-instruction.

The Schedule drawings are listed in the document entitled 083R3089.

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Schedule

EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 03 ATEX 135254X

17] Special conditions for safe use:

- The ambient temperature range is -20 °C to +50 °C.
- The barrier shall be connected to the PE earth (light blue) according to local installation equipments. IEC60079-14 can be used as guideline.
- The PE earth shall be connected to the PE at the sensor according to local installation equipments. IEC60079-14 can be used as guideline.
- The intrinsic safety wiring shall be separated from non intrinsic safety wiring according to local installation equipments.
- The apparatus must be installed in plastic enclosure code FDK:083F5038 with an Ingress Protection suitable for the environment. The Plastic box FDK083F5038 has been evaluated for IP65 according to EN60529: 1989.

18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

On behalf of UL International Demko A/S

Herlev, 2006-12-04

Karina Christiansen
Certification Manager

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For more information

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Subject to change without prior notice
Order No.: A5E02082880
Lit. No.: SFIDK.PS.026.C4.02

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