# Transmitter MAG 5000/6000

### Overview



Transmitter MAG 5000/6000 compact version (left) and 19" insert version (right)

The MAG 5000 and 6000 are microprocessor-based transmitters engineered for high performance, easy installation, commissioning and maintenance. The transmitters evaluate the signals from the flowmeter sensors type MAG 1100, MAG 1100 F, MAG 3100 and MAG 5100 W.

Transmitter types:

- MAG 5000: Max. measuring error 0.5% of rate (incl. sensor)
- MAG 6000: Max. measuring error 0.25% of rate (incl. sensor, see also sensor specifications) and with additional features such as: Plug & Play insert bus modules; integrated batch functions.

### Benefits

- Superior signal resolution for optimum turn down ratio
- · Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection.
- 3 lines, 20 characters display in 11 languages.
- · Flow rate in various units
- Totalizer for forward, reverse and net flow as well as additional information available
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging
- · Batch control
- Custody transfer approval: PTB, OIML R75, R117, OIML R 49 and MI-001,
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, MODBUS RTU/RS485, PROFIBUS PA and DP

### Application

The flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries. The main applications can be found in:

- · Water and waste water
- · Chemical and pharmaceutical industries
- · Food & beverage industries
- · Power generation and utility

### Design

The transmitter is designed as either IP67 NEMA 4X enclosure for compact or wall mounting or 19" version as a 19" insert as a base to be used in:

- 19" rack systems
- · Panel mounting IP65/NEMA 4
- · Back of panel mounting IP20/NEMA 2
- · Wall mounting IP66/NEMA 4

Several options on 19" versions are available such as:

- Transmitters mounted in safe area for Ex ATEX approved flow sensors (incl. barriers)
- · Transmitters with electrode cleaning unit

#### Function

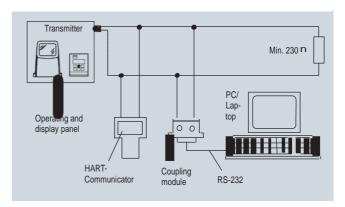
The MAG 5000/6000 are microprocessor-based transmitters with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

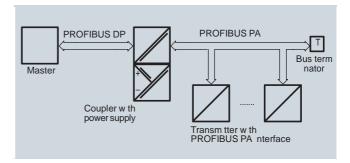
### Displays and controls

Operation of the transmitter can be carried out using:

- · Control and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or MODBUS communication



HART communication



PROFIBUS PA communication

			Transmitter MAG 5000/6000
Technical specifications		EMC performance	EN 61326-1 (all environments) EN 61326-2-5
Mode of operation and design		Display and keypad	LIV 0 1320-2-3
Measuring principle	Electromagnetic with pulsed constant field	Totalizer	Two eight-digit counters for forward, net or reverse flow
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)	Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized
Excitation frequency Electrode input impedance	Depend on sensor size $> 1 \times 10^{14} \Omega$		values, settings and faults; Reverse flow indicated by nega- tive sign
Input Digital input	11 30 V DC, R <sub>i</sub> = 4.4 KΩ	Time constant	Time constant as current output time constant
Activation time	50 ms	Design	
• Current	$I_{DC \ 11 \ V} = 2.5 \text{ mA}, I_{DC \ 30 \ V} = 7 \text{ mA}$	Enclosure material	
Output	1DC 11 V = 2.3 11 1, 1DC 30 V = 7 11 11	Compact version	Fiber glass reinforced polyamide;
Current output		oompaat valuion	optional (IP67 only):
Signal range	0 20 mA or 4 20 mA	40"	AISI 316 stainless steel
• Load	< 800 Ω	• 19"-insert	Standard 19" insert of alumin- ium/steel (DIN 41494), width: 21 TE, height: 3 HE
Time constant	0.1 30 s, adjustable	Back of panel	IP20/NEMA 2; Aluminium
Digital output		Panel mounting	IP65/NEMA 4; ABS plastic
Frequency	0 10 kHz, 50% duty cycle (uni/bidirectional)	Wall mounting	IP66/NEMA 4; ABS plastic
Pulse (active)	DC 24 V, 30 mA,	Dimensional drawings	<u> </u>
r uise (active)	1 K $\Omega \le R_i \le 10$ K $\Omega$ , short-circuit- protected (power supplied from	Compact version 19" insert	See dimensional drawings See dimensional drawings
	flowmeter)	Weight	
Pulse (passive)	DC 3 30 V, max. 110 mA, 200 $\Omega \le R_i \le 10 \text{ K}\Omega$ (powered from connected equipment)	Compact version 19" insert	0.75 kg (2 lb) See dimensional drawings
Time constant	0.1 30 s, adjustable	Power supply	• 115 230 V AC +10% -15%,
Relay output			50 60 Hz, 17 VA
Time constant	Changeover relay, same as cur-		• 11 30 V DC or 11 24 V AC
	rent output	Power consumption	• 230 V AC: 17 VA
Load	42 V AC/2 A, 24 V DC/1 A		• 24 V AC : 9 W, I <sub>N</sub> = 380 mA, I <sub>ST</sub> = 8 A (30 ms)
Low flow cut off	0 9.9% of maximum flow		• 12 V DC : 11 W, I <sub>N</sub> = 920 mA,
Galvanic isolation	All inputs and outputs are galvan- ically isolated	Certificates and approvals	I <sub>ST</sub> = 4 A (250 ms)  CE, ULc general purpose, C-tick;
Max. measuring error (incl. sensor and zero point)			CSA/FM Class 1, div 2
MAG 5000	0.5% of rate	Custody transfer approval (MAG 5000/6000 CT)	<ul> <li>PTB OIML R49 (cold water pattern approval); MI-001</li> </ul>
MAG 6000	0.25% of rate	,	PTB and DANAK OIML R75 (hot
Rated operation conditions			water pattern approval) (MAG 6000 CT)
Ambient temperature			• PTB and DANAK OIML R117
Operation	• Display version: -20 +50 °C (-4 +122 °F)		(cold water/milk, beer etc. pat- tern approval) (MAG 6000 CT)
	• Blind version:	Communication	
0.	-20 +60 °C (-4 +140 °F)	Standard	
Storage  Mechanical load	-40 +70 °C (-40 +158 °F)	• MAG 5000	Without serial communication or HART as option
	40 4000 Hz 2 47 C mag gian.	• MAG 6000	Prepared for client mounted add-
Compact version	18 1000 Hz, 3,17 G rms, sinusoidal in all directions to IEC 68-2-36	Optional (MAG 6000 only)	on modules  HART, MODBUS RTU/RS485,
19" insert	1 800 Hz, 1 G, sinusoidal in all directions to IEC 68-2-36		FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on mod-
Degree of protection			ules
Compact version	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH <sub>2</sub> O 30 min.)	• MAG 5000/6000 CT	no communication moduls
19" insert	IP20/NEMA 2 to IEC 529 and DIN 40050		approved

### Transmitter MAG 5000/6000

#### Safety barrier (e/ia)



Application	For use with MAG 5000/6000 19" and MAG 1100 Ex ATEX/MAG 3100 Ex ATEX					
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX					
	MAG 3100 Ex [EE	MAG 3100 Ex [EEx e ia] IIC ATEX				
• Electrode	Group	Capacity in µF	Inductance in mH			
	IIC	≤ 4.1	≤ 80			
	IIB	≤ 45	≤ 87			
	IIA	≤ 45	≤ 87			

Ambient temperature -20 ... +50 °C (-4 ... +122 °F) · During operation · During storage -20 ... +70 °C (-4 ... +158 °F) **Enclosure** 

Standard 19" insert in aluminium/steel (DIN 41494) • Width 21 TE (4.75") 3 HE (5.25") Height Rating IP20 / NEMA 2 to EN 60529 and DIN 40050

· Mechanical load 1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36

**EMC** performance • Emission

Material

EN 50081-1 (Light industry) EN 50082-2 (Industry) • Immunity

### Electrode cleaning unit



Application	For use with transmitters MAG 5000 and 6000 19" to clean the electrodes on sensors MAG 1100 or MAG 3100				
	NB: Must not be used with intrinsically safe ATEX sensors				
	NB: Not to be used with sensors with Hastelloy and Tantalum electrodes				
Cleaning voltage					
AC cleaning	60 V AC				
DC cleaning	30 V DC				

Cleaning voltage	
AC cleaning	60 V AC
DC cleaning	30 V DC
Cleaning period	60 s + 60 s pause period
Relay	
• Load	42 V/2 A
Operation	Switch relay activated when cleaning is in progress
<ul> <li>Automatic</li> </ul>	Yes
Manual	No
Indicator lamps	LEDs: "ON" and "CLEANING"
Supply voltage and power	115 230 V AC, +10%15%, 50 60 Hz, 7 VA cleaning, 5 VA stand by
consumption	11 30 V DC / 11 24 V AC, 50 60 Hz, 7 VA cleaning, 5 VA stand by
Ambient temperature	
<ul> <li>During operation</li> </ul>	-20 +50 °C (-4 +122 °F)
<ul> <li>During storage</li> </ul>	-20 +70 °C (-4 +158 °F)
Enclosure	
Material	Standard 19" insert in aluminium/steel (DIN 41494)

Material Standard 19" insert in aluminium/steel (DIN 41494) • Width 21 TE (4.75") Height 3 HE (5.25")

 Rating IP20 / NEMA 2 to EN 60529 and DIN 40050

· Mechanical load 1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36

### Cleaning unit

The Siemens cleaning unit can be used with MAG 5000 or 6000 in 19" insert version.

The cleaning unit can be used in applications where the liner and subsequently the electrodes may be coated with deposits. If the coating is electrically insulating, the electrode signal will be reduced. If the coating is electrically inductive, the electrode signal will be partly short-circuited and in both cases the accuracy of the meter will decrease (dependent on coating type and thickness).

## Note:

The cleaning unit cannot be used for inflammable or explosive

# Transmitter MAG 5000/6000

#### Mode of operation

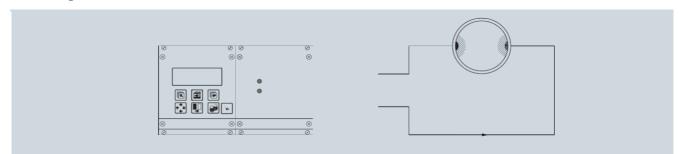
The cleaning unit cleans the electrodes electro-chemically by applying a voltage to the electrodes for approx. 60 seconds. While cleaning, the transmitter stores and holds the latest measured flow reading on the display and also the signal outputs. After an additional pausing period of 60 seconds the flowmeter resumes normal measurement and the cleaning is now completed.

The relay in the transmitter activates the cleaning cycle. In the relay output menu (under cleaning) the cleaning interval can be set between 1 hour and 24 hours.

Cleaning should only take place with liquid in the pipe. This can be detected via the empty pipe function. It is therefore recommended to select "empty pipe detection" ON when using the cleaning.

The cleaning sequence can also be controlled manually through the electrical input of the transmitter. Before this is done, ensure that the measuring pipe is full.

### AC cleaning

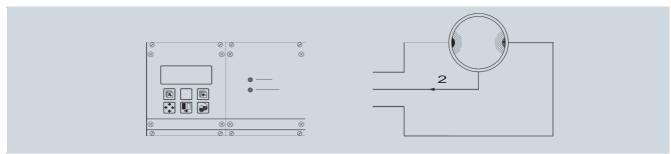


AC-cleaning is used to remove fatty deposits on the electrodes. These fatty deposits are seen in waste water applications, in abattoirs and water applications with oil residuals. During the cleaning process, the surface of the electrodes get warmer, which tends to soften grease particles and the gas bubbles generated mechanically lift deposits away from the surface of the electrodes.

#### Note:

Do not use AC-cleaning on sensors with Tantalum or Hastelloy electrodes.

# DC cleaning



DC-cleaning is used to eliminate electrically conductive deposits in the measuring pipe influencing the measuring accuracy.

Particularly in district heating applications an electrically conductive deposit (magnetite) may occur and short-circuit the electrode signal. In this case the accuracy of the meter decreases and the signal/noise conditions of the meter become inferior. The problem only arises if the conductivity of the water is less than approx.  $250 \, \mu S/cm$ .

During DC-cleaning electrolysis takes place where the flow of electrons removes the particle deposits from the electrode area.

### Note:

Do not use DC-cleaning on sensors with Tantalum or Hastelloy electrodes.

### Transmitter MAG 5000/6000

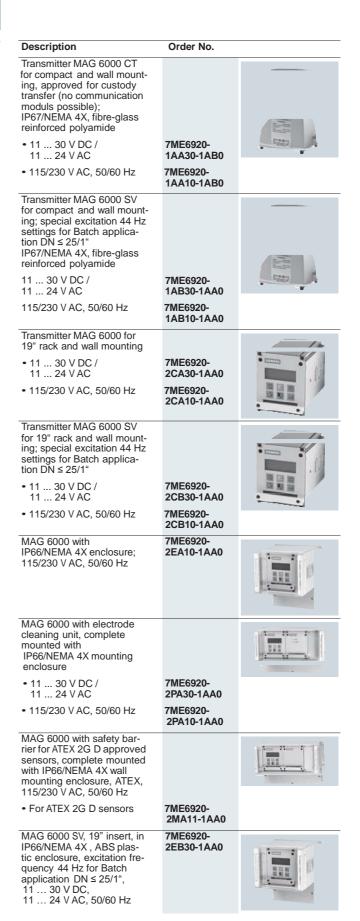
### Selection and Ordering Data

### Transmitter MAG 5000

Transmitter MAG 5000		
Description	Order No.	
Transmitter MAG 5000 Blind for compact and wall mount- ing; IP67/NEMA 4X, fibre- glass reinforced polyamide		
• 11 30 V DC / 11 24 V AC	7ME6910- 1AA30-0AA0	T H
• 115/230 V AC, 50/60 Hz	7ME6910- 1AA10-0AA0	-
Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 30 V DC / 11 24 V AC	7ME6910- 1AA30-1AA0	discourse of the same of the s
• 115/230 V AC, 50/60 Hz }	7ME6910- 1AA10-1AA0	T
<ul> <li>115/230 V AC, 50/60 Hz, with HART</li> </ul>	7ME6910- 1AA10-1BA0	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer; IP67/NEMA 4X, fibre-glass reinforced polyamide	ZMECOMO	
• 11 30 V DC / 11 24 V AC	7ME6910- 1AA30-1AB0	- Senant
• 115/230 V AC, 50/60 Hz	7ME6910- 1AA10-1AB0	
Transmitter MAG 5000 for 19" rack and wall mounting		
• 11 30 V DC / 11 24 V AC	7ME6910- 2CA30-1AA0	NO IN
• 115/230 V AC, 50/60 Hz	7ME6910- 2CA10-1AA0	
Transmitter MAG 6000		

Transmitter MAG 6000		
Description	Order No.	
Transmitter MAG 6000 Blind for compact and wall mount- ing; IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 30 V DC / 11 24 V AC	7ME6920- 1AA30-0AA0	
• 115/230 V AC, 50/60 Hz	7ME6920- 1AA10-0AA0	
Transmitter MAG 6000 for compact and wall mounting;		
• 11 30 V DC / 11 24 V AC	7ME6920- 1AA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920- 1AA10-1AA0	
IP67/NEMA 4X, AISI 316 stainless steel (only for sen- sor with SS terminal box )		
• 11 30 V DC / 11 24 V AC	7ME6920- 1QA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920- 1QA10-1AA0	

<sup>}</sup> Available ex stock



### Communication modules for MAG 6000

	Order No.			
}	FDK-085U0226	MET		
}	FDK-085U0234	AVE TO THE		
}	FDK-085U0236	SHEMENS HART CC		
}	FDK-085U0237			
}	FDK-085U0229			
}	A5E02054250			
	<pre>} } } } } </pre>	<ul><li>FDK-085U0226</li><li>FDK-085U0234</li><li>FDK-085U0236</li><li>FDK-085U0237</li><li>FDK-085U0229</li></ul>		

### Accessories for MAG 5000 and MAG 6000

Description		Order No.	
Wall mounting unit for IP67/NEMA 4X version, wall bracket, terminal box in polyamide			
<ul> <li>4 x M20 cable glands</li> </ul>	}	FDK-085U1018	No.
• 4 x 1/2" NPT cable glands	}	FDK-085U1053	•
Cable for standard electrode or coil, 3 x 1.5 mm²/18 gage with shield PVC			
• 10 m (33 ft)	}	FDK-083F0121	
• 20 m (65 ft)	}	FDK-083F0210	
• 40 m (130 ft)	}	FDK-083F0211	
• 60 m (200 ft)	}	FDK-083F0212	
• 100 m (330 ft)		FDK-083F0213	
• 150 m (500 ft)		FDK-083F3052	
• 200 m (650 ft)		FDK-083F3053	
• 500 m (1650 ft)		FDK-083F3054	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm <sup>2</sup>			
• 10 m (33 ft)		FDK-083F3020 <sup>D)</sup>	
• 20 m (65 ft)	}		
• 40 m (131 ft)		FDK-083F3094 <sup>D)</sup>	
• 60 m (200 ft)		FDK-083F3093 <sup>D)</sup>	
• 100 m (330 ft)		FDK-083F3092 <sup>D)</sup>	
• 150 m (500 ft)		FDK-083F3056 <sup>D)</sup>	
• 200 m (650 ft)		FDK-083F3057 <sup>D)</sup>	
• 500 m (1650 ft)		FDK-083F3058 <sup>D)</sup>	
Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²			<del>-</del>
• 10 m (33 ft)		A5E01181647 <sup>F)</sup>	
• 20 m (65 ft)		A5E01181656 <sup>F)</sup>	
• 40 m (130 ft)		A5E01181686 <sup>F)</sup>	
• 60 m (200 ft)		A5E01181689 <sup>F)</sup>	
• 100 m (330 ft)		A5E01181691 <sup>F)</sup>	
• 150 m (500 ft)		A5E01181699 <sup>F)</sup>	
• 200 m (650 ft)		A5E01181703 <sup>F)</sup>	
• 500 m (1640 ft)		A5E01181705 <sup>F)</sup>	

# Transmitter MAG 5000/6000

	Transmitter	MAG 5000/6000
Description	Order No.	
Cable glands, for above		4 30
cable, 2 pcs.		
• M20	A5E00822490	
• ½" NPT	A5E00822501	
		½" NPT M20
Sealing screws for sensor/	FDK-085U0221	\$i
transmitter, 2 pcs		Ti'
Terminal box, in polyamide,		
inclusive lid	EDIX OSELIAGEO	
-	FDK-085U1050	
• ½" NPT	FDK-085U1052	
Terminal box lid, in polyamid	FDK-085U1003	
Terminal box for MAG 6000, in stainless steel, inclusive lid		
• M20	A5E00836867	
• ½" NPT	A5E00836868	
	7102000000	
Terminal box (3A) for		
MAG 1100 Food in polya- mide, inclusive lid		
• M20	A5E00822478	
• ½" NPT	A5E00822479	7
Potting kit for terminal box of }	FDK-085U0220	
MAG sensors for IP68/NEMA 6P (not ATEX)		
IFOO/NEWA OF (HOLATEX)		
19" cleaning unit for electrode cleaning (21TE) incl.		
back plate		
• 11 30 V DC /	FDK-083F5039	= 1.19
11 24 V AC	EDIV 002E6026	
• 115 230 V AC, 50/60 Hz	FDK-083F5036	•/
19" safety barrier (21 TE) [EEx e ia] IIC for MAG 1100	FDK-083F5034	
ATEX and MAG 3100 ATEX,		
incl. back plate		1.50
Panel mounting enclosure	FDK-083F5030	1/
for 19" insert (Ž1 TE);	1 DK-0031 3030	
IP65/NEMA 4 enclosure in ABS plastic for front panel		
mounting		-
Panel mounting enclosure	FDK-083F5031	
for 19" insert (42 TE); IP65/NEMA 4 enclosure in		
ABS plastic for front panel		1
mounting		
Back of panel mounting enclosure for 19" insert	FDK-083F5032	
(21 TE); IP20/NEMA 2 enclo-		
sure in aluminium		

<sup>}</sup> Available ex stock

D) Subject to export regulations AL: N, ECCN: EAR99H.

F) Subject to export regulations AL: 91999, ECCN: N.

# **Transmitter MAG 5000/6000**

Description	О	rder No.	
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 2 enclo- sure in aluminium	F	DK-083F5033	
IP66/NEMA 4, wall mounting enclosure for 19" inserts (without backplates)			
• 21 TE	F	DK-083F5037	
• 42 TE	} F	DK-083F5038	
Front cover (7TE)	F	DK-083F4525	

Available ex stock

# ack plates (if wall enclosure IP66 is used as part)

Description	Order No.	
Wall unit enclosure IP66, 12 24 V, 115 230 V		
Transmitter	FDK-083F4121	
<ul> <li>Transmitter ia/e and safety barrier</li> </ul>	FDK-083F4122	
<ul> <li>Transmitter ia/ib and safety barrier (only for sensors produced before October 2007)</li> </ul>	FDK-083F4120	
<ul> <li>Transmitter and cleaning unit</li> </ul>	FDK-083F4124	

### Spare parts

Spare parts		
Description	Order No.	
Connection plate		
• 12 24 V	FDK-083F4149	
• 115 230 V	FDK-083F4148	The same of the sa
19" enclosure, 12 24 V, 115 230 V		
Connection plate for stan- dard 19" transmitter	FDK-083F4117	500000 -
<ul> <li>Connection plate for transmitter ia and safety barrier</li> </ul>	FDK-083F4118	
Connection plate for trans- mitter ia/ib and safety bar- rier (only for sensors produced before October 2007)	FDK-083F4119	
Connection plate for trans- mitter and cleaning unit	FDK-083F4123	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order)  • 2 kB	FDK-085U1005	Arraman Property Company
(for MAG 5000/6000/ MAG 6000 I)		ń, ,
• 250 B (for MAG 2500/3000)	FDK-085U1008	
Display unit for MAG 5000/6000		
black neutral front	FDK-085U1038	
• Siemens front	FDK-085U1039	

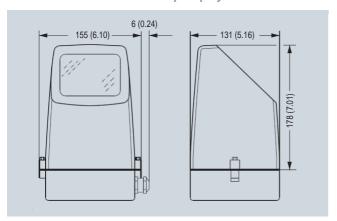
### Sun Shields for MAG 5000/6000 transmitters

Description	Order No.	
Sun shield for remote MAG 5000/6000 transmit- ters	A5E01209496	
Sun Shield for compact MAG 5000/6000 transmit- ters on MAG 3100 (DN 15 2000 (½" 78") or MAG 5100 (DN 150 1200 (6" 48")	A5E01209500	

# **Transmitter MAG 5000/6000**

# Dimensional drawings

# Transmitter IP67/NEMA 4X compact polyamide



Ø8(0.31)
Ø12(0.47)
Ø8(0.31)

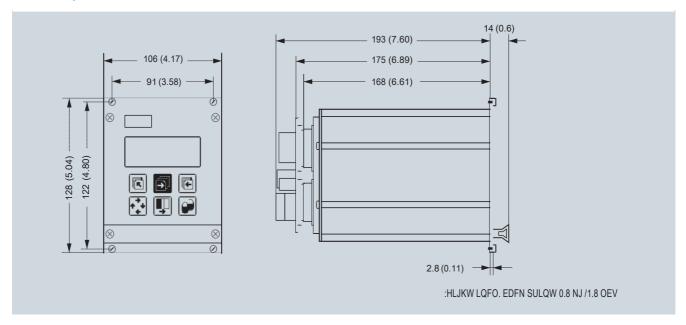
13(0.51)

155(6.10)

Transmitter compact mounted

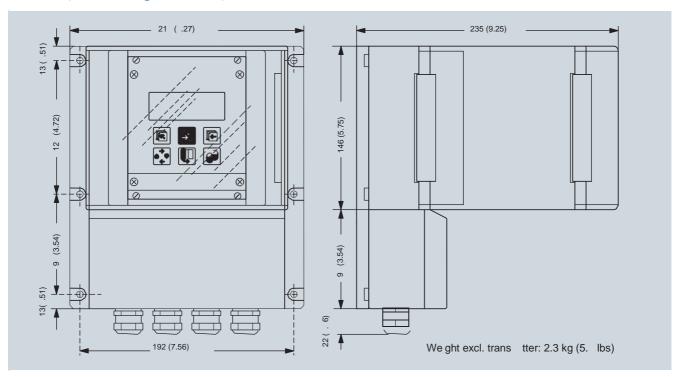
Transmitter wall mounted

# Transmitter, 19" IP20/ NEMA 2 standard unit

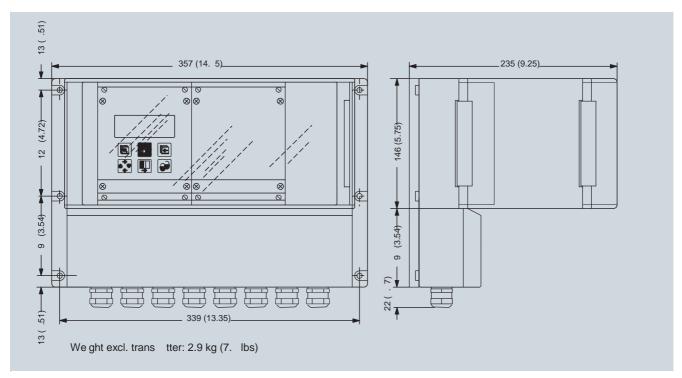


# Transmitter MAG 5000/6000

### Transmitter, wall mounting IP66/NEMA 4, 21 TE

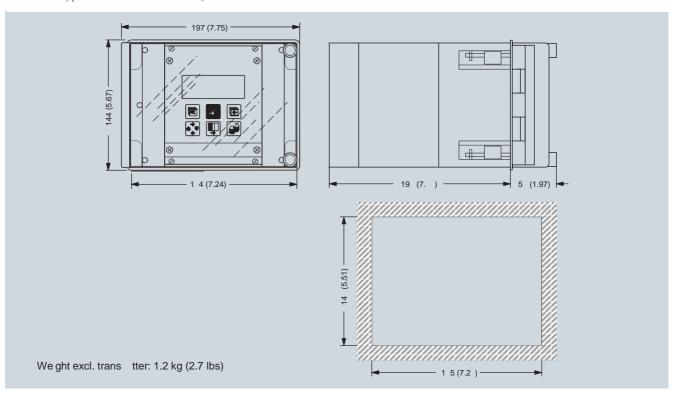


# Transmitter, wall mounting IP66/NEMA 4, 42 TE

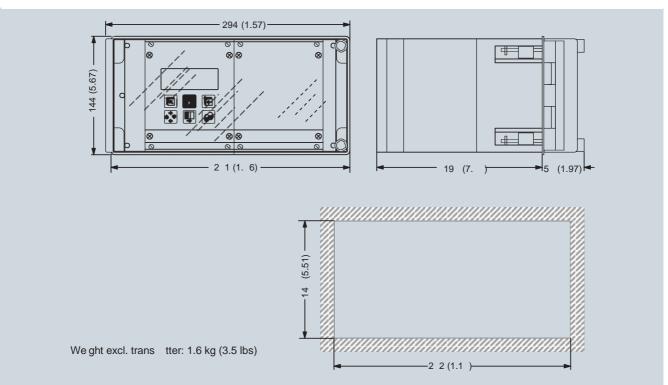


# **Transmitter MAG 5000/6000**

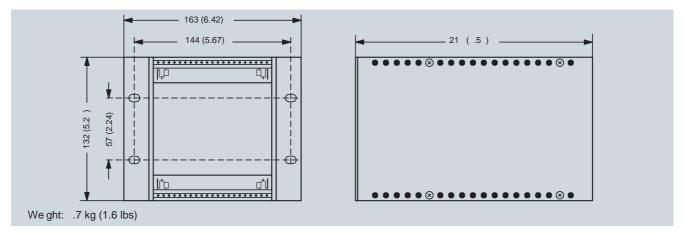
### Transmitter, panel front IP65/NEMA 4, 21 TE



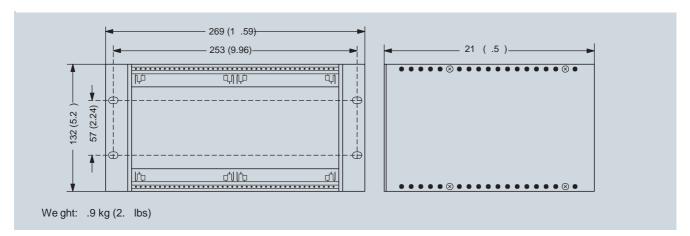
# Transmitter, panel front IP65/NEMA 4, 42 TE



### Transmitter, back of panel IP20/NEMA 2, 21 TE



# Transmitter, back of panel IP20/NEMA 2, 42 TE



### Transmitter MAG 5000/6000

### Schematics

### Electrical connection

### Grounding

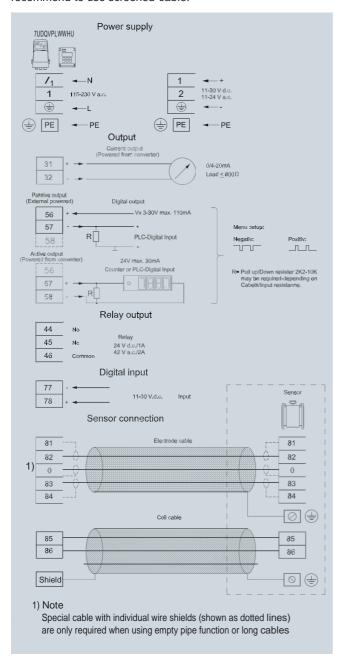
PE must be connected due to safety class 1 power supply.

### Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a  $1000 \, \mu F$  capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

#### Output cables

If the output cable length is long in noisy environment, we recommend to use screened cable.



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