



## accuMAG meter Handbook

Electromagnetic signal converter

Electronic Revision ER 4.1.1\_

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## 1.1 Software versions

For all GDC devices, the "Electronic Revision" (ER) is consulted to document the revision status of the electronics according to NE 53. It is easy to see from the ER whether any fault repairs or major changes to the electronic equipment have taken place and what effect they have had on compatibility.

### Changes and effect on compatibility

1	Downwards compatible changes and fault repair with no effect on operation (e.g. spelling mistakes on display)	
3- _	Downwards compatible hardware and/or software change of inputs and outputs:	
	P	Pulse output
	S	Status output
	X	all inputs and outputs
4	Downwards compatible changes with new functions	
5	Incompatible changes, i.e. electronic equipment must be changed.	

Release date	Electronic revision	Changes and compatibility	Documentation
2010	ER4.1.1 (SW. REV. 4.1.2G )	1; 3-P; 3-S; 4	MA accuMAG R01

## 1.2 Intended use

This signal converter has been designed to be combined with a water meter, for measuring potable water and water with suspended particles.

This device features not only accurate flow measurement, but also continuous diagnostics in accordance with applicable standards. This self-diagnosis monitors and automatically reports improper functioning of the electronics, or faulty sensor electrodes. It reports battery charge condition and even provides a cable-break alarm.

## 1.3 Transportation, handling and using instruction for batteries

**WARNING!**

*The used lithium batteries are primary power sources with high energy content. If mistreated, they may present a potential risk.*

**INFORMATION!**

*The manufacturer assumes no liability for customer failure.*

**Please observe the following transportation, handling and using instructions:**

- Transport only in special packaging with special labels and transportation documents.
- Do not short-circuit, recharge, overcharge or connect with false polarity.
- Do not expose to temperature beyond the specified temperature range or incinerate the battery.
- Do not crush, puncture or open cells or disassemble battery packs.
- Do not weld or solder to the body of the battery.
- Do not expose contents of battery to water.
- Remove the battery from device before returning to the manufacturer for service or warranty reasons.
- Dispose battery packs in accordance with local regulations; where possible, recycle used batteries.

## 1.4 Safety instructions from the manufacturer

### 1.4.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

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We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

### 1.4.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

### **1.4.3 Product liability and warranty**

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

### **1.4.4 Information concerning the documentation**

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.

### 1.4.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



**DANGER!**

*This information refers to the immediate danger when working with electricity.*



**DANGER!**

*This warning refers to the immediate danger of burns caused by heat or hot surfaces.*



**DANGER!**

*These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.*



**WARNING!**

*Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.*



**CAUTION!**

*Disregarding these instructions can result in damage to the device or to parts of the operator's plant.*



**INFORMATION!**

*These instructions contain important information for the handling of the device.*



**LEGAL NOTICE!**

*This note contains information on statutory directives and standards.*



• **HANDLING**

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➔ **RESULT**

This symbol refers to all important consequences of the previous actions.

## 1.5 Safety instructions for the operator



**WARNING!**

*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.  
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*

## 2.1 Instrument description

Two versions are available. You received a compact version or a remote version.

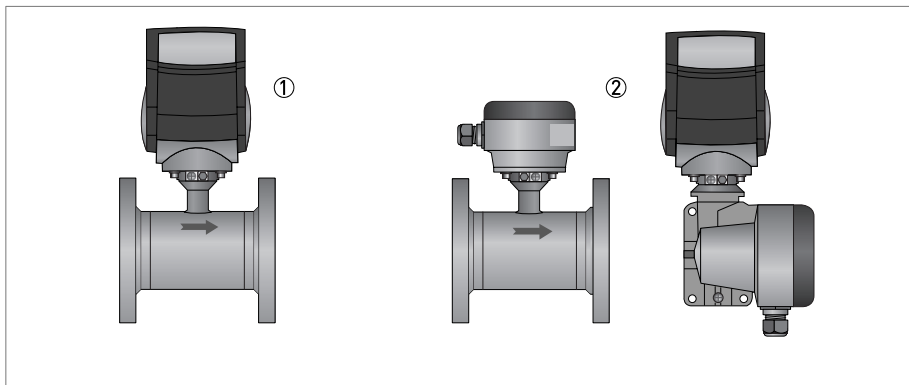


Figure 2-1: Versions

- ① compact version
- ② remote version

## 2.2 Scope of delivery

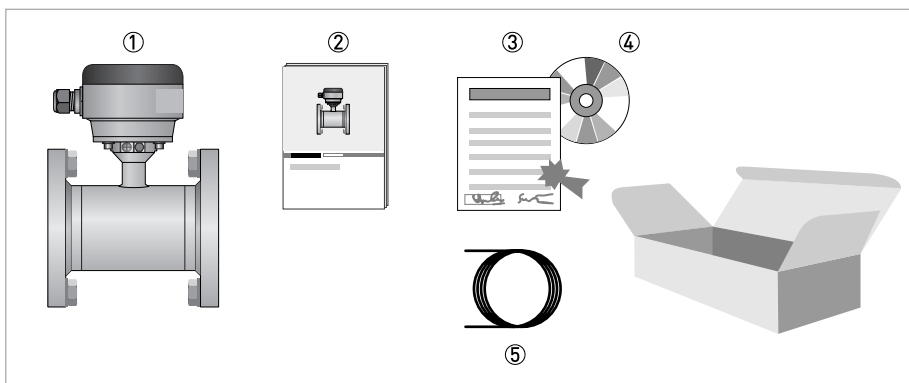


Figure 2-2: Scope of delivery

- ① Ordered flowmeter
- ② Quick Start
- ③ Factory calibration report
- ④ CD-ROM with product documentation
- ⑤ Cable (remote versions only)

## 2.3 Nameplate



### INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

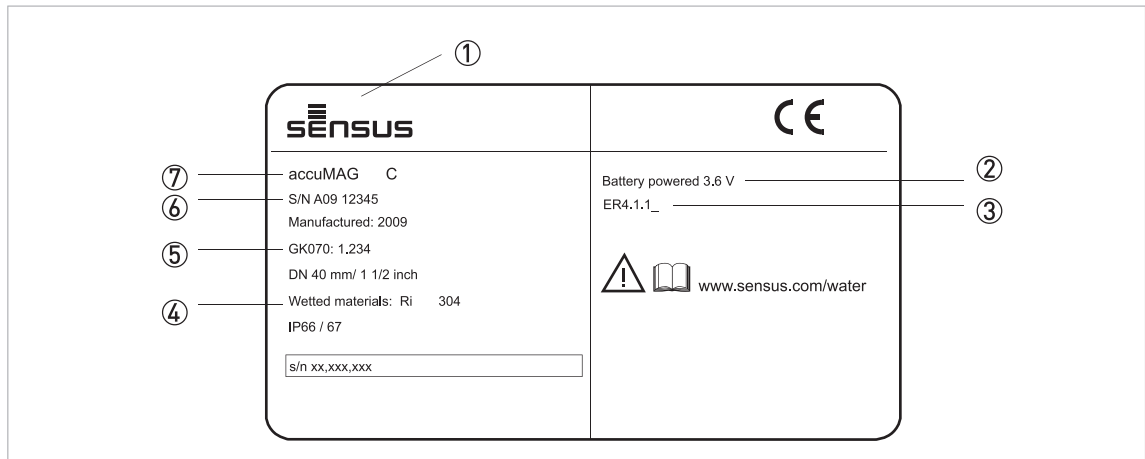


Figure 2-3: Example for nameplate

- ① Manufacturer
- ② Voltage information
- ③ Electronic Revision number
- ④ Material of wetted parts
- ⑤ Meter constant
- ⑥ Serial number
- ⑦ Device type

### 3.1 Notes on installation

**INFORMATION!**

Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**

Check the packing list to check if you received completely all that you ordered.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

### 3.2 Storage

- Store the device in a dry, dust-free location.
- Avoid continuous direct sunlight.
- Store the device in its original packaging.
- Storage temperature: -50 ...+70°C / -58...+158°F

### 3.3 Transport

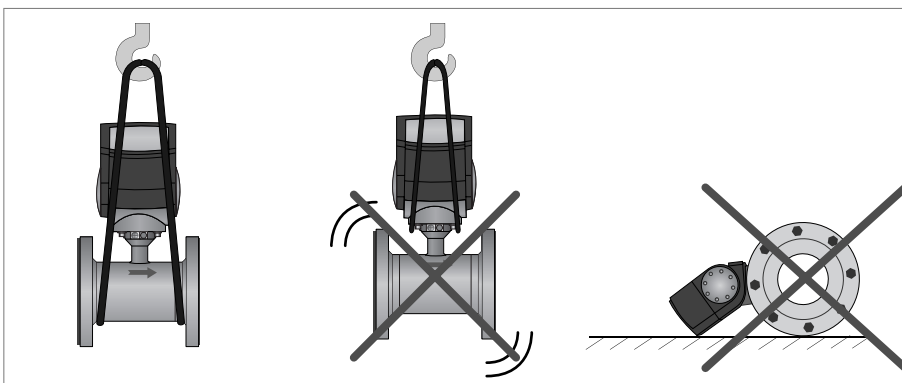


Figure 3-1: Transport

### 3.4 Pre-installation requirements

**Make sure that you have all necessary tools available:**

- Allen key (4 mm)
- Small screwdriver
- Wrench for cable glands
- Wrench for wall mounting bracket (remote version only)
- Torque wrench for installing flowmeter in pipeline

## 3.5 Installation requirements

### 3.5.1 Vibration

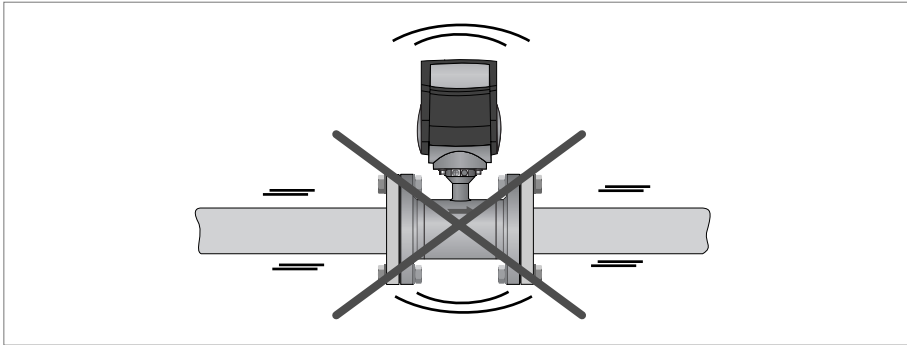


Figure 3-2: Vibration

### 3.5.2 Magnetic field

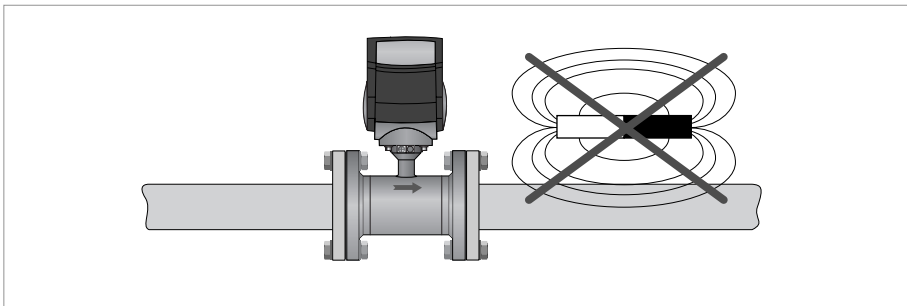


Figure 3-3: Magnetic field

### 3.5.3 Installation of converter



**INFORMATION!**

*Only applicable for remote versions.*



- Mount converter with mounting plate on wall or standpipe.
- Keep distance between sensor and signal converter as short as possible.
- Observe length of the delivered signal cable.

## 4.1 Safety instructions

**DANGER!**

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**

Observe the national regulations for electrical installations!

**WARNING!**

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

## 4.2 Grounding

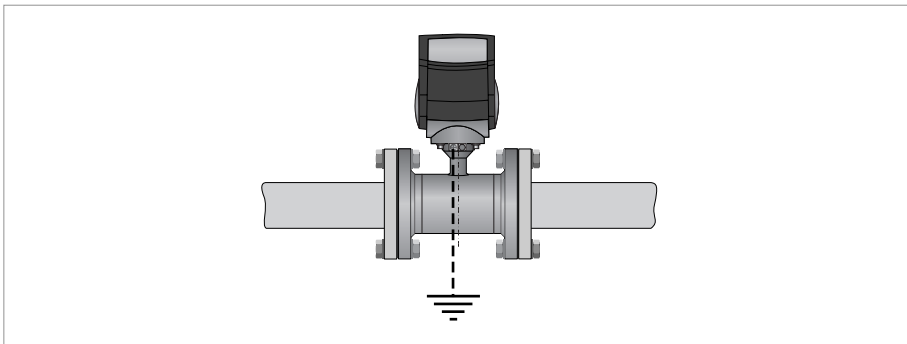


Figure 4-1: Grounding

### 4.3 Signal cable



**CAUTION!**

To ensure smooth functioning, always use the signal cables included in the delivery.



**INFORMATION!**

You only receive a signal cable if you ordered a remote version.

### 4.4 Connection of signal cable



**INFORMATION!**

The signal cable is only used with remote versions. The standard cable includes both electrode and field current leads.

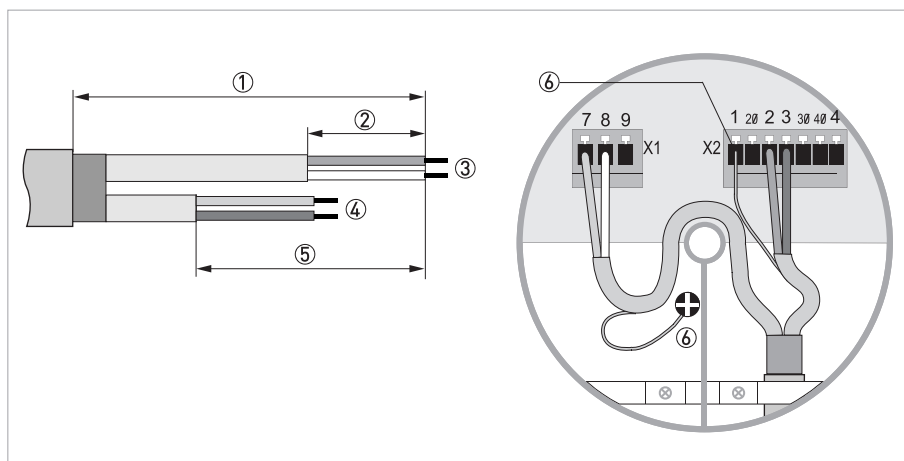


Figure 4-2: Cable connection at converter side, standard cable

- ① cable length: 13 cm / 5"
- ② cable length: 5 cm / 2"
- ③ brown + white cable, used for field current
- ④ pink and grey cable, used for electrode signals
- ⑤ cable length: 8 cm / 3"
- ⑥ Shield (terminal 1 of connector X2 + U-clamp)



- Prepare appropriate cable lengths (①...③)
- Connect the shield to the U-clamp, the brown cable to terminal 7 and the white to terminal 8.
- Connect the shield to terminal 1, the pink cable to terminal 2 and the grey to terminal 3.

## 4.5 Terminal assignment of converter

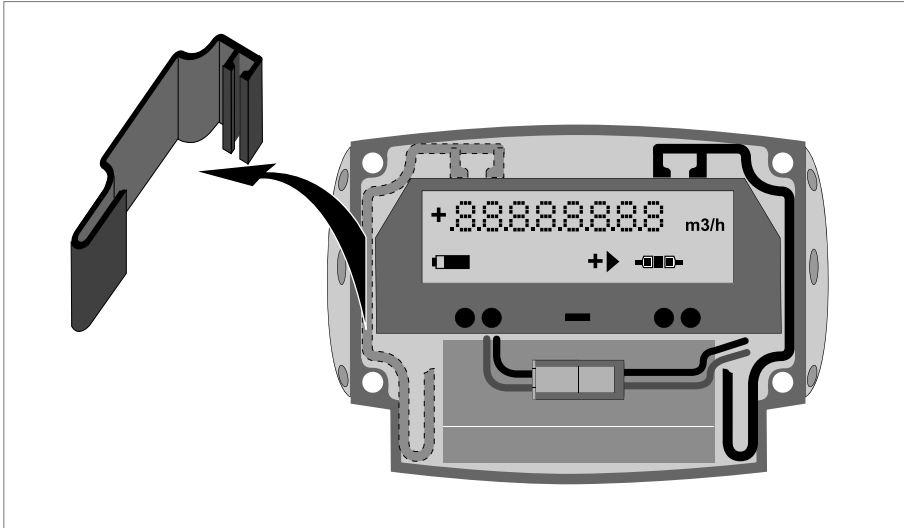


Figure 4-3: Removing side cap

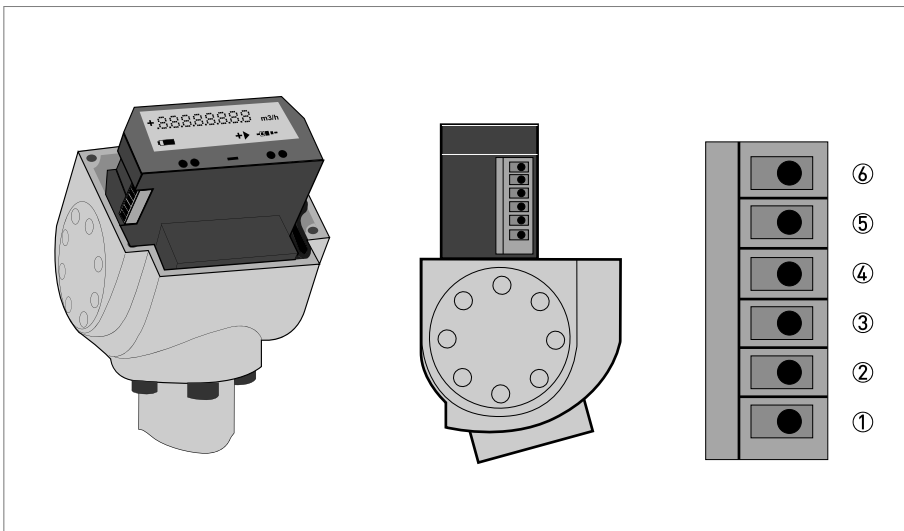


Figure 4-4: Terminal assignment

- ① Status output 1
- ② Status output 2
- ③ Not connected
- ④ Ground
- ⑤ Pulse output A
- ⑥ Pulse output B

## Electrical values

- **Pulse output passive:**  
 $f \leq 500 \text{ Hz}$ ;  $I \leq 10 \text{ mA}$ ;  $U: 2.7 \dots 24 \text{ VDC}$  ( $P \leq 100 \text{ mW}$ )
- **Status output passive:**  
 $I \leq 10 \text{ mA}$ ;  $U: 2.7 \dots 24 \text{ VDC}$  ( $P \leq 100 \text{ mW}$ )

## 5.1 Connection of battery



### CAUTION!

Please connect battery before first use, see relevant chapter for your type of battery. Each converter is always delivered with a disconnected battery.

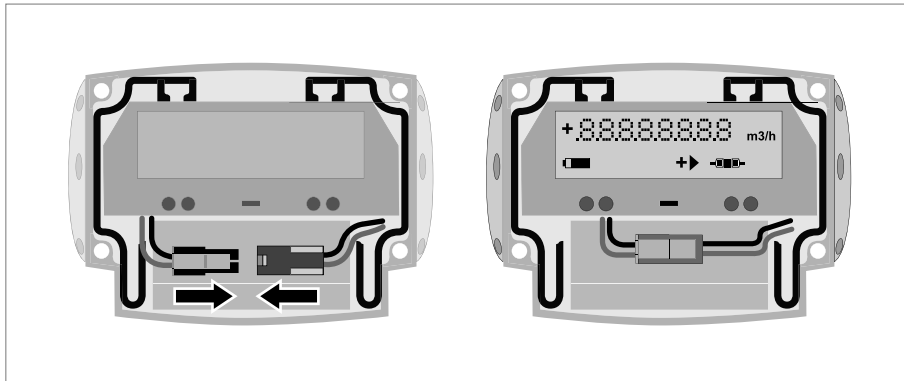


Figure 5-1: Connecting battery

### 5.1.1 Internal battery



- Remove the blue protection cap.
- Loosen the 4 Allen bolts (4 mm).
- Remove the cover.
- Fasten the battery connector to the internal connector in the converter.
- Check that the display lights up.
- Put the cover back.



### WARNING!

Make sure that the battery cable is not jammed by the cover.



- Tighten the 4 Allen bolts.
- Put the blue protection cap back.



### INFORMATION!

The instrument now operates with factory set parameters. For configuration of these settings, please refer to the handbook and/or the documentation of the converter.

### 5.1.2 External battery



- Remove the blue protection cap.
- Loosen the 4 Allen bolts (4 mm).
- Remove the cover.
- Remove one of the blind cable glands in the bottom of the converter housing.
- Remove the metal strip at the bottom of the housing (2 screws).
- Lead the cable of the external battery through the gland opening and mount the attached cable gland loosely.
- Pull the cable to the top of the electronics.
- Fasten the battery connector to the internal connector in the converter.
- Check that the display lights up.
- Refit the metal strip at the bottom of the housing.
- Tighten the cable gland.
- Put the cover back.



**WARNING!**

*Make sure that the battery cable is not jammed by the cover.*



- Tighten the 4 Allen bolts.
- Put the blue protection cap back.

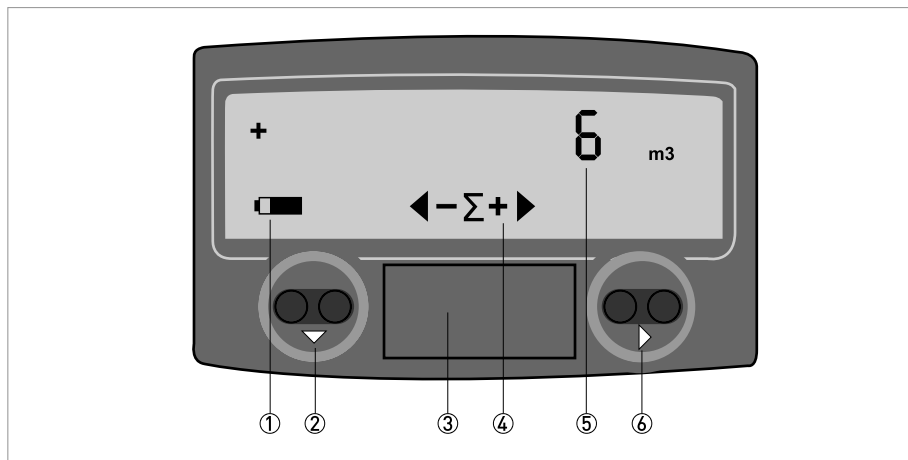


**INFORMATION!**

*The instrument now operates with factory set parameters.*

*For configuration of these settings, please refer to the handbook and/or the documentation of the converter.*

## 6.1 Display and operating elements



- ① Battery status
- ② Optical key  $\nabla$  to navigate through the menu and to scroll through the measuring pages
- ③ Reset button (only accessible with removed cover)
- ④ Flow direction
- ⑤ Measured value and measuring unit
- ⑥ Optical key  $\triangleright$  to navigate through the menu

## 6.2 Menu of converter



- To enter the menu, hold the  $\nabla$  and  $\triangleright$  key for 5 seconds.
- ➡ The display flashes.
- Press the  $\triangleright$  key to enter the menu.
- ➡ You see the menu number at the left and the value at the right side of the display.
- Scroll through the available positions with the  $\nabla$  key to the position you want to change.
- Press the  $\triangleright$  key to enter the value.
- ➡ The value flashes.
- Use the  $\triangleright$  and  $\nabla$  key to change the value.
- Hold the  $\triangleright$  key for 3 seconds to confirm the new value.
- To leave the programming mode, hold the  $\nabla$  key for 3 seconds to store the new value(s). If you do not want to store the new values, do not touch any key for 60 seconds.

### Other functions:

- software version: press  $\triangleright$  key for 1 second
- display test: press  $\triangleright$  key twice for 1 second

**CAUTION!**

Take care with changing menu number 1. If you set this to "1", the display locks. IF this happens:



- Remove the protection cap.
- Loosen the 4 Allen bolts (4 mm).
- Remove the cover.
- Press both keys simultaneously and press the reset button for 6 seconds as shown in the graph below. Use a small screwdriver for the reset button.
- Display starts with the menu.
- Go to menu no. 1 and change 1 into 0.
- Hold the ▷ key for 3 seconds to confirm the new value.
- Put the cover back.

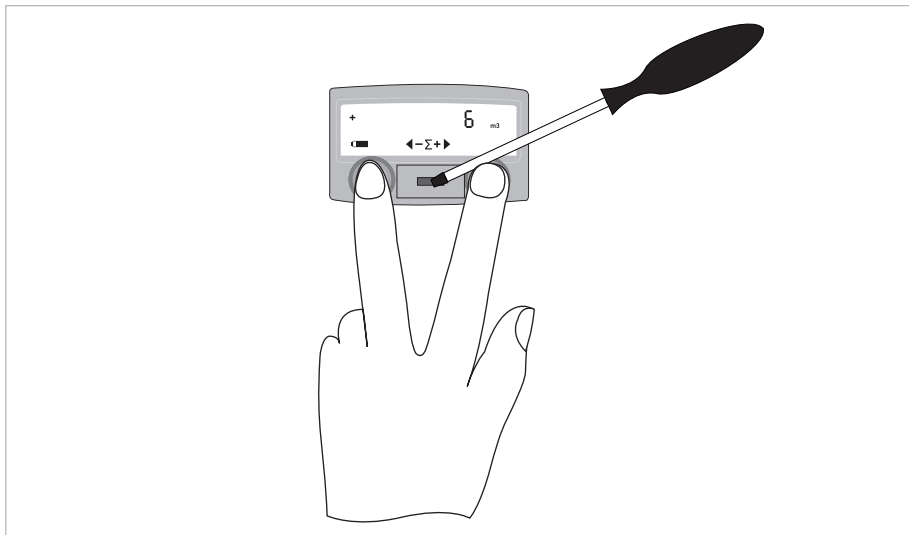


Figure 6-1: Entering the menu if menu no. 1 is set to 1 (fiscal metering active)

**WARNING!**

Make sure that the battery cable is not jammed by the cover.



- Tighten the 4 Allen bolts.
- Put the blue protection cap back.

Software version 4.1.2G				
Menu No.	Description	Display default	Selection list	Remarks
1	Access control	0	0 = Standard	
			1 = Fiscal metering / Custody transfer	
2	AMR Mode	0	0 = Off	
			1 = On	
5	AMR digits Only visible if "on" is selected in menu no. 2	8	8	Use all digits 87654321
			7 -	Use 7 most significant digits 8765432-
			- 7	Use 7 least significant digits -7654321
			6 - -	Use 6 most significant digits 876543--
			- 6 -	-765432-
			- - 6	--654321
			5 - - -	87654---
			- 5 - -	-76543--
			- - 5 -	--65432-
			- - - 5	---54321
			4 - - - -	8765----
			- 4 - - -	-7654---
			- - 4 - -	--6543--
			- - - 4 -	---5432-
- - - - 4	----4321			
7	Totalizers, unit of volume	01	00 = l	Some units are only available if "on" is selected in menu no. 2
			01 = m <sup>3</sup>	
			02 = gal	
			03 = Imperial gallon	
			04 = ft <sup>3</sup>	
			05 = acre-ft	
			06 = acre-inch	
8	Totalizers, number of decimals	99	99 = Default	Choose "Default" (the value is automatically chosen) or choose the number of decimals.
			0...7 = number of decimals	
9	Totalizers, multiplier value	99	99 = Default	"Default" means that the value is automatically chosen.
			1 = x1	
			10 = x10	
			100 = x100	
			1000 = x1000	

Software version 4.1.2G				
Menu No.	Description	Display default	Selection list	Remarks
10	Flow rate	0102	0000 = l / s	Some units are only available if "on" is selected in menu no. 2 In the representation of the flow rate on the display, the unit for time is automatically chosen. This automatic choice can be overruled using menu item no. 11. The number of decimals is fixed and can not be changed.
			0102 = m <sup>3</sup> /h	
			0201 = gal / min	
			0301 = Imperial gallon / min	
			0402 = ft <sup>3</sup> / h	
			0503 = acre-ft / day	
			0603 = acre-inch / day	
11	Flow rate (unit of time)	99	99 = Default	"Default" means that the value is automatically chosen. Choose unit of time.
			0 = per second	
			1 = per minute	
			2 = per hour	
			3 = per day	
12	Pressure / temperature sensor	00	00 = off	
			01 = P only	
			02 = P + T enabled	
			03 = T only	
13	Pressure	00	00 = bar	1 decimal
			01 = mbar	
			02 = psi	
14	Pressure reference	1.0	xx.x / xxxx	Default: 1.0 bar Unit depends on unit chosen in menu no. 13
15	Pressure limit, maximum	24.0	xx.x / xxxx	Default: +24.0 bar Unit depends on unit chosen in menu no. 13
16	Pressure limit, minimum	0.0	xx.x / xxxx	Default: -0.0 bar Unit depends on unit chosen in menu no. 13
17	Temperature	00	00 = Celsius	1 decimal
			01 = Fahrenheit	
18	Temperature limit, maximum	140.0	xxx.x	Default: +140.0 °C Choose a maximum temperature.
19	Temperature limit, minimum	0.0	xxx.x	Default: 0.0 °C Choose a minimum temperature.
20	Meter type	0	0 = Rectangular	Select "0" in case of a square cross section, select "1" in case of a round cross section.
			1 = Circular	
21	Meter size	100	Defined at factory calibration	Choose from table, in chosen unit (menu no. 7).
22	Meter constant	01.000	Defined at factory calibration	Meter constant is shown on typeplate.
23	Zero offset calibration	0	Set to 1	In situ determination of zero point.
			Confirm with ">" for 3 seconds	After countdown meter switches to measuring mode.
				Menu no. 24 is automatically set to 1.

Software version 4.1.2G				
Menu No.	Description	Display default	Selection list	Remarks
24	Zero selection	0	0 = factory calibration	Selection which zero point to use
			1 = measured	
25	Flow direction	0	0 = Forward	
			1 = Reverse	
26	Measuring rate	15	1, 5, 10, 15, 20 seconds	Measurement interval in seconds, choose from table.
27	Low flow cut off	10	0, 5, 10, 20 mm/s	Maximum value in custody transfer mode is 10.
28	Time constant flow reading	2	1 = fast	Time constant of display
			2 = normal	
			3 = slow	
30	Self check	0	0 = off	Is automatically switched on at fiscal metering (menu no. 1 = 1)
			1 = on	
31	Empty pipe detection	0	0 = off	If switched on, display shows "- EP -". See graph below this table.
			1 = on	
32	Simulate outputs	0	0 = off	If set to on, display shows 0 and 1 alternately (independent of setting in menu no. 41/42). Set to "0" to stop the simulation.
			1 = on (1 pulse per second)	
41	Output A (pulse)	0	0 = off	Set pulse rate in menu no. 45
			1 = on	
42	Output B (pulse)	0	0 = off	Set pulse rate in menu no. 45
			1 = on	
43	Phase shift between pulse outputs	90	90 degrees offset	
			180 degrees offset	
			F-r (A - forward flow, B - reverse flow)	
44	Pulse width	1	1, 2, 5, 10, 20, 50, 100, 200 ms	Choose from table
45	Pulse value	00.100	in m <sup>3</sup> /pulse or 100 USG/pulse	-
46	Pulse output	99	99	Puls output reacts as set in menu no. 45
			1	*****1 (Generate a puls on the output If the least significant digit changes)
			2	*****2*
			3	*****3**
			4	*****4***
			5	*****5****
			6	*****6*****
			7	*****7*****
			8	8***** (Generate a puls on the output If the most significant digit changes)

Software version 4.1.2G				
Menu No.	Description	Display default	Selection list	Remarks
47	Pulse output c / status output 1	St	St = Status output 1	
			PF = Pulse output C - Forward counter	
			Pr = Pulse output C - Reverse counter	
48	Pulse output C - unit of volume	01	00 = l	Choose unit of volume
			01 = m <sup>3</sup>	
			02 = gallon	
			03 = imperial gallon	
			04 = ft <sup>3</sup>	
			05 = acre-ft	
			06 = acre-inch	
49	Pulse values	00.100	xx.xxx or x.xxxx	Value to be programmed in (unit of menu item no. 48) per pulse.
51	Status output 1 Self checking	0	0 = off	Active at instrument failure, e.g. coil, electrode, battery. Can be reset by menu no. 72.
			1 = on	
52	Status output 1 Battery pre warning	0	0 = off	Active at low battery (10% left). Can be reset by menu no. 72.
			1 = on	
53	Status output 1 Battery final warning	0	0 = off	Active at very low battery (1% left). Can be reset by menu no. 72.
			1 = on	
54	Status output 1 Counter overrun	0	0 = off	Active if counter goes from 99999999 to 00000000. Can be reset by menu no. 72.
			1 = on	
55	Status output 2 Self checking	0	0 = off	Active at instrument failure. Can be reset by menu no. 72.
			1 = on	
56	Status output 2 Battery pre warning	0	0 = off	Active at low battery (10% left). Can be reset by menu no. 72.
			1 = on	
57	Status output 2 Battery final warning	0	0 = off	Active at very low battery (1% left). Can be reset by menu no. 72.
			1 = on	
58	Status output 2 Counter overrun	0	0 = off	Active if counter goes from 99999999 to 00000000. Can be reset by menu no. 72.
			1 = on	
59	Status outputs pulsating	1	0 = off	1 puls/s when active, pulse width determined by menu no. 44. Can be reset by menu no. 72.
			1 = on	
60	Show flow rate	0	0 = off	-
			1 = on	
61	Show counter forward	0	0 = off	-
			1 = on	
63	Show counter reverse	0	0 = off	-
			1 = on	
65	Show net counter	1	0 = off	-
			1 = on	

Software version 4.1.2G				
Menu No.	Description	Display default	Selection list	Remarks
66	All counters reset	88888	Set to 00000	After reset display value is back to 88888
			Confirm with ">" for 3 seconds	
67	Show pressure	0	0 = off	Is "off" when menu no. 12 = "00" or "03"
			1 = on	
68	Show temperature	0	0 = off	Is "off" when menu no. 12 = "00" or "01"
			1 = on	
71	Counters run/stop	1	0 = stop	For service / maintenance purposes, pulse output also stops.
			1 = run	
72	All errors reset	0	Set to 1	After reset display value is back to 0
			Confirm with ">" for 3 seconds	
73	Battery type	1	1 = internal 1 battery	Choose from tabel
			2 = internal 2 battery	
			3 = external battery pack	
			0 = None (mains supply)	
74	Battery capacity	19.000	Value in Ah	-
75	Reset battery life time counter	0	Set to 1	After reset menu value is back to 0.
			Confirm with ">" for 3 seconds	
76	Load default settings	0	Set to 1	After reset menu value is back to 0, manual reprogramming necessary.
			Confirm with ">" for 3 seconds	
77	Verification reading	0	0 = off	Test modus, for verification at/by authority, display indicates P8888888, decimal separator position varies per diameter.
			1 = on	
78	Add-on communication	0	0 = off	
			1 = on	

Empty pipe detection

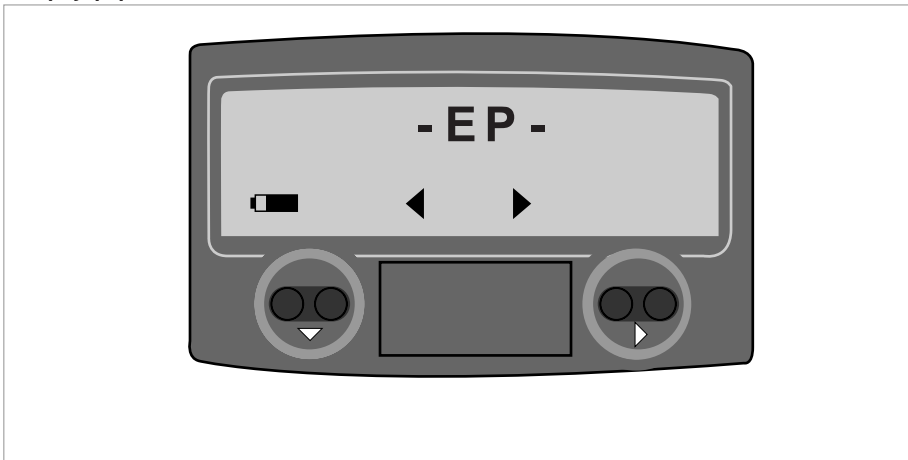


Figure 6-2: Display in Empty Pipe situation (if menu 31 is set to "1")

## 7.1 Replacement of battery

Different type of batteries with different capacities are available. They can be exchanged by other types if wanted.

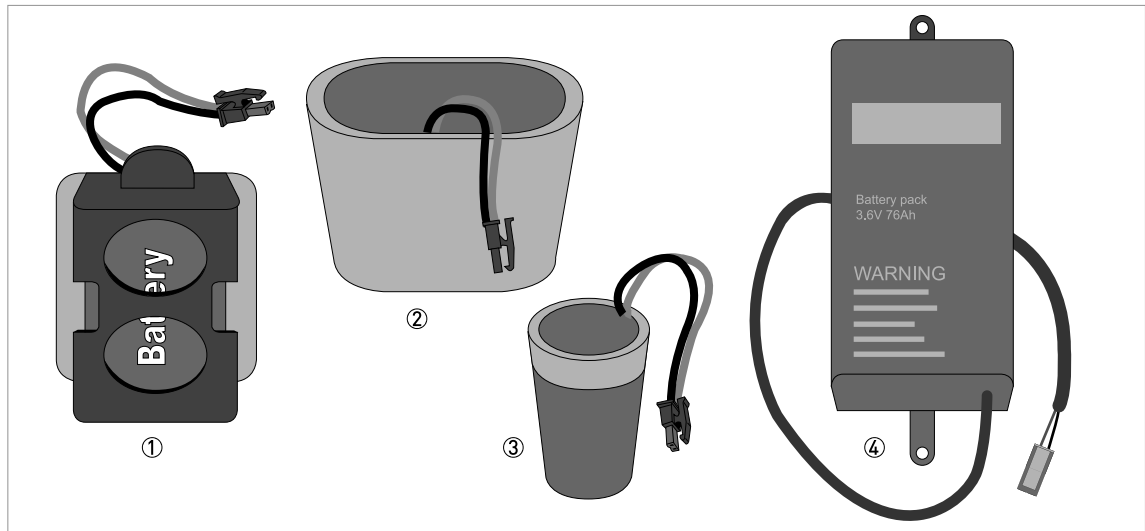


Figure 7-1: Batteries with cable and connector

- ① Internal battery in holder
- ② Internal dual pack battery
- ③ Internal single pack battery
- ④ External battery pack

### 7.1.1 Replacement of internal battery

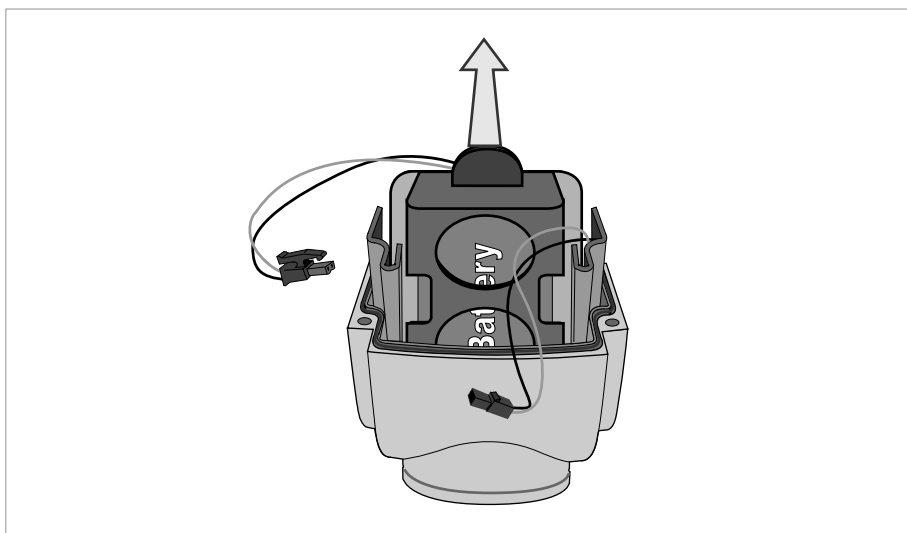


Figure 7-2: Removing battery



- Remove the protection cap.
- Loosen the 4 Allen bolts (4 mm).
- Remove the cover.
- Disconnect the connector of the battery.

- Remove the battery holder by pulling it upwards.
- Remove the battery from the holder.
- Insert the new battery in the holder.
- Replace the holder.
- Fasten the battery connector to the internal connector in the converter.
- Check that the display lights up.
- Replace the cover.

**WARNING!**

*Make sure that the battery cable is not jammed by the cover.*



- Tighten the 4 bolts.
- Enter the programming mode, hold the ▽ and ▷ key for 5 seconds.
- ➡ The display flashes.
- Press the ▷ key to enter the menu.
- Scroll through the available positions with the ▽ key to position 74 and check the battery capacity (important for battery life indication):
  - internal single pack battery: 19 Ah
  - internal dual pack battery: 38 Ah
  - External battery pack: 76 Ah
- Go to position 75 and enter "1" (reset battery counter).
- ➡ Battery capacity symbol at the display should be "full".
- Hold the ▽ key for 3 seconds to confirm the new value and go back to the measuring mode.
- Put the blue protection cap back.

### 7.1.2 Replacement of external battery

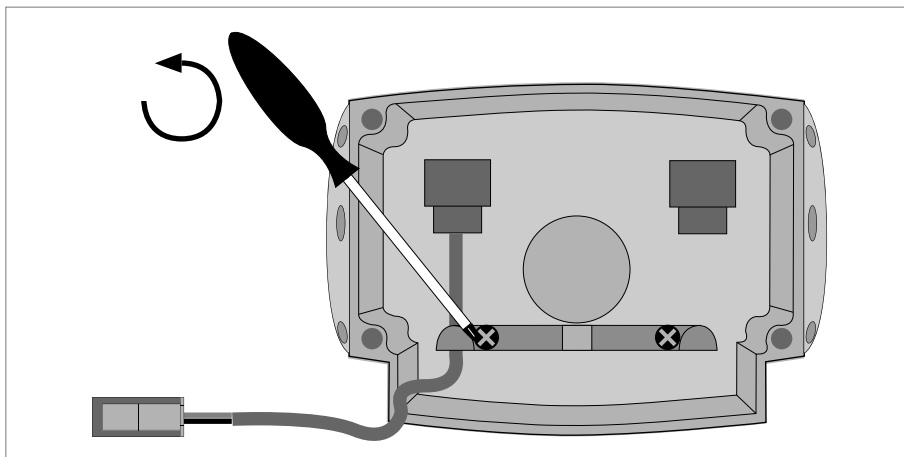


Figure 7-3: Removing metal strip



- Remove the blue protection cap.
- Loosen the 4 Allen bolts (4 mm).
- Remove the cover.
- Loosen the used cable gland in the bottom of the converter housing.
- Remove the metal strip at the bottom of the housing (2 screws).
- Disconnect the connector of the battery.
- Remove the cable of the old battery.

- Lead the cable of the new external battery through the gland opening and mount the attached cable gland loosely.
- Pull the cable to the top of the electronics.
- Fasten the battery connector to the internal connector in the converter.
- Check that the display lights up.
- Refit the metal strip at the bottom of the housing.
- Tighten the cable gland.
- Put the cover back.

**WARNING!**

*Make sure that the battery cable is not jammed by the cover.*



- Tighten the 4 bolts.
- Enter the programming mode, hold the ▽ and ▷ key for 5 seconds.
  - ➡ The display flashes.
- Press the ▷ key to enter the menu.
- Scroll through the available positions with the ▽ key to position 74 and check the battery capacity (important for battery life indication):
  - internal single pack battery: 19 Ah
  - internal dual pack battery: 38 Ah
  - External battery pack: 76 Ah
- Go to position 75 and enter "1" (reset battery counter).
  - ➡ Battery capacity symbol at the display should be "full".
- Hold the ▽ key for 3 seconds to confirm the new value and go back to the measuring mode.
- Put the blue protection cap back.

## 7.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

## 7.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

**INFORMATION!**

*For more precise information, please contact your local representative.*

## 7.4 Returning the device to the manufacturer

### 7.4.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**CAUTION!**

*Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:*

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

**CAUTION!**

*If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:*

- *to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that is safe to handle and stating the product used.*

### 7.4.2 Form (for copying) to accompany a returned device

Company:		Address:	
Department:		Name:	
Tel. no.:		Fax no.:	
Manufacturer's order no. or serial no.:			
The device has been operated with the following medium:			
This medium is:	water-hazardous		
	toxic		
	caustic		
	flammable		
	We checked that all cavities in the device are free from such substances.		
	We have flushed out and neutralized all cavities in the device.		
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.			
Date:		Signature:	
Stamp:			

### 7.5 Disposal



**CAUTION!**

*Disposal must be carried out in accordance with legislation applicable in your country.*

## 8.1 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage  $U$  is generated:

$$U = v * k * B * D$$

in which:

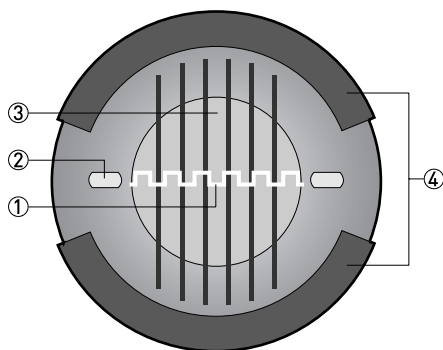
$v$  = mean flow velocity

$k$  = factor correcting for geometry

$B$  = magnetic field strength

$D$  = inner diameter of flow meter

The signal voltage  $U$  is picked off by electrodes and is proportional to the mean flow velocity  $v$  and thus the flow rate  $q$ . A signal converter is used to amplify the signal voltage, filter it and convert it into signals for totalising, recording and output processing.



- ① Induced voltage (proportional to flow velocity)
- ② Electrodes
- ③ Magnetic field
- ④ Field coils

## 8.2 Technical data



### INFORMATION!

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website .

### Measuring system

Measuring principle	Faraday's law
Application range	Electrically conductive fluids
<b>Measured value</b>	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

### Design

Modular construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as remote version. More information about the sensor can be found in the relevant documentation.
Compact version	accuMAG C
Remote version	accuMAG F Maximum cable length 25 m / 75 ft
<b>User interface</b>	
Display	8 digits LCD
	Display of positive and negative counter, sum counter, flow rate
	Status indication for battery, flow / counter direction, empty pipe
Units	Volume in m <sup>3</sup> , US Gallons, litre, imperial gallon, ft <sup>3</sup> , acre-ft, acre-inch
	Flow rate in m <sup>3</sup> /h, USGPM, l/s, imperial gallon/min, ft <sup>3</sup> /h, acre-ft/day, acre-inch/day
Cable connections	Standard: 2x M20x1.5
	Optional: ½" NPT, PF½

### Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Inlet section: 5 DN
	Operating pressure: 1 bar / 14.5 psig
Maximum measuring error	±0.2% of measured value ±0.5 mm/s / 0.02 inch/s
	For detailed information on the measuring accuracy, see chapter "Measuring accuracy".
Repeatability	±0.1% (v > 0.5 m/s / 1.5 ft/s)

### Operating conditions

<b>Temperature</b>	
Process temperature	-5...+70°C / 23...+158°F
Ambient temperature	-40...+65°C / -40...+149°F
Storage temperature	-50...+70°C / -58...+158°F
<b>Chemical properties</b>	
Physical condition	Liquids
Electrical conductivity	≥ 20 µS/cm
Recommended flow velocity	-9...9 m/s / -30...30 ft/s
Process conditions	Raw water, ground- and surface water
	Potable water
	Irrigation water

### Installation conditions

Dimensions and weights	For detailed information see chapter "Dimensions and weights".
------------------------	--

### Materials

Housing	Die-cast aluminium, polyurethane coated
Connection box (remote versions only)	Die-cast aluminium, polyurethane coated

### Electrical connections

<b>Power supply</b>	
Battery	<b>Standard</b>
	1 Lithium battery (D-cell)
	<b>Optional</b>
	2 Lithium batteries (D-cell)
	External battery pack with 4 lithium batteries (D-cell, IP 68)
Typical lifetime	See graph at the end of this table.
Alarm	Pre-alarm at 10% of energy left
	Final alarm at 1% of energy left
Battery replacement	Possible without loss of totalizer data
<b>In- and output</b>	
Outputs	2 Passive pulse outputs for remote totalising: f ≤ 500 Hz; I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)
	2 Passive status outputs: I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)

**Approvals and certificates**

<b>CE</b>	
	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Electromagnetic compatibility	Directive: 2004/108/EC
	Harmonized standard: EN 61326-1 : 2006
Low voltage directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010 : 2001
<b>Hazardous areas</b>	
Non-Ex	Standard
ATEX	Not available
<b>Other approvals and standards</b>	
Custody transfer	Standard: without verification
	MI-001 type examination certificate for DN25...300, pending for other diameters.
	OIML R-49 certificate of conformity for DN25...300, pending for other diameters.
	Conform EN 14154 / ISO 4064
Protection category acc. to IEC 529 / EN 60529	IP 66/67 (NEMA 4/4X/6)
Shock- and vibration resistance	IEC 68-2-3

**Typical lifetime of batteries (at 25°C) for a DN80**

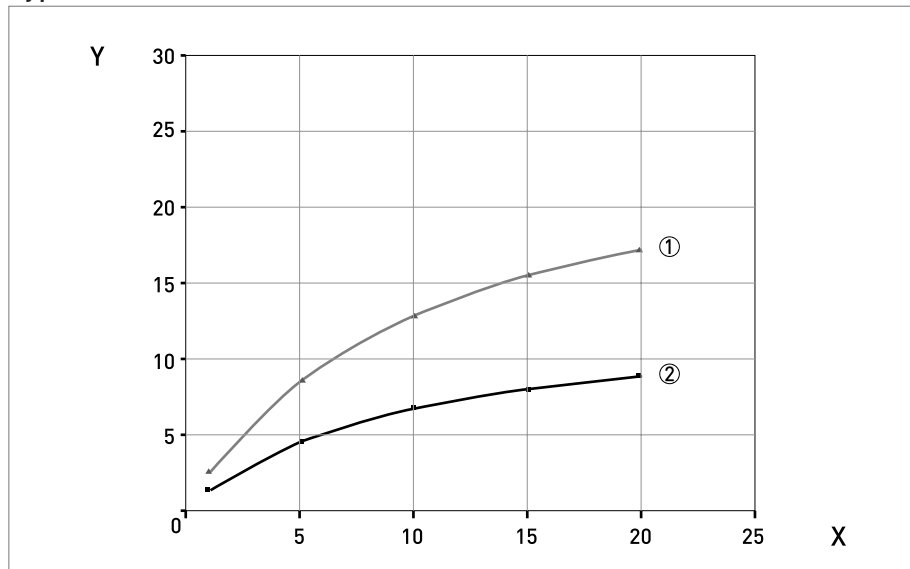


Figure 8-1: X = Sampling interval in seconds, Y = typical lifetime in years

- ① dual battery pack
- ② single battery

### 8.3 Measuring accuracy

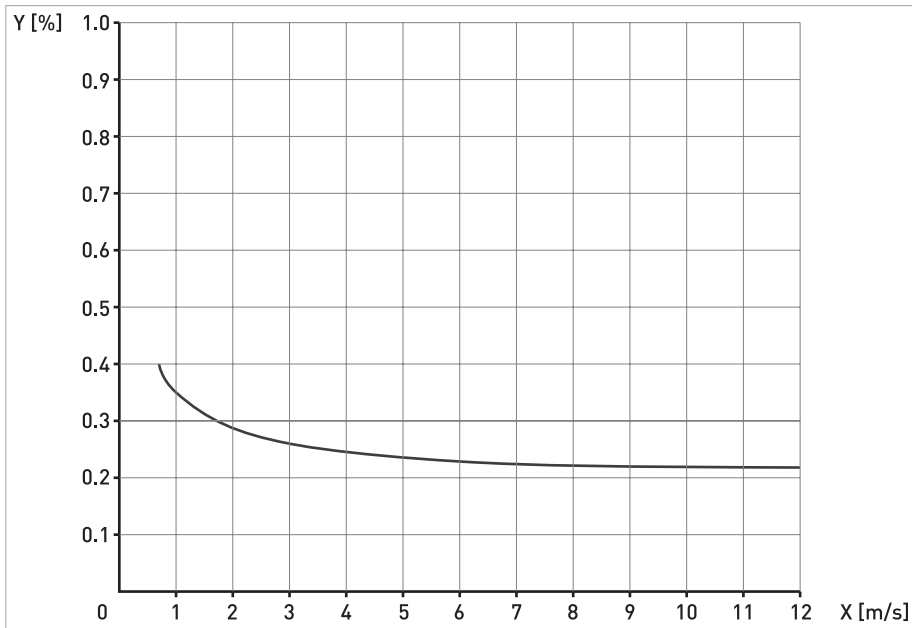


Figure 8-2: X:flow velocity [m/s]; Y deviation [%]

### 8.4 Dimensions and weights

Compact version	
	a = 170 mm / 6.7" b = 132 mm / 5.3" c = 140 mm / 5.5" Weight of converter = 1.9 kg / 4.2 lbs Sizes of sensor can be found in the relevant datasheet.
	Remote version, signal converter
	b = 122 mm / 4.8" c = 235 mm / 9.3" H = 310 mm / 12.2" Weight of converter = 3.3 kg / 7.3 lbs







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