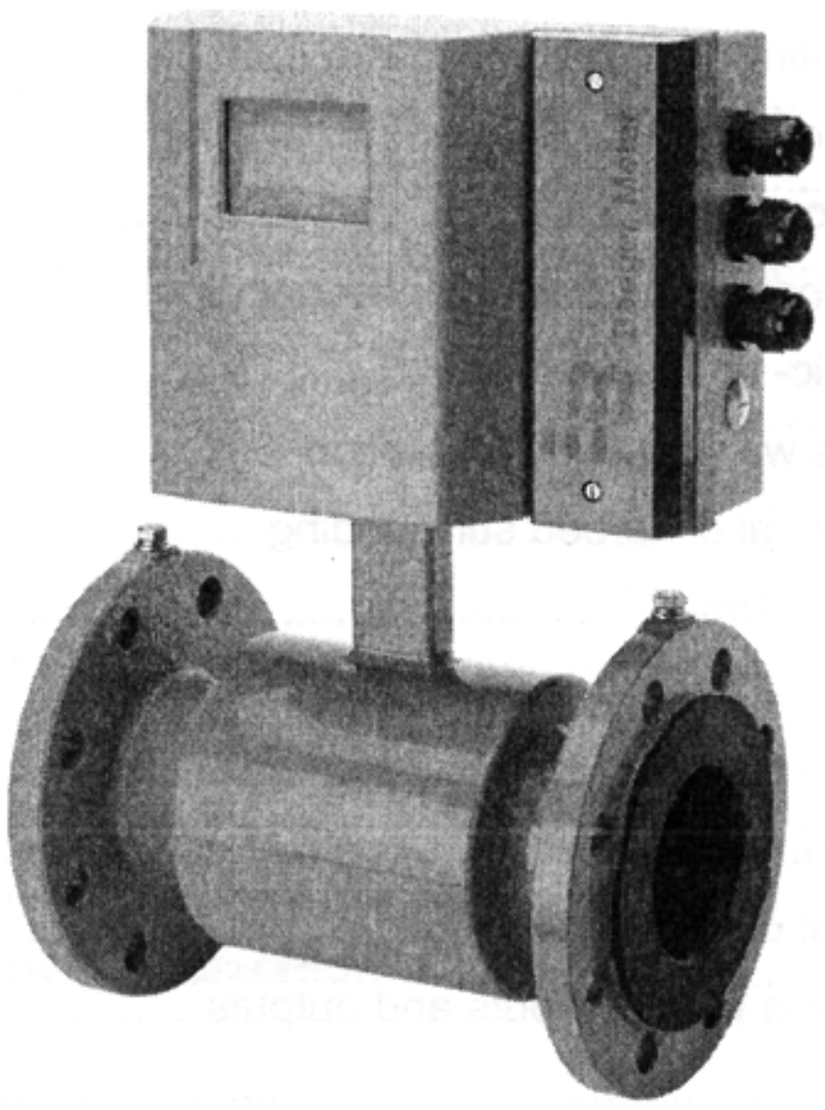
Badger Meter Europa GmbH

Primo® Classic



INSTRUCTION AND OPERATION MANUAL

October 2004

Version Primo-Classic-10/04-e

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1. Basic safety recommendations

The electromagnetic flow meter is only suitable for the measurement of conductive fluids. The manufacturer is not liable for damages that result from improper use.

The meters are constructed according to state-of-the-art technology and tested operationally reliable. They have left the factory in a faultless condition concerning safety regulations.

The mounting, electric installation, taking into operation and maintenance of the meter may only be carried out by suitable technicians. Furthermore the operating personnel has to be trained by the operating authority and the instructions of this manual have to be followed.

Basically, you have to respect the regulations for the opening and repairing of electrical equipment valid in your country.

Repairs

Should you send back a flow meter, which has already been used, please take notice of the following points:

- Please enclose a description of the error as well as a precise statement of the measured medium (if necessary a safety specification sheet).
- The meter has to be in a cleaned condition (outside and inside). Especially with harmful measuring mediums you have to pay attention that there are no impurities in the pipe or at the connections.
- If it is not possible to clean the meter completely, particularly with harmful materials, do not send back the meter.

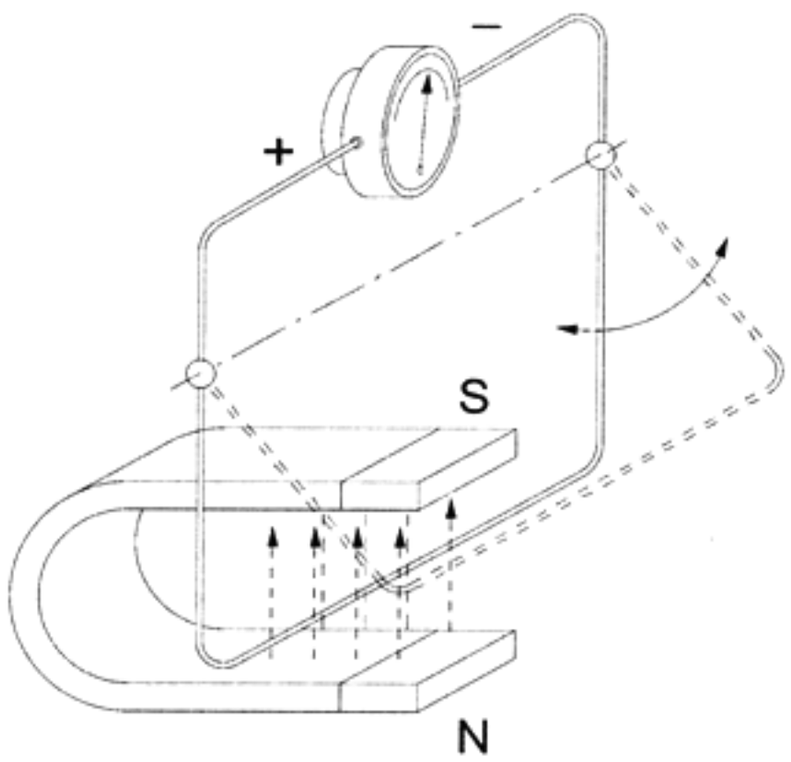
We reserve the right to repair only cleaned meters. Costs, which result from insufficient cleaning, will be charged to you.

2. Description

The electromagnetic flow meters are ideally suited for flow measurement of all liquids with a minimum conductivity of 5 µS/cm. These meters are very accurate and the flow measurement is independent of density, temperature and pressure of the medium.

Measuring principle

The operating principle of the electromagnetic flow meter is based on Faraday's law of magnetic induction: The voltage induced across any conductor, as it moves right angles through a magnetic field, is proportional to the velocity of that conductor. The voltage induced within the fluid is measured by two diametrically opposed internally mounted electrodes. The induced signal voltage is proportional to the product of the magnetic flux density, the distance between the electrodes and the average flow velocity of the fluid.



3. Installation

Warning: • *The below described installation notices must be followed in order to ensure the operativeness and the safe operation of the meter.*

3.1 General

3.1.1 Temperature ranges

Attention: • *In order to prevent damage to the meter, the maximum temperature ranges of the detector and amplifier have to be observed absolutely.*

- *You have to provide a protection from direct insolation in regions with very high ambient temperatures.*
- *At a medium temperature higher than 100°C the amplifier has to be separated from the detector (remote version).*

Amplifier	Ambient temp.		-20 up to + 60 °C
Detector	Medium temp.	PTFE / PFA	-40 up to +150 °C
		Hard rubber	0 up to +80 °C
		Soft rubber	0 up to +80 °C

3.1.2 Protection class

In order to guarantee the requirements of the protection class, the following points have to be followed:

Attention: • *Housing seals have to be undamaged and in a clean condition.*

- *All housing screws have to be tightened.*
- *The outside diameter of the used connection cables have to correspond with the cable insertions (at PG 13.5 Ø 5....15 mm).*
  At non use of the cable insertion use a filler plug.
- *Cable insertions have to be tightened.*
- *If possible lead the cable away downwards. Humidity can not reach the cable insertion.*

The meter is delivered in protection class IP 65 standard. If a higher protection class is required, the amplifier has to be remote mounted from the detector. The detector is also available in IP 68 as an option.

3.1.3 Transportation

Attention:
- *All detectors larger than DN 150 are equipped with lifting eyes. For transportation or lifting of the meter you have to use them.*
- *Do not lift the meters at the amplifier or detector neck.*
- *Do not lift the detectors at the sheet casing with a fork lift truck, because the housing will be pushed in.*
- *Do not lead lifting devices (rope, forks of a lifter, etc.) through the tube, otherwise the lining will be damaged.*

3.2 Mounting

In order to secure the function of the meter in full range, as well as to avoid damages, the following mounting recommendations have to be observed.

Attention:
- *The meter has to be mounted in the pipeline according to the flow direction sign on the nameplate.*

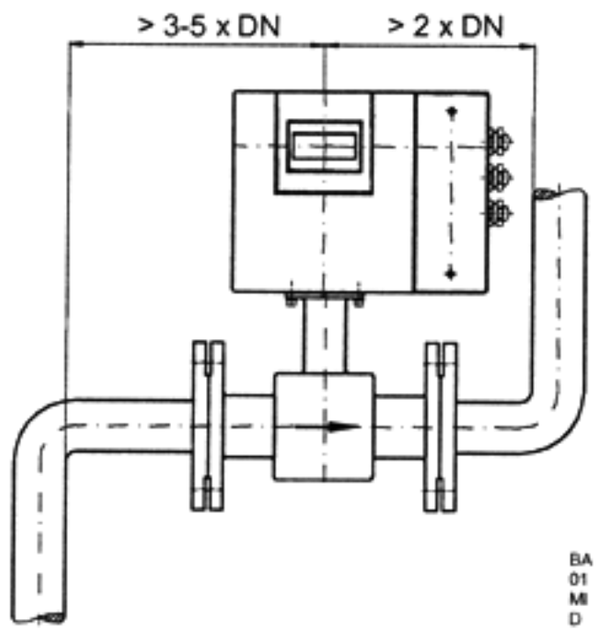
3.2.1 Mounting position

The meter can be mounted in any position. The meter can be mounted in horizontal as well as vertical pipelines.
At vertical mounting the flow direction is to be provided upwards. Carried solid particles are sinking downwards.
At horizontal mounting you have to pay attention, that the measure electrodes are lying in a horizontal level. Carried gas bubbles could otherwise lead to a short time isolation of the measure electrodes.

The meter has to be mounted in the pipeline according to the flow direction sign on the nameplate.

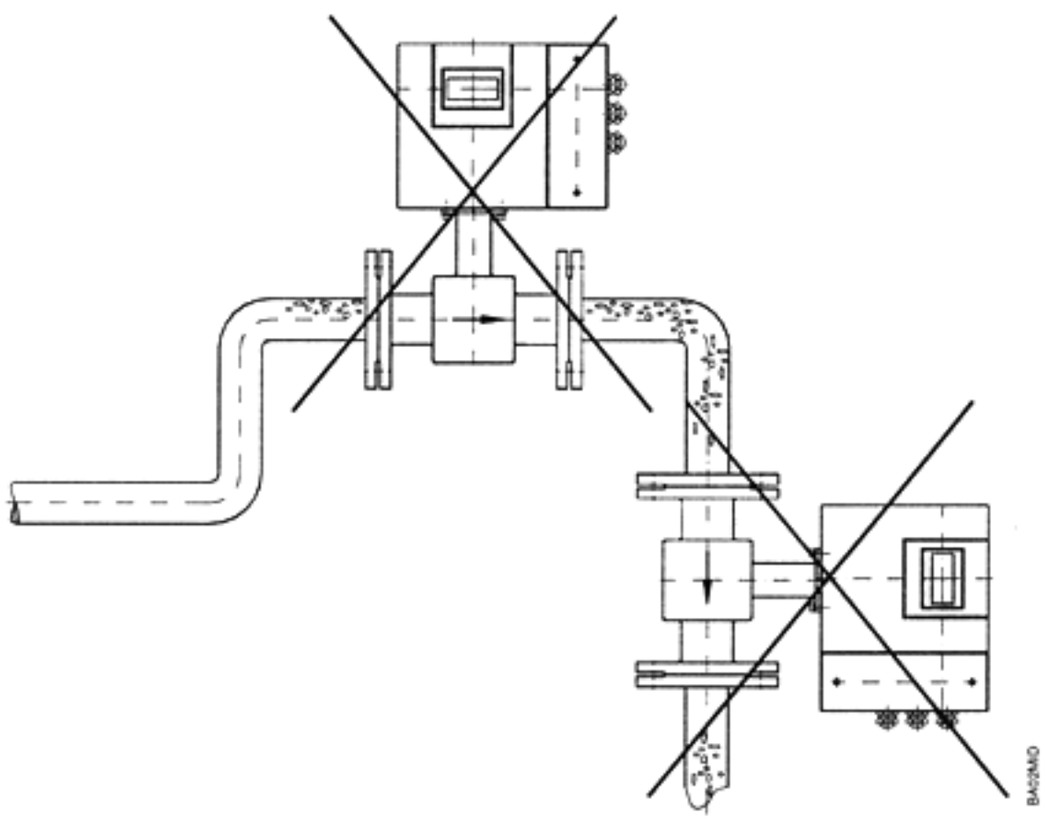
3.2.2 Inlet and outlet distance

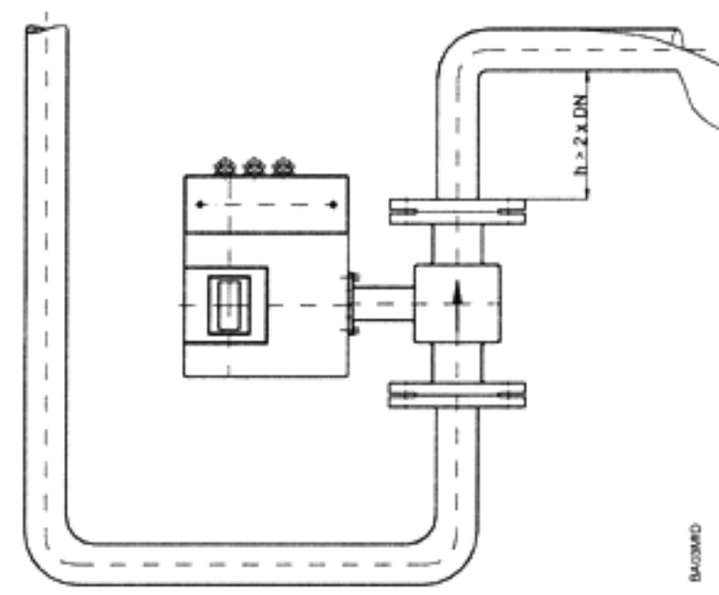
The detector should always be installed in front of turbulence generating fittings. If this is not always possible, then inlet distances of 3 x DN should be provided. The outlet distance should be > 2 x DN.

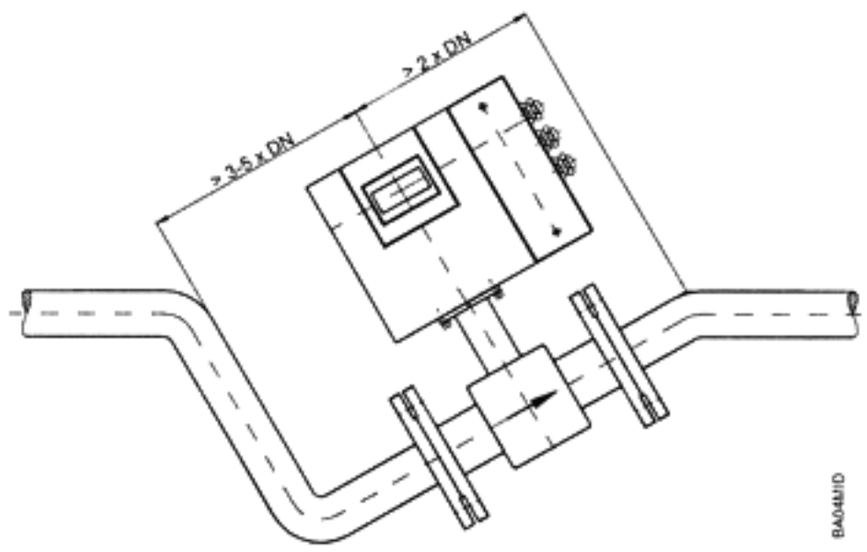


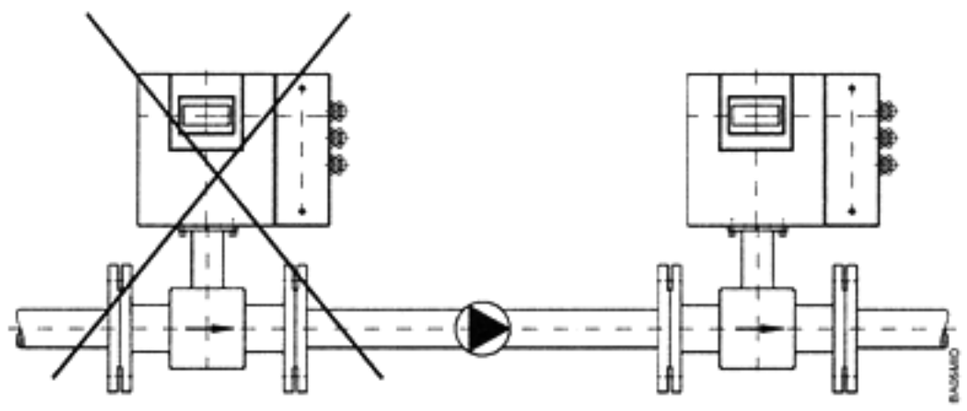
3.2.3 Mounting location

Attention:
- *The detector should not be installed on the suction side of a pump, otherwise there will be the danger of damage to the liner (especially PTFE liner) by depression.*
- *Please be careful that the pipeline at the measuring point is always fully filled, otherwise no correct resp. accurate measuring is possible.*
- *Do not install the detector at the highest point of a system of pipes, otherwise there will be the danger of gas accumulation.*
- *Do not install in a downpipe with following free discharge.*
- *At vibrations the pipeline has to be fastened before and after the detector. At very strong vibrations the amplifier has to be separated from the detector (remote version).*







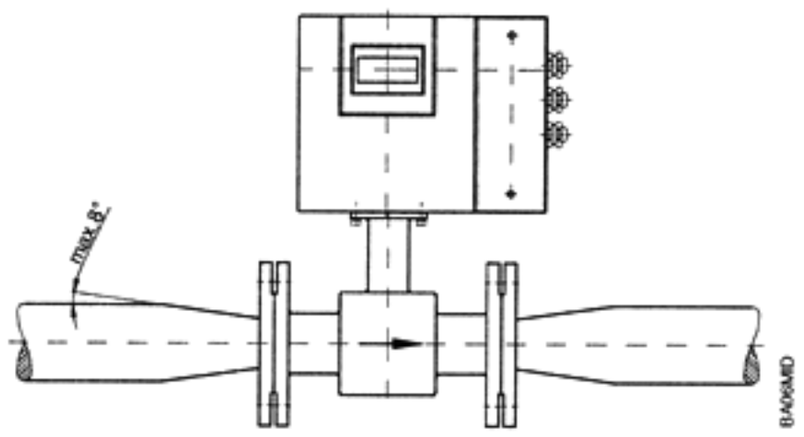


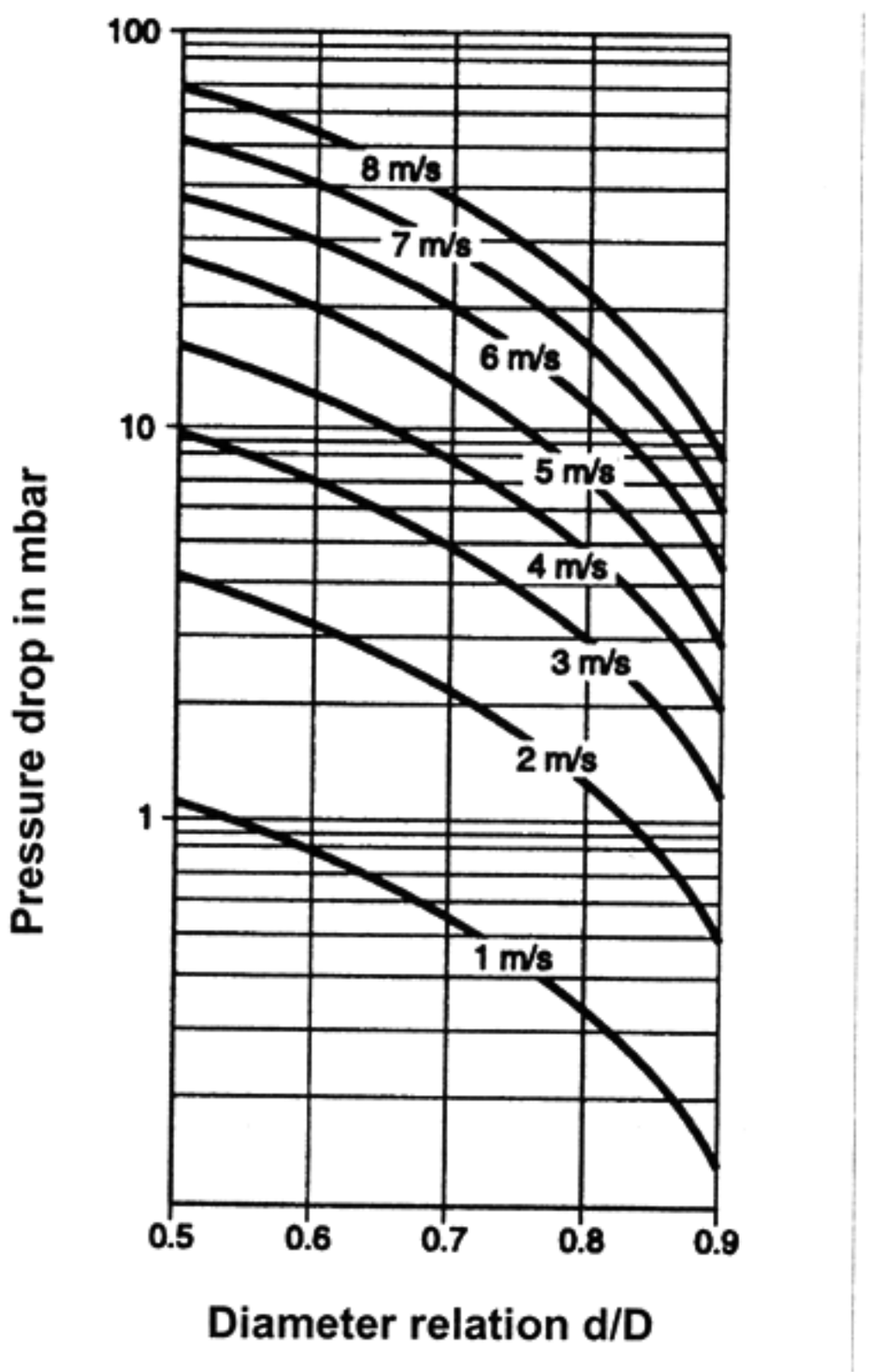
3.2.4 Size reduction

By using pipe adaption pieces according to DIN 28545 the detectors can be mounted in pipelines of larger sizes.
The emerging pressure drop can be determined with the depicted nomogram (only for liquids with a similar viscosity like water).

Notice:
- *At very low flow rates the flow rate can be increased by reducing the size at the measuring point and therefore the measuring accuracy can be improved.*

D = Pipe
d = Detector





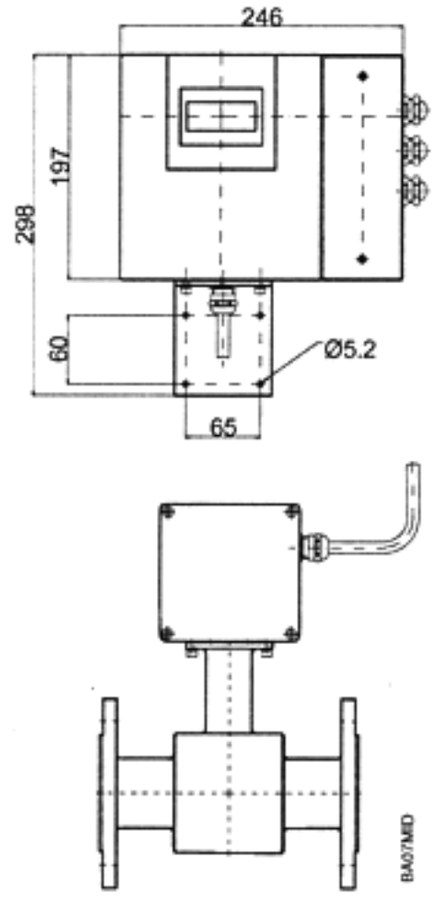
Determination of the pressure drop:
1. Calculate the diameter relation d/D.
2. Read the pressure drop depending of the d/D relation and the flow rate.

3.2.5 Remote version

The remote version is absolutely necessary at the following conditions:

Notice:
- *Detector protection class IP 68*
- *Medium temperature > 100 °C*
- *Strong vibrations*

Attention:
- *Do not lay signal cables in the direct surrounding of power cables, electrical machines, etc.*
- *Fix the signal cables. Cable movements could otherwise lead to improper measurings by capacity changes.*

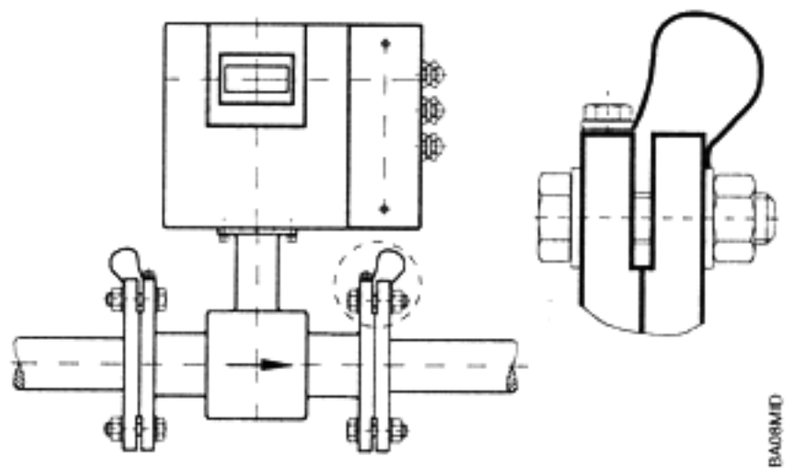


3.2.6 Grounding and equipotential bonding

In order to get an accurate measurement, the detector and the medium to be measured have to be approximately on the same electrical potential.

For flanged or in between flanges models without additional grounding electrode, this will be carried out by the connected pipeline.

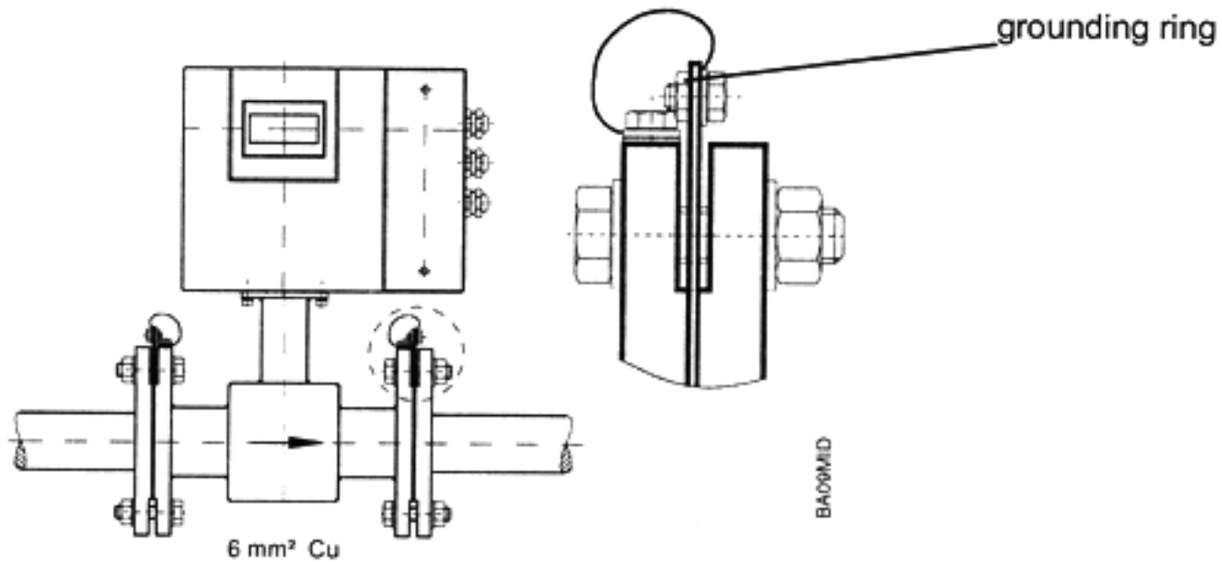
Attention:
- *For the flange design, please take an additional connection cable (min. 4mm²) to the fastening screws between the grounding screw at the flange of the detector to the mating flange. Make sure that a good electrical connection will be established.*
- *Colour or corrosion at the mating flange can reduce a good electrical connection.*
- *For in between flanges designs, the electrical connection to the detector will be executed by two ¼ AMP plugs at the detector neck.*



3.2.7 Plastic- or lined pipelines

When using non conductive pipelines or pipelines with a non conductive liner, the equipotential bonding has to happen via an additionally installed grounding electrode or between the flanges mounted grounding rings. The grounding rings are mounted like a gasket between the flange and connected by a ground cable with the detector.

Attention: • *When using grounding rings, attention to the corrosion resistance of the material has to be paid to. For aggressive media, it is recommended to use grounding electrodes.*

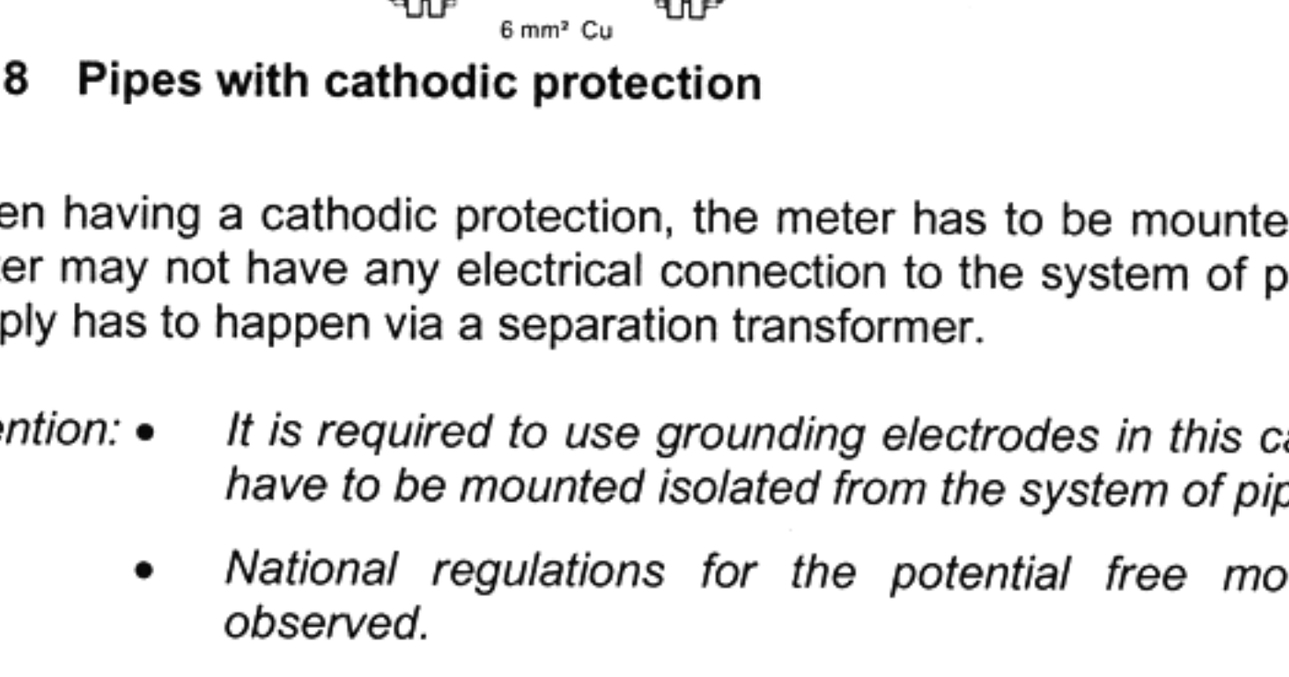


3.2.8 Pipes with cathodic protection

When having a cathodic protection, the meter has to be mounted potential free. The meter may not have any electrical connection to the system of pipes and the voltage supply has to happen via a separation transformer.

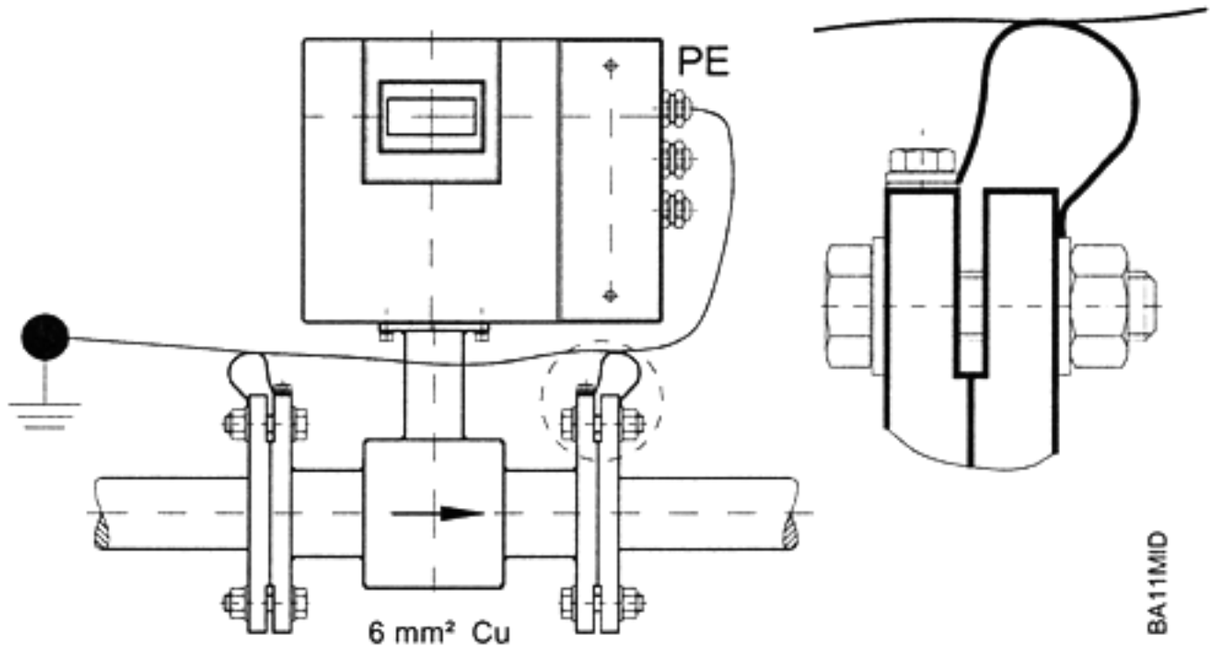
Attention: • *It is required to use grounding electrodes in this case (grounding rings have to be mounted isolated from the system of pipes as well).*

• *National regulations for the potential free mounting have to be observed.*



3.2.9 Electrical disturbed surrounding

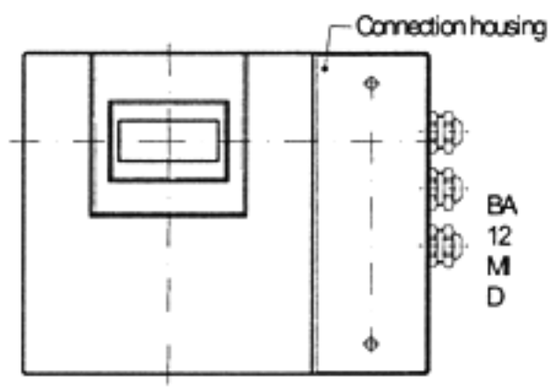
In electrical disturbed surroundings or not grounded metallic pipelines, a grounding like described below is recommended in order to guarantee an uninfluenced measuring.



4. Electrical connection

Attention:

- *Only flexible electrical wires can be used for the 3 x PG 13.5 cable insertions.*
- *Use separate line entrances for auxiliary power, signal- and in-/output wires.*



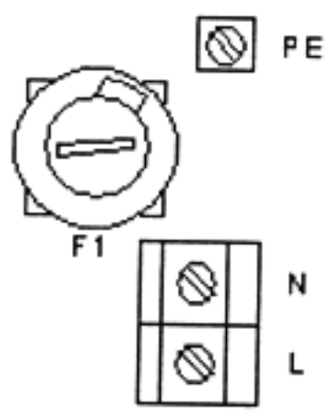
4.1 Power

Warning:

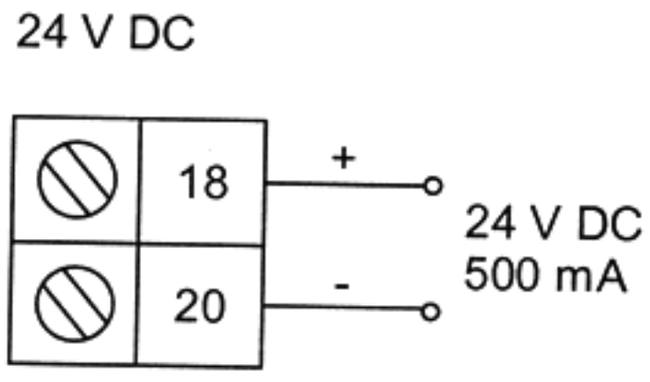
- *Do not install the meter under applied power supply.*
- *National valid regulations have to be followed.*
- *Observe the nameplate (power supply and frequency).*

The Primo Classic can be operated with a supply voltage of 230 V AC, 115 V AC as well as with 24 V DC. The meter is delivered with the supply voltage ordered by the customer. A later conversion of the supply voltage is described in the next chapter. A changing to 24 V DC is not necessary. This connection can be used parallel to the normal supply voltage as a backup voltage.

1. Loosen both fastening screws of the connection cover and remove the cover.
2. Slide the power cable through the upper cable insertion.
3. Connection according to the wiring plan.
4. Close the connection cover tightly again once the connection has been completed.

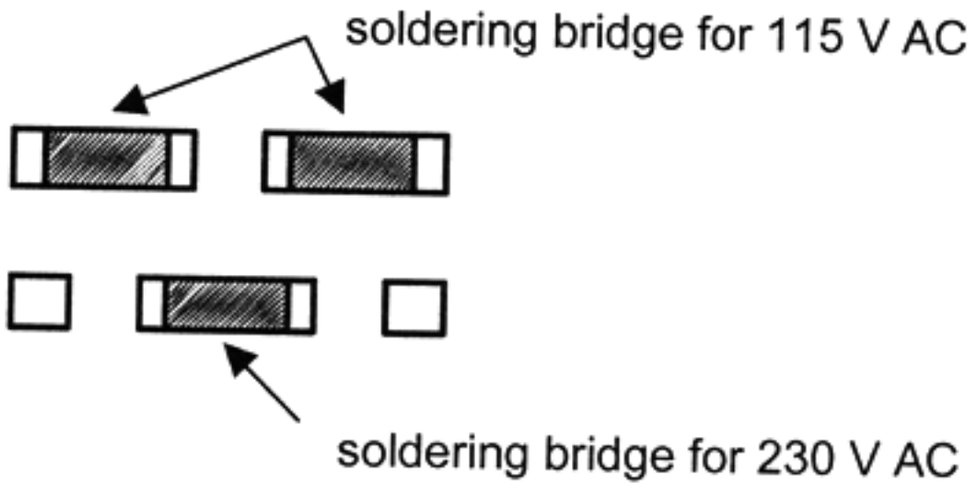


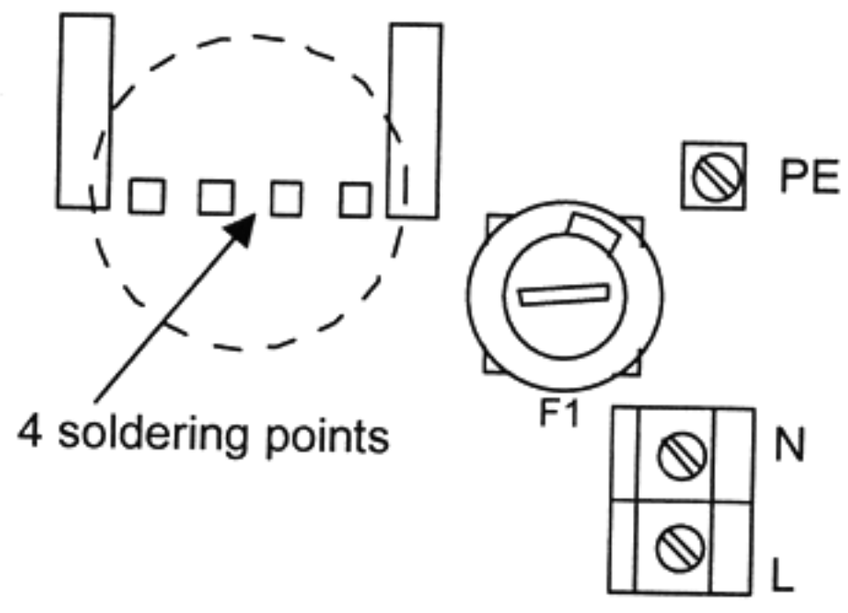
Connection 24 V DC



4.2 Changing the supply voltage

A changing from 230 V AC to 115 V AC is done with soldering bridges as follows:





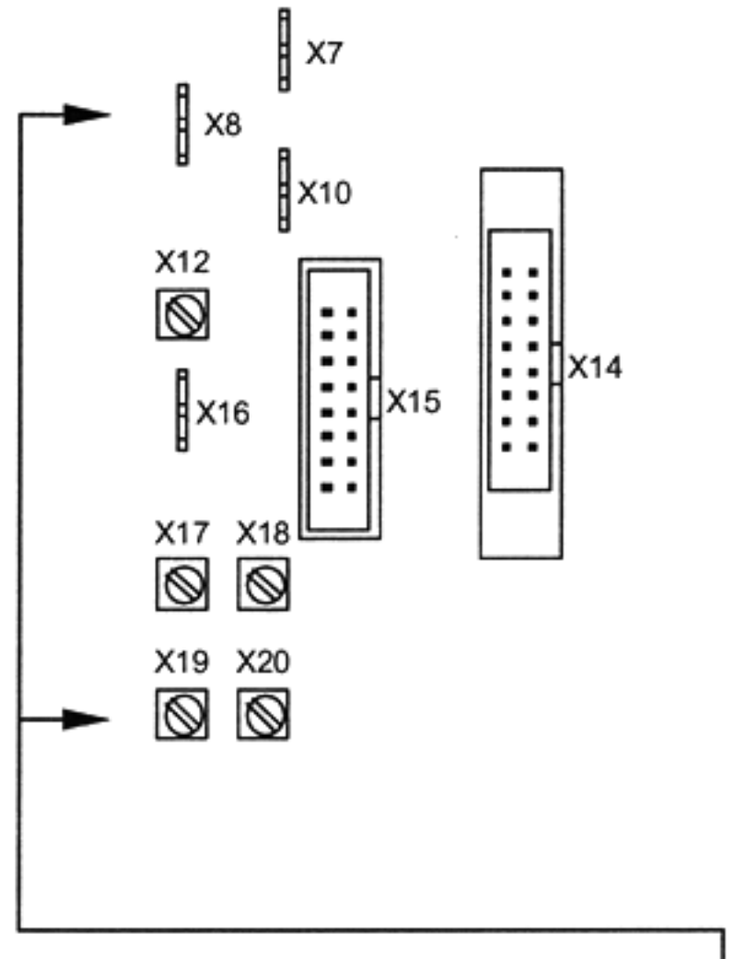
A changing to 24 V DC is not necessary. This connection can be used parallel to the normal supply voltage as a backup voltage.

4.3 Remote version

Attention: • *Connect or detach signal connection wires only when the meter is switched off.*

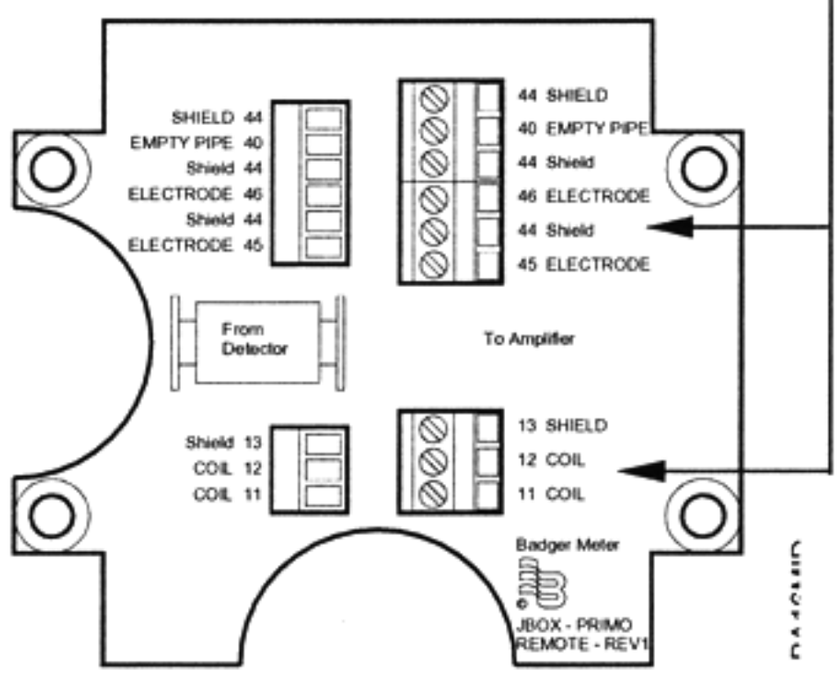
Connection in the amplifier

1. Loosen both fastening screws of the connection cover and remove the cover.
2. Loosen upper and lower meter cover screw and open up the cover to the left.
3. Slide the signal cable on the bottom of the meter (wall mounting) through the cable insertion.
4. Connection according to the wiring plan.
5. Close the connection cover tightly again once the connection has been completed.



Connection at the detector

1. Loosen the fastening screws of the connection cover and remove the cover.
2. Slide the signal cable through the cable insertion.
3. Connection according to the wiring plan.
4. Close the connection cover tightly again once the connection has been completed.



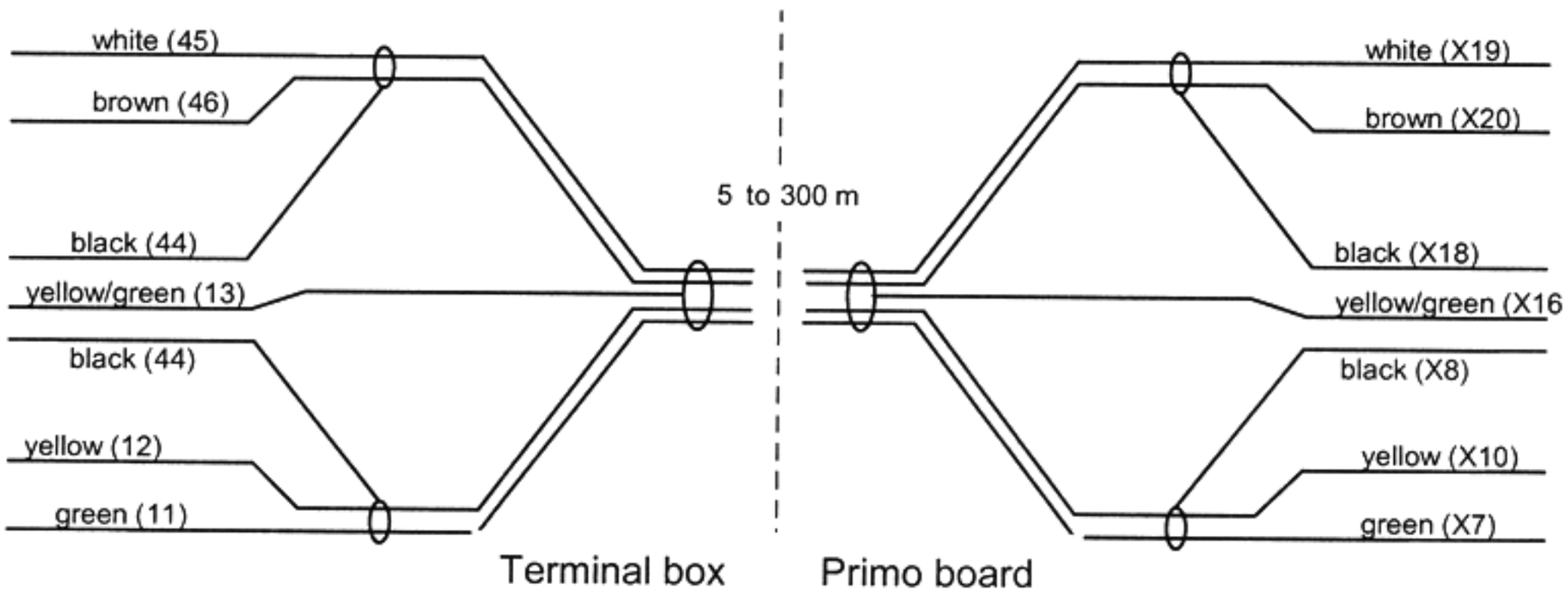
Terminal box		Primo board Connection n°	Description	Wire colour
Standard	Stainless steel			
11	5	X7	Coil 1	Green
12	4	X10	Coil 2	Yellow
13	PE	X8	Shield coil	Black
44*	PE	X16	Shield complete	Yellow/Green
45	1	X19	Electrode 1	White
44*	PE	X18	Shield electrode	Black
46	2	X20	Electrode 2	Brown

*Are lying on the same potential

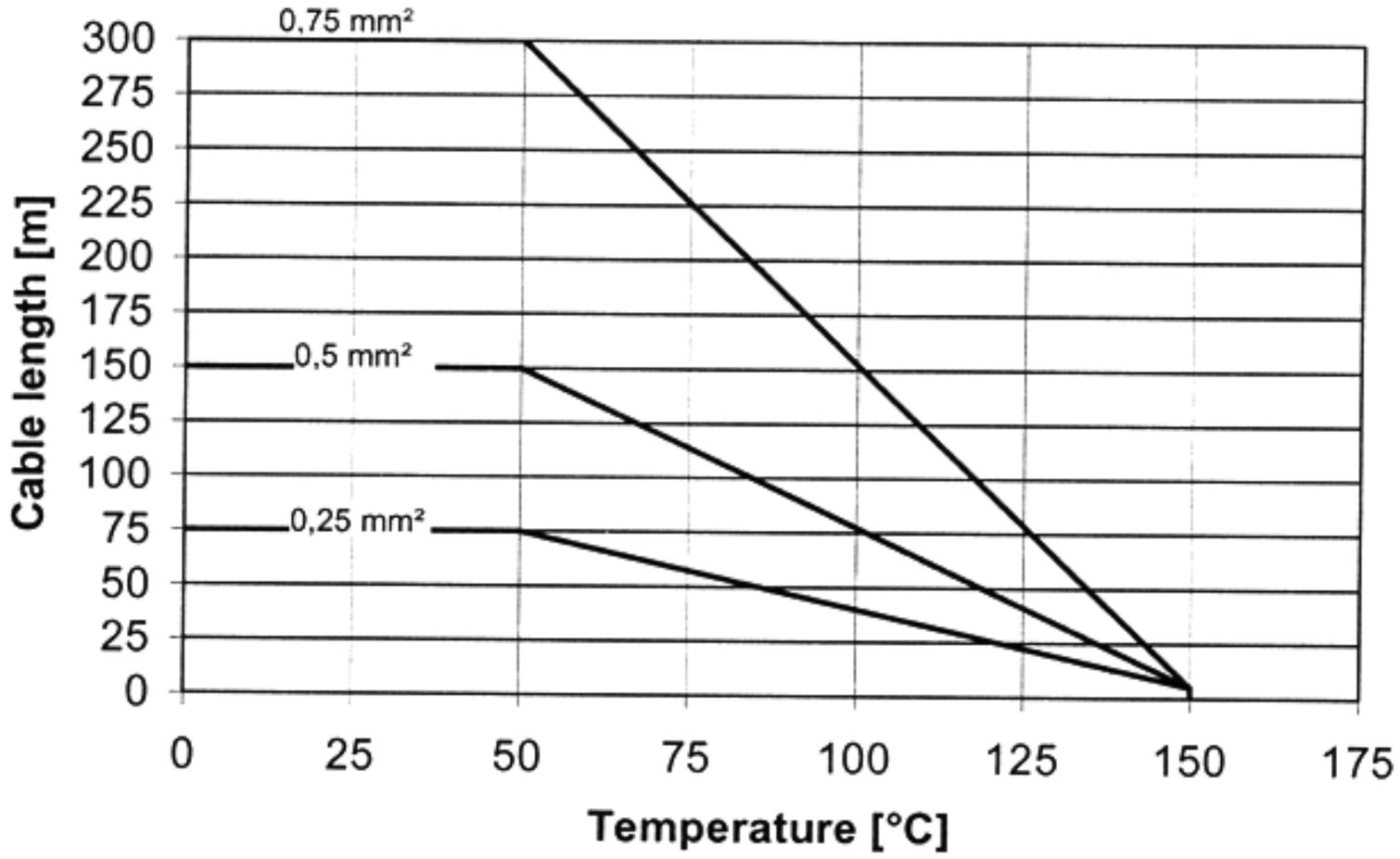
4.3.1 Signal cable specification

Notice:
- *Use only the signal cables supplied by Badger Meter or corresponding cables with the following specifications.*
- *Observe the max. signal cable length between detector and amplifier (keep the distance as short as possible).*

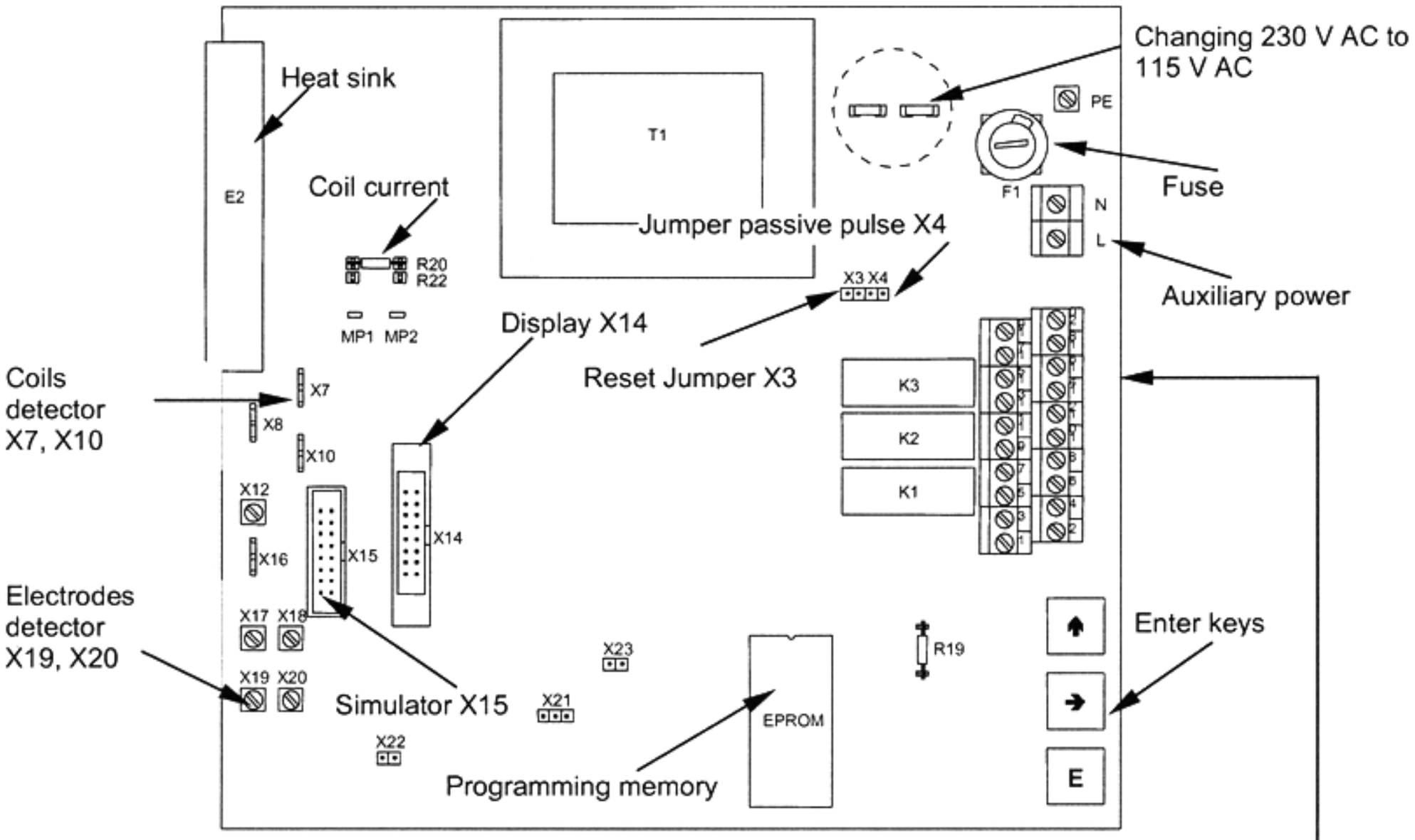
Distance	With electrode for empty pipe detection	Loop resistance
0 – 75 m	2 x (2 x 0,25 mm²)	=< 160 Ω/km
> 75 – 150 m	2 x (2 x 0,50 mm²)	=< 80 Ω/km
> 150 – 300 m	2 x (2 x 0,75 mm²)	=< 40 Ω/km
PVC-wire with pair- and total shield Capacity: Lead/lead < 120 nF/km, lead/shield < 160 nF/km Temperature range –30 up to +70 °C		



Maximum cable length at different medium temperatures



4.4 Terminal wiring plan of inputs and outputs



In- / Output	Description	Terminal
Power output	0 - 20 mA 4 - 20 mA RL < 600 Ohm 0 - 10 mA 2 - 10 mA	3 (+) 1 (-)
Voltage output	0 - 10 V 2 - 10 V RL > 1000 Ohm 0 - 5 V 1 - 5 V	5 (+) 1 (-)
Pulse	0 - 10 kHz, pulse-/break relation approx. 1:1 adjustable pulse length 5 - 500 ms (5 ms steps)	
Active	24 V DC, 200 mA main direction reverse	13 (+) and 19 (-) 15 (+) and 19 (-)
Passive	max. 30 V DC, 200 mA main direction (Jumper X4 pulled) reverse	13 (+) and 19 (-) 15 (+) and 19 (-)
Relay 1	Set point 1 max. 48 V, 500 mA	7 and 8
Relay 2	Set point 2 max. 48 V, 500 mA	9 and 10
Relay 3	Meter disturbance max. 48 V, 500 mA	11 and 12
Reset	Totalizer 2 (Jumper X3 placed)	14 and 19
RS 232	Output of current readings	1 GND 6 RxD 4 TxD
Battery	Power 24 V DC (+10% / -5%)	18 (+) and 20 (-)

5. Parameter setting

The parameter setting is done with the 3 keys (↑,→ and **E**).

The meter has got 2 different levels:

1. **Parameter setting mode**
   The parameter setting of the meter can be done in this mode.
2. **Measuring mode**
   In the measuring mode the current flow as well as totalizers and error messages are indicated on the display.

5.1 Parameter setting mode

You can enter the parameter setting mode by pressing the key **E** in the measuring mode. Even while the parameter setting mode is on, measurings are still carried out.

5.1.1 Factors

5.1.1.1 Detector- and amplifier constant

Notice: ▪ *The meter was calibrated in the factory and the detector factor belonging to the detector has been already programmed. Changes of the detector- or amplifier factor are influencing the measuring accuracy of the meter.*

Each meter has been wet calibrated in the factory and the corresponding correction factor (detector factor) has been determined. Each detector has its individual detector factor, which is programmed in the amplifier. The detector factor is shown on each detector nameplate.

The amplifier constant is used for calibration of the amplifier. The standard setting is 2,50.

5.1.1.2 Size

Notice: ▪ *The diameter of the detector has already been programmed in the factory. Changes of the value are influencing the measuring accuracy of the meter.*

This parameter is used for setting the detector diameter (size). The setting of the different sizes can be carried out here (DN 6 up to DN 2000).

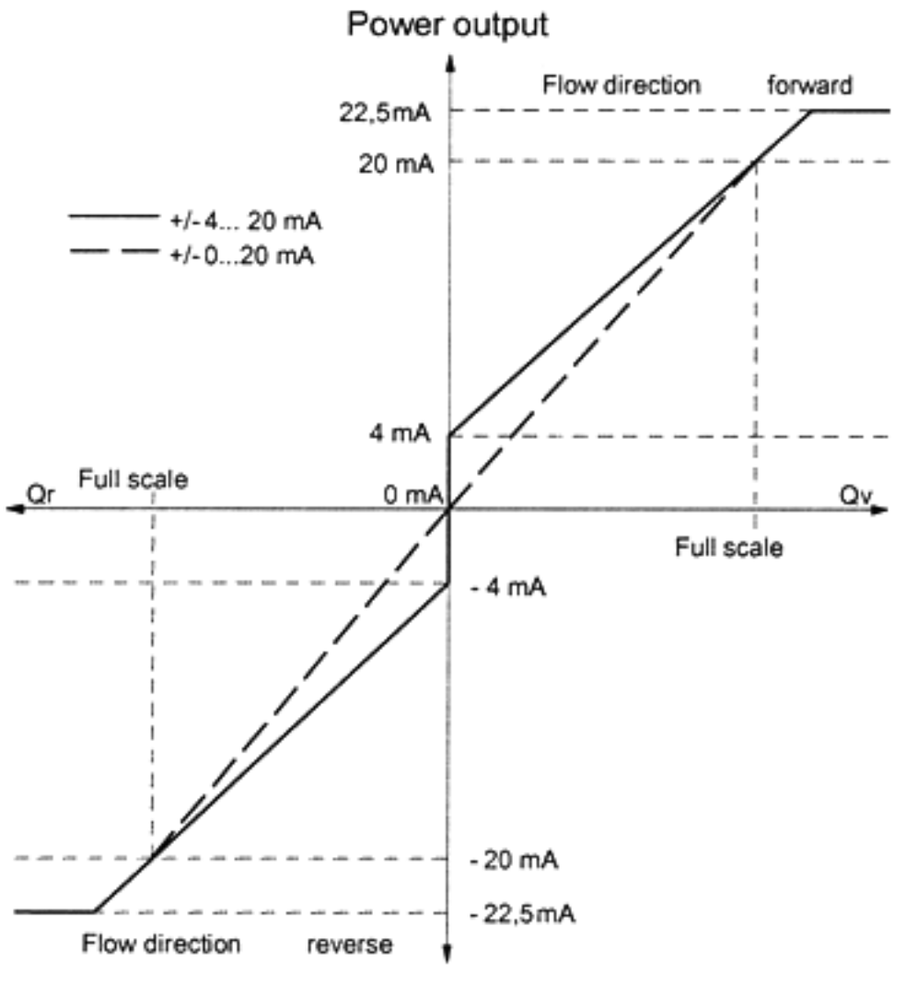
5.1.2 Outputs

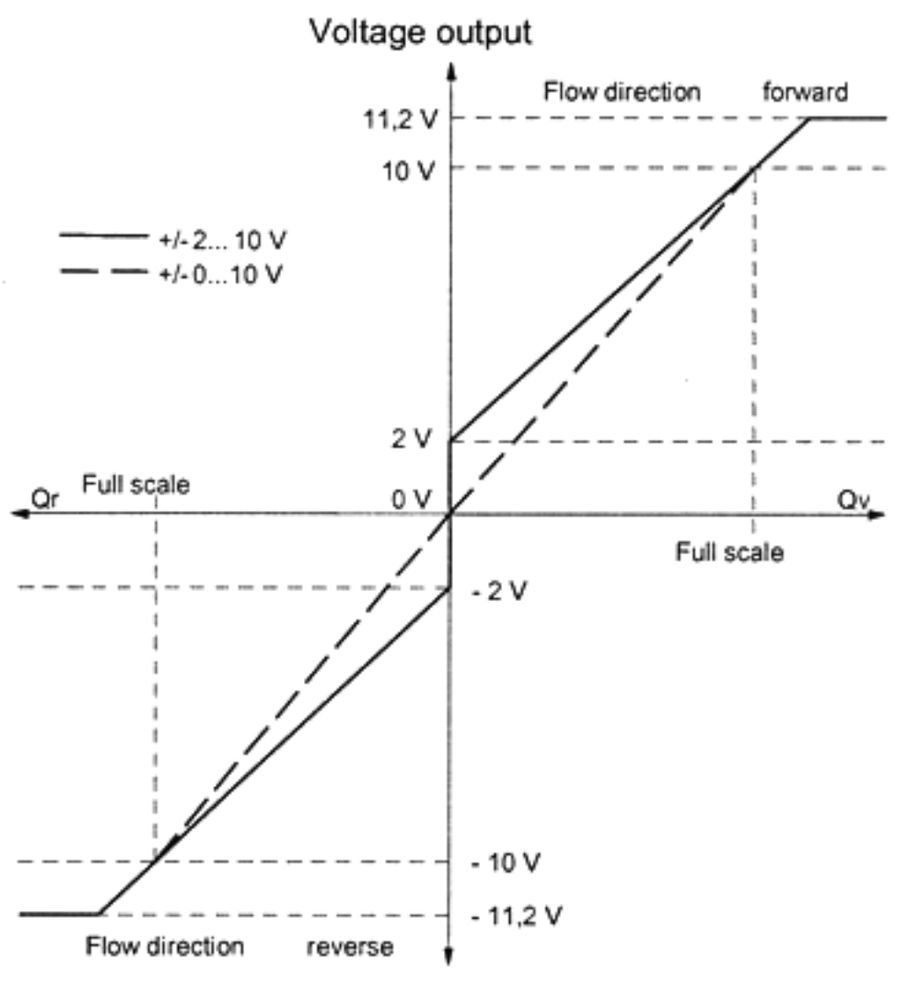
5.1.2.1 Analog output

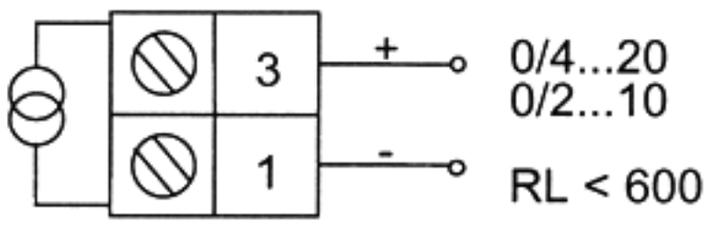
The following possible power and voltage ranges are available for the setting of the measuring range 0 to 100% (= full scale):

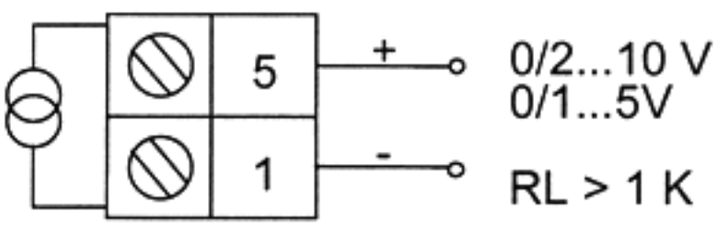
Voltage output	Power output
0 to 10 V DC	0 to 20 mA
2 to 10 V DC	4 to 20 mA
0 to 5 V DC	0 to 10 mA
1 to 5 V DC	2 to 10 mA

Notice:
- *At bidirectional operation the flow direction is indicated via the sign.*
- *See also setting of the full scale.*









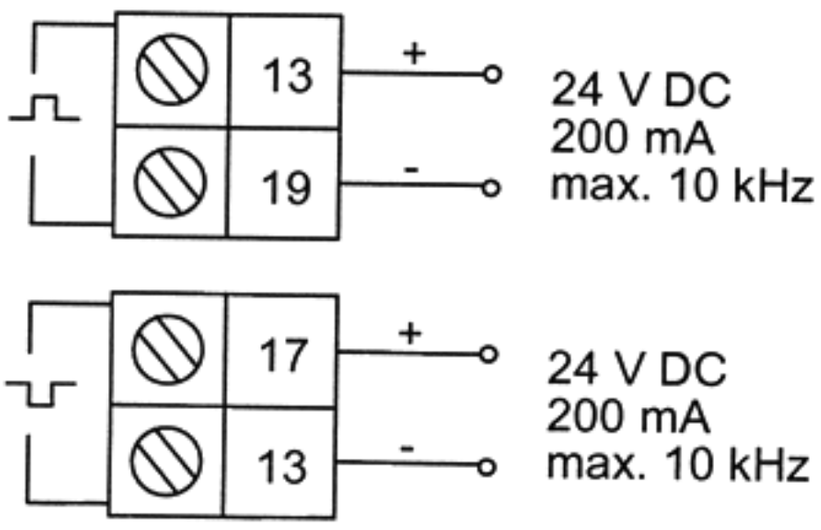
5.1.2.2 Pulse output

The pulse value defines how many pulses per volume unit are dispensed. These can be totalized and displayed as total flow volume via an external counter.
A setting of 0,001 up to 10.000 pulses/volume unit is possible. A max. output frequency of 10 kHz (10.000 pulses/sec) may, however, not be exceeded.

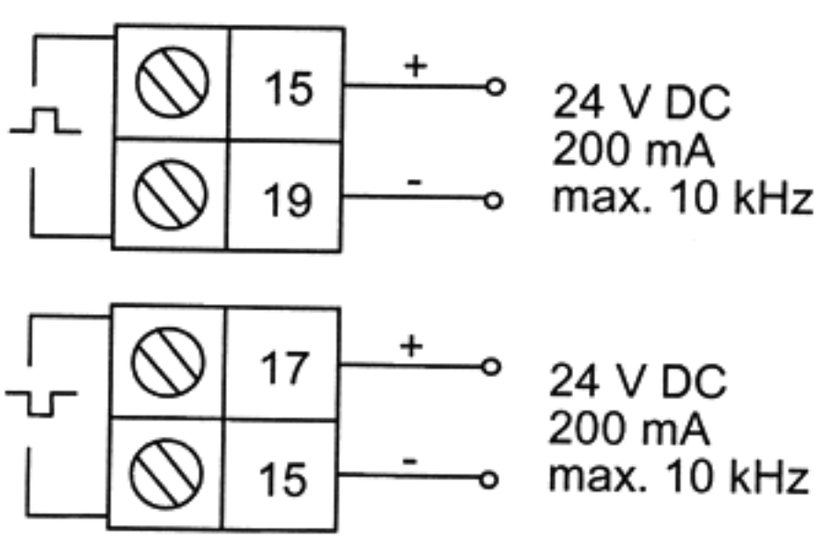
Notice: ▪ *The volume unit depends on the flow unit (see units).*

The active pulse output is connected as follows.

Pulse output forward (active)

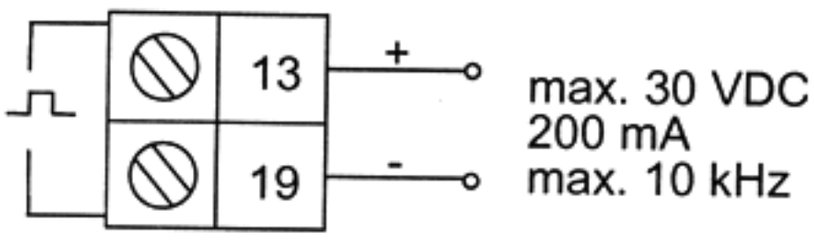


Pulse output reverse (active)

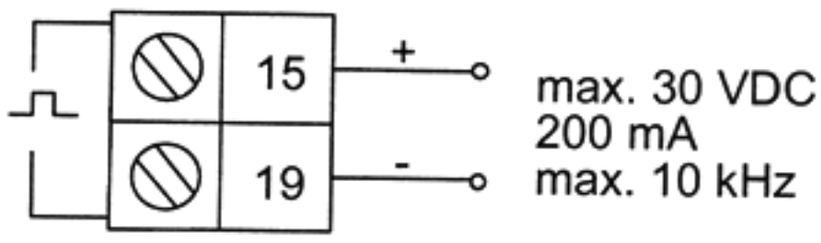


At passive pulse output, Jumper X4 has to be pulled first (see chapter 4.4, terminal wiring plan of the in- and outputs).

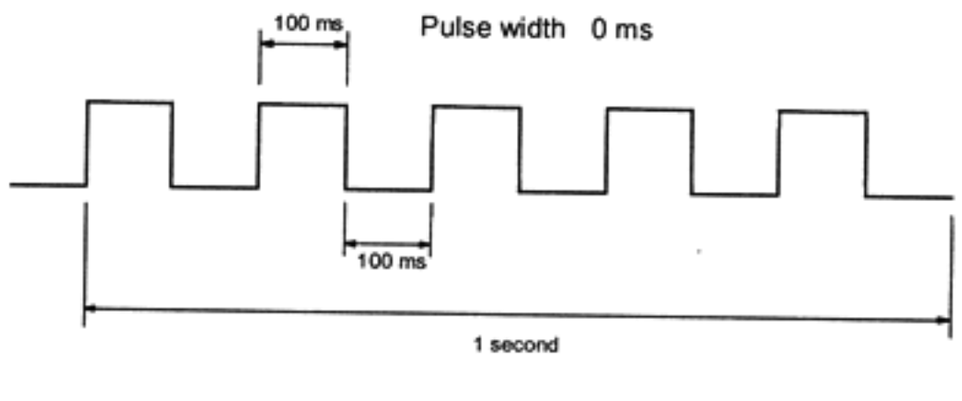
Pulse output forward (passive)

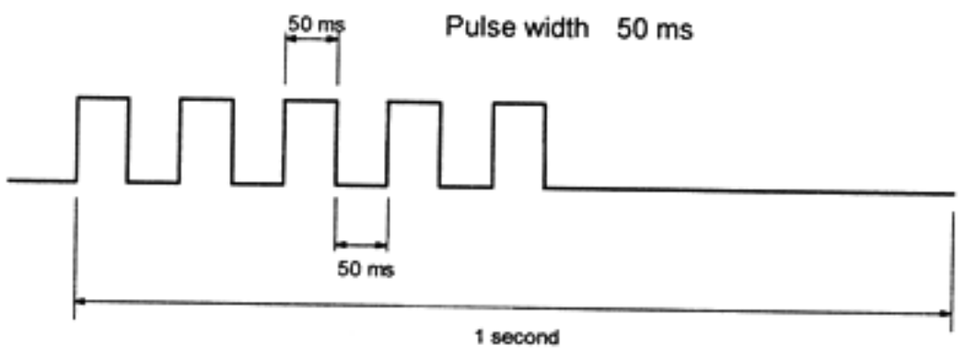


Pulse output reverse (passive)



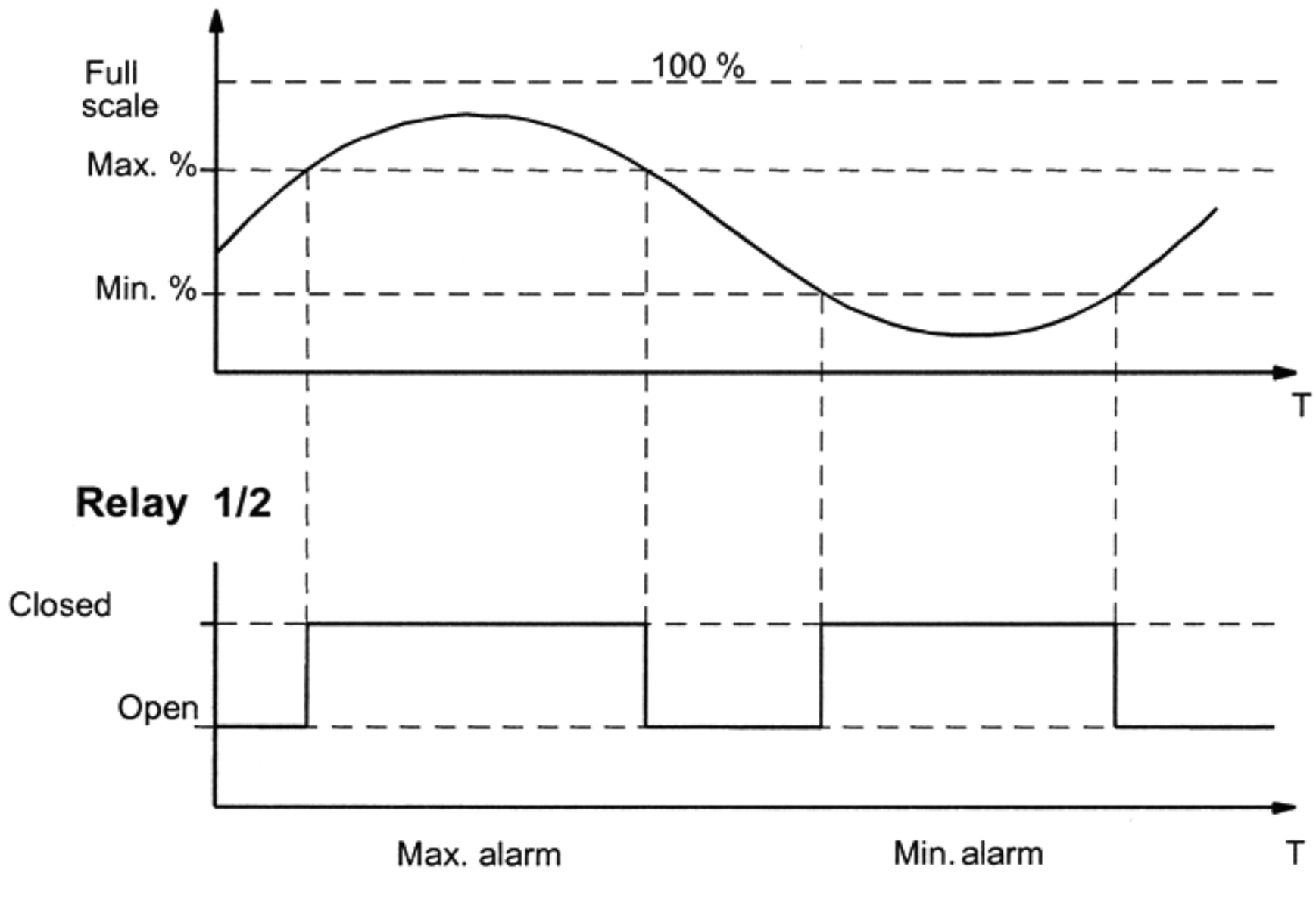
The pulse/break relation is approx. 1:1. At a setting of pulse width of „0 ms“, the pulse width is automatically adjusted to each pulse frequency. The pulse width can, however, be programmed from 5 ms to 500 ms.





5.1.2.3 Set point

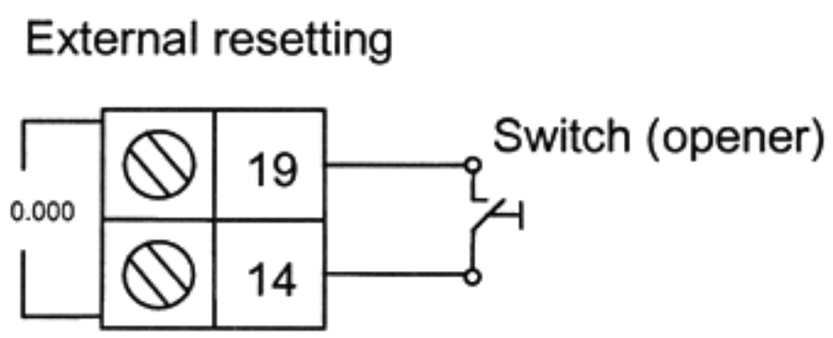
The set point (min, max) is used for control of the momentary flow rate and is set in percent from the full scale. The values can be chosen freely in 1% steps between 0 to 100%. The exceeding/underflowing of the programmed set point is indicated by closing of the relay.



5.1.2.4 Resetting the totalizers

The totalizers indicated in the display are set to zero via this menu point.

To enable the totalizer 2 to be reset via an external switch (opener), the jumper „Reset X3“ (see chapter 4.4, terminal wiring plans of the in- and outputs) has to be placed on the board and the meter programmed to unidirectional operation (see chapter 5.1.3.5, flow direction).



Totalizer	Menu		External switch		Voltage loss	
	Bi	Uni	Bi	Uni	Bi	Uni
Tot 1 / Tot+	R	R				
Tot 2 / Tot -	R	R		R		R

R = Reset (possible), Bi = bidirectional mode, Uni = unidirectional mode

5.1.3 Measuring

5.1.3.1 Measuring units

7 flow measuring units can be chosen. The flow values are automatically converted in the chosen unit. The units Gallon and Million Gallon are available in a separate software version
The totalizer units are given below and depend on the chosen flow unit (see table below).

Flow unit		Volume unit		Software version
l/h	Liter/hour	L	Liter	V2.074 and V2.40 m V2.41 m
l/min	Liter/minute	L	Liter	
l/s	Liter/second	L	Liter	
m^3/h	Cubic meter/hour	m^3	Cubic meter	
m^3/min	Cubic meter/minute	m^3	Cubic meter	
GPM	US Gallons/minute	G	Gallon	V2.40 us V2.41 us
MGD	US Million Gallons/day	MG	US Million Gallon	

5.1.3.2 Full scale Qmax

The full scale can be chosen in a range of 0,1 up to 12 m/s. A flow is assigned to the power- and voltage output by scaling of the full scale. The scaling is valid for both flow directions.

Notice: ▪ *The full scale and low flow cut off are also referring to the full scale.*

5.1.3.3 Low flow cut off

If a display or a sum of „wrong“ liquid movements, e.g. caused by vibrations or fluctuating of the liquid column, shall be prevented, the low flow cut off can be set accordingly.
Depending on the full scale, flow values in the lower measuring range between 0 and 10% can be hold back.

5.1.3.4 Empty pipe detection

The medium control indicates via relay 3 (error), if the tube is only partially filled with liquid. The control can be switch on and off.

5.1.3.5 Flow direction

The flow direction can be programmed to uni- or bi-directional direction.
Uni-directional means that only the flow in one direction (arrow direction on the detector = main direction) is measured and added. If the medium is flowing opposite to the main direction, the counter is showing zero on the display and on the outputs. Both totalizers can be used as total- and resettable daily counter in this mode.
At bi-directional setting the flow is measured and added in both directions. Totalizer 1 is adding in the main direction and totalizer 2 opposite to the main direction. A change of the flow direction is indicated via the sign of the power or voltage output as well as in the display via the arrow direction.

5.1.3.6 Filter (damping)

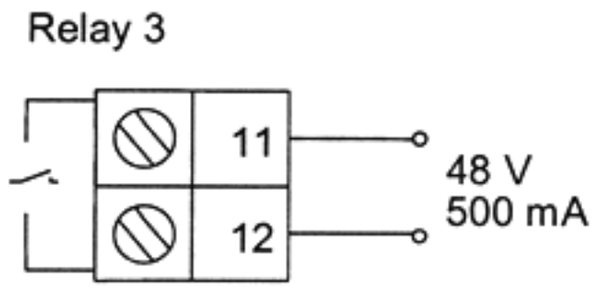
This option is used for damping all output signals. The damping factor can be set from 1 up to max. 256. The damping corresponds to a low pass filter. The time constant of the low pass filter is the same as 2^{factor} in seconds.

Notice: ▪ *The damping has no influence on the totalizers.*

5.1.3.7 Error message

An error is indicated via relay 3 and in the fourth line of the display. The relay is closed during normal operation and opens as soon as an error is occuring.

An overview of the possible errors, causes as well as trouble shooting is described closer in the chapter 7 „error indication and clearance“.



5.2 Measuring mode

The backlighted LCD display consists of 4 lines with each 16 digits and is used for displaying the following information:

Line	Information		Value*
1	Current flow		8 digits
2	Totalizer 1 in main flow direction		10 digits
3	Uni-directional:	Totalizer 2 in main flow direction	10 digits
	Bi-directional:	Totalizer opposite to the main flow direction	10 digits
4	Error indication		16 digits

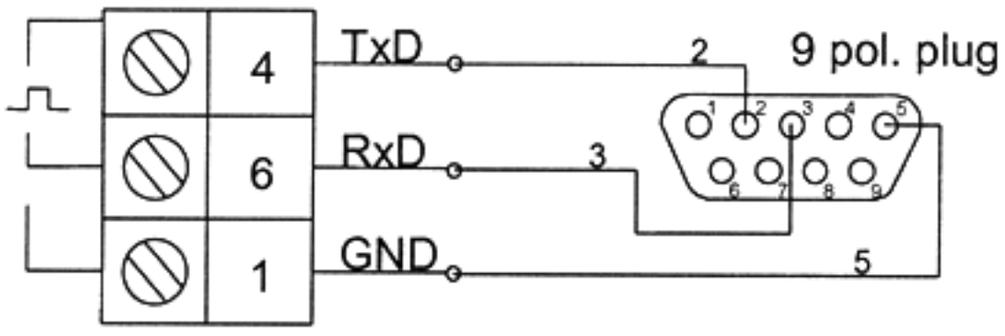
*Number of digits without decimal point nor sign.

6. Interfaces

6.1 RS232

The RS232 interfaces do not need to be set up.

RS 232



Configuration of the COM interface

Baud	= 9600
Data bits	= 8
Stop bits	= 1
Parity	= none
Protocol	= none

7. Error indication and clearance

Error indication of the meter is indicated on the display (line 4) as well as via relay 3. The relay is closed during normal operation and opens as soon as an error is occuring.

The following error indications can appear

Error indication	Possible cause	Measures
Err: Transmitter coil	▪ No detector connected. ▪ Connection to the detector interrupted. ▪ Detector electronic or coils of the detector defective. ▪ Supply voltage too low.	Check, if the detector is connected and if there is no interruption in the cable connection. Check voltage and increase if necessary. Otherwise contact service.
Err: Transmitter offset	Input signal of the detector too high (offset) Parameter „reinforcement“ & „measuring rate“ not on 1 Electrodes dirty	Check and improve grounding of the meter. See installation of the detector Set parameters to 1. Switch meter off and on. Clean the electrodes
Err: Error in slave	Outputs control is defective.	Please contact service.
Err: Empty pipe	Pipe is not fully filled.	Pipe at the measuring point always has to be fully filled (pressure pipe). Possibly new calibration needed. See calibration of the medium control.
Err: Unknown int.	Error in the main processor	Please contact service.
Err: Error 1	Error in the slave processor	Please contact service.
Err: Error 2	Pulse overflow Frequency > 10 kHz	Decrease pulse value and/or pulse width
Err: Error 4	Connection between main processor and slave disturbed	Please contact service.
Err: Error 8	Temperature in amplifier too high	Mount amplifier in the shadow

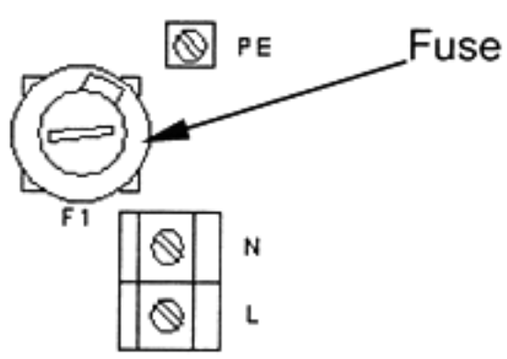
Some frequent errors are listed in the following:

Other errors	Possible cause	Measures
No operation of the meter	▪ No power ▪ Fuse defective	▪ Provide power. ▪ Replace the fuse.
Despite of flow ZERO is displayed.	▪ Signal cable not connected or connection interrupted. ▪ Detector mounted opposite to the main flow direction (see arrow on the nameplate). ▪ Connection cable of the coils or electrodes permutated.	▪ Check signal cable. ▪ Turn detector by 180°. ▪ Check connection cable.
Inaccurate measuring	▪ Parameter wrong. ▪ Pipe not fully filled.	▪ Check the parameters (transmitter-, amplifier factor and size) according attached data sheet. ▪ Check, if tube is fully filled.

7.1 Replacing the meter fuse

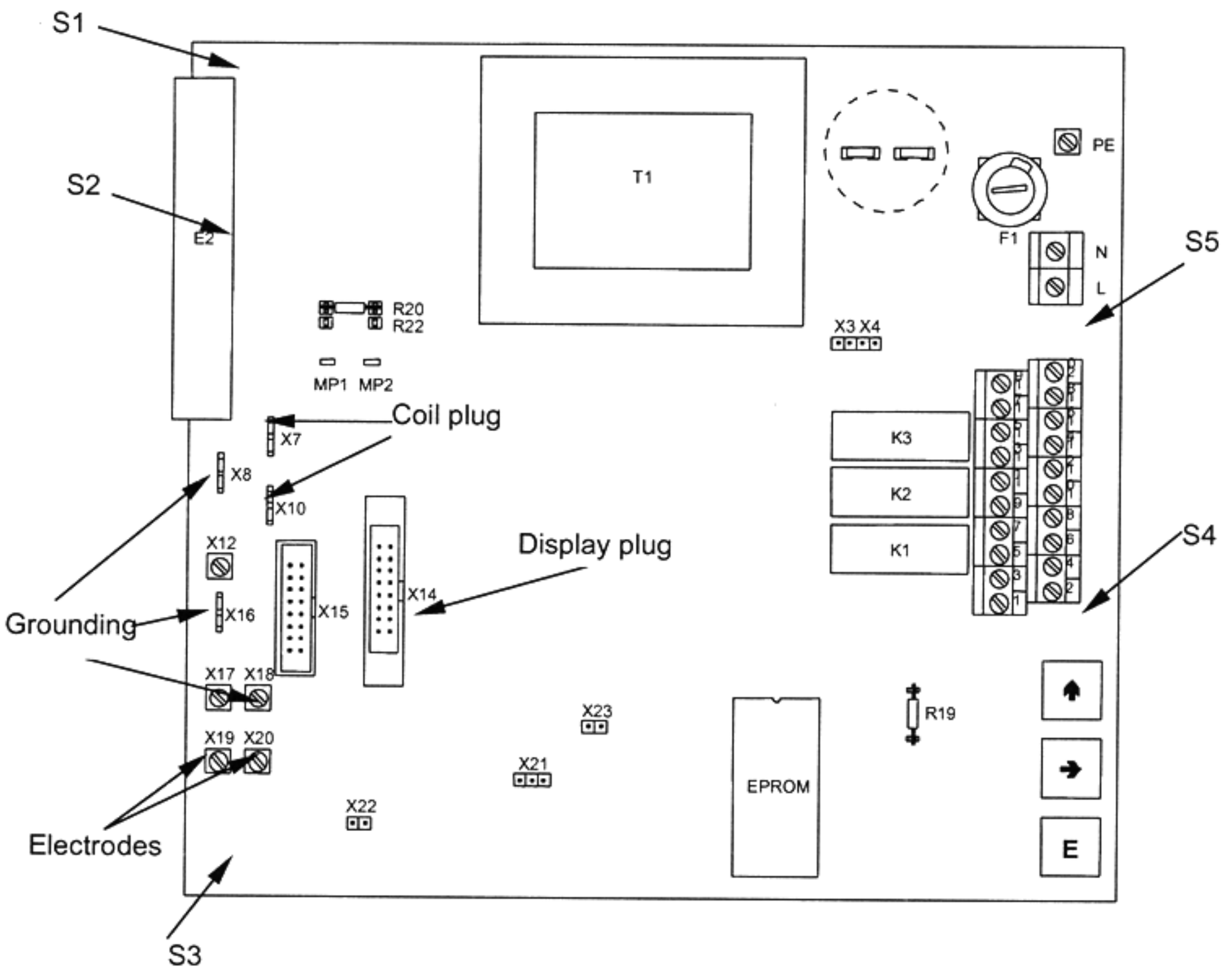
Warning: • *Do not exchange the fuse under applied power supply.*

Fuse type: at 250 V AC, 315 mA (slow blow)
at 115 V AC, 630 mA (slow blow)



7.2 Replacing the amplifier electronic

Warning: ▪ *Switch off the auxiliary power before opening the casing cover.*



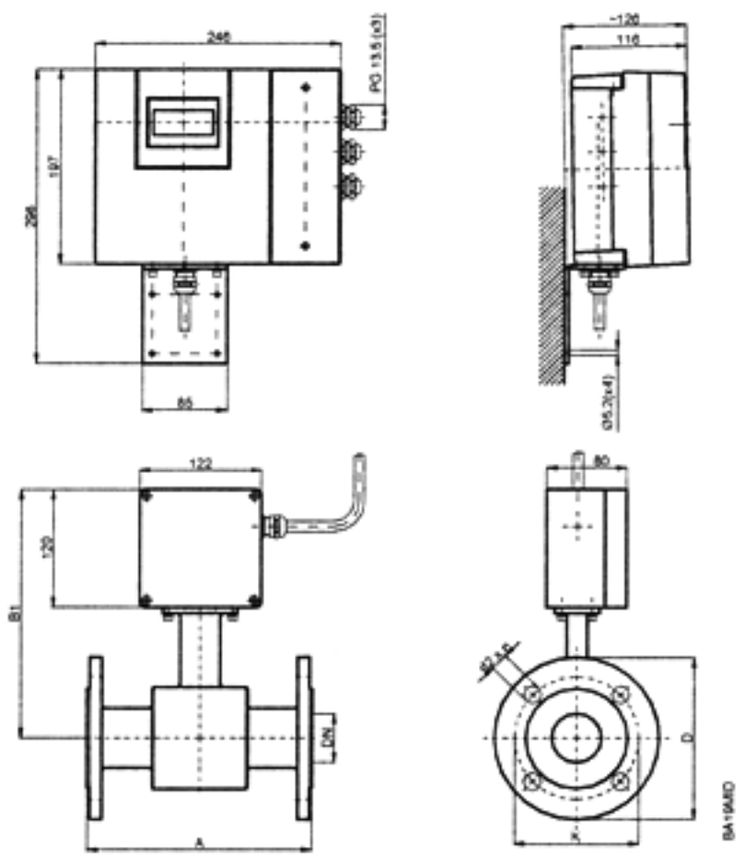
1. Pull the electrode- (X19, X20), coil- (X7, X10), grounding (X8, X16, X18) and display plugs (X14). Loosen the screws S1 to S5 and take out the circuit board.
2. Put in new circuit board and fasten with the screws S1 to S5. Connect the plugs and cables.
3. The new circuit board possibly has to be programmed to the existing detector (transmitter factor, size).

8. Technical data

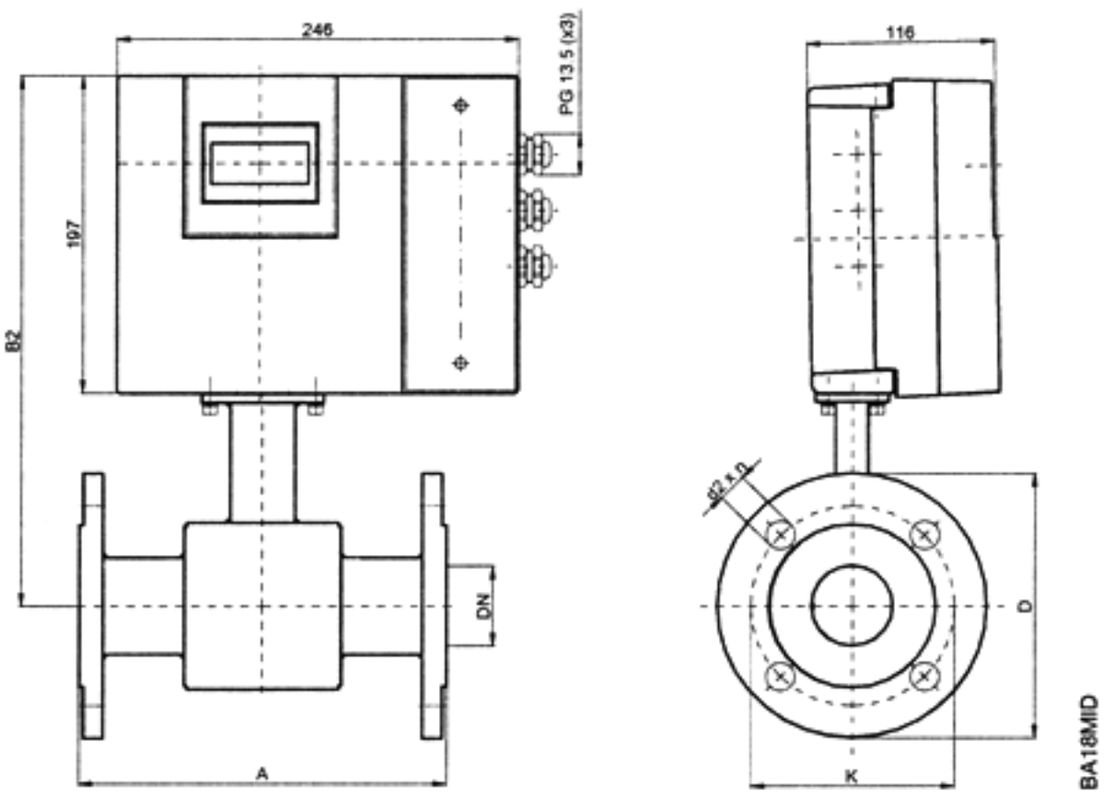
8.1 Detector type II

Technical data			
Size	DN 6 – 1400 (1/4"...56")		
Process connections	Flange: DIN, ANSI, JIS, AWWA etc.		
Nominal pressure	Up to PN 100		
Protection class	IP 65, optional IP 68		
Min. conductivity	5 µS/cm		
Liner materials	Hard-/soft rubber	from DN 25	0 up to +80°C
	PTFE	DN 6 - 600	-40 up to +150°C
	Halar (ECTFE)	from DN 300	
Electrodes materials	Hastelloy C (Standard) Tantalum Platinum/Gold plated Platinum/Rhodium		
Housing	Carbon steel/optional stainless steel		
Lay length	DN 6 – 20	170 mm	
	DN 25 – 50	225 mm	
	DN 65 – 100	280 mm	
	DN 125 – 200	400 mm	
	DN 250 – 350	500 mm	
	DN 400 – 750	600 mm	
	DN 800 – 1000	800 mm	
	DN 1200 – 1400	1000 mm	

Flange process connection
Primo® wall mounted



Flange process connection
Primo® meter mounted



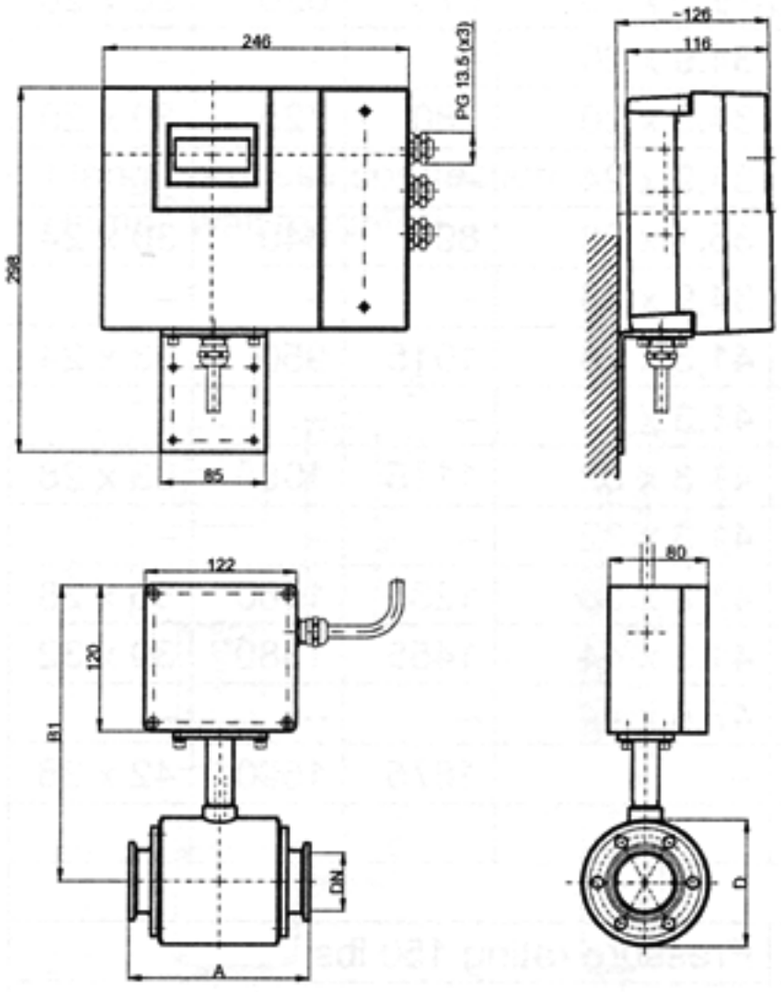
Dimensions (mm)										
					with ANSI flanges			with DIN flanges		
DN		A	B1	B2	Ø D	Ø K	Ø d2 x n	Ø D	Ø K	Ø d2 x n
6	1/2"	170	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
8	3/10"	170	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
10	3/8"	170	228	305	88,9	60,3	15,9 x 4	90	60	14 x 4
15	1/2"	170	238	315	88,9	60,3	15,9 x 4	95	65	14 x 4
20	1 1/2"	170	238	315	98,4	69,8	15,9 x 4	105	75	14 x 4
25	1"	225	238	315	107,9	79,4	15,9 x 4	115	85	14 x 4
32	1 1/2"	225	253	330	117,5	88,9	15,9 x 4	140	100	18 x 4
40	1 1/2"	225	253	330	127	98,4	15,9 x 4	150	110	18 x 4
50	2"	225	253	330	152,4	120,6	19 x 4	165	125	18 x 4
65	2 1/2"	280	271	348	177,8	139,7	19 x 4	185	145	18 x 4
80	3"	280	271	348	190,5	152,4	19 x 4	200	160	18 x 8
100	4"	280	278	355	228,6	190,5	19 x 8	220	180	18 x 8
125	5"	400	298	375	254	215,9	22,2 x 8	250	210	18 x 8
150	6"	400	310	387	279,4	241,3	22,2 x 8	285	240	22 x 8
200	8"	400	338	415	342,9	298,4	22,2 x 8	340	295	22 x 12
250	10"	500	362	439	406,4	361,9	25,4 x 12	395	350	22 x 12
300	12"	500	425	502	482,6	431,8	25,4 x 12	445	400	22 x 12
350	14"	500	450	527	533,4	476,2	28,6 x 12	505	460	22 x 16
400	16"	600	475	552	596,9	539,7	28,6 x 16	565	515	26 x 16
450	18"	600	500	577	635,0	577,8	31,7 x 16	–	–	–
500	20"	600	525	602	698,5	635,0	31,7 x 20	670	620	26 x 20
550	22"	600	550	627	749,3	692,1	34,9 x 20	–	–	–
600	24"	600	588	665	812,8	749,3	34,9 x 20	780	725	30 x 20
650	26"	600	613	690	869,9	806,4	34,9 x 24	–	–	–
700	28"	600	625	702	927,1	863,6	35,1 x 28	895	840	30 x 24
750	30"	800	650	727	984,2	914,4	34,9 x 28	–	–	–
800	32"	800	683	760	1060,5	977,9	41,3 x 28	1015	950	33 x 24
850	34"	800	708	785	1111,2	1028,7	41,3 x 32	–	–	–
900	36"	800	725	802	1168,4	1085,8	41,3 x 32	1115	1050	33 x 28
950	38"	800	750	827	1238,3	1149,4	41,3 x 32	–	–	–
1000	40"	800	790	867	1346,2	1257,3	41,3 x 36	1230	1160	36 x 28
1200	48"	1000	900	977	1511,5	1422,4	41,3 x 44	1455	1380	39 x 32
1350	54"	1000	975	1052	1682,8	1593,9	47,8 x 44	–	–	–
1400	56"	1000	1000	1077	–	–	–	1675	1590	42 x 36

Standard		
with ANSI flanges	from DN 6 – 1400	Pressure rating 150 lbs
with DIN flanges	from DN 6 – 200	Pressure rating PN 16
	from DN 250 – 1400	Pressure rating PN 10

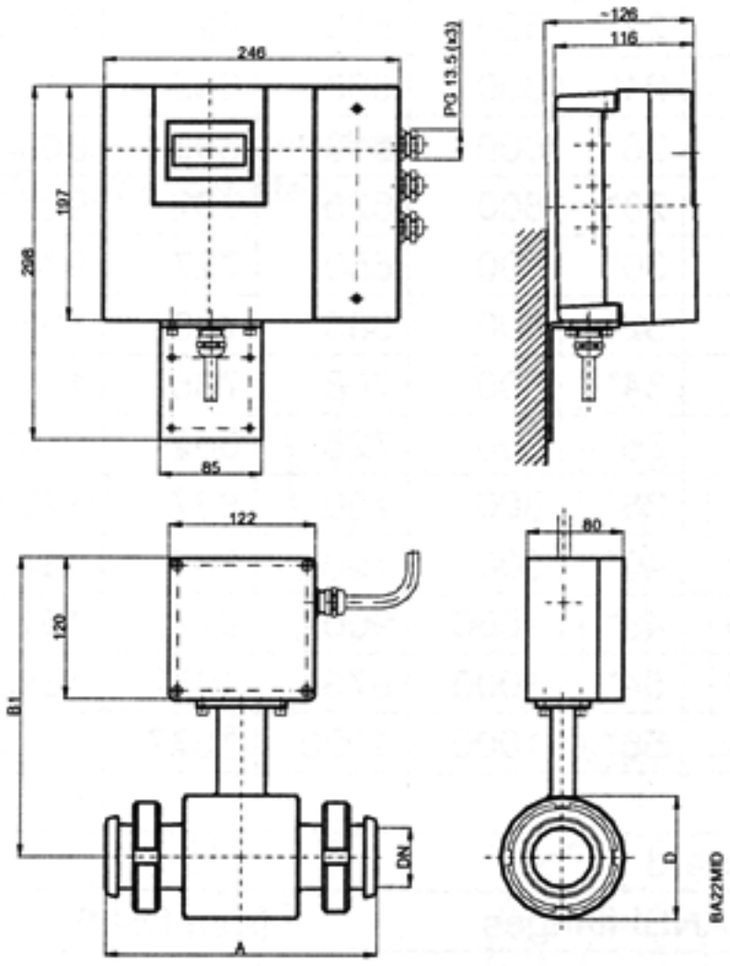
8.2 Detector type food

Technical data			
Size	DN 10 – 100 (3/8"...4")		
Process connections	Tri-Clamp®, DIN 11851, ISO 2852, etc.		
Nominal pressure	PN 10		
Protection class	IP 65, optional IP 68		
Min. conductivity	5 µS/cm		
Liner materials	PTFE	-40 up to +150°C	
Electrodes materials	Hastelloy C (Standard) Tantalum Platinum/Gold plated Platinum/Rhodium		
Housing	Stainless steel		
Lay length	Tri-Clamp® connection	DN 10 – 50	145 mm
		DN 65 – 100	200 mm
	DIN 11851 connection	DN 10 – 20	170 mm
		DN 25 – 50	225 mm
		DN 65 – 100	280 mm

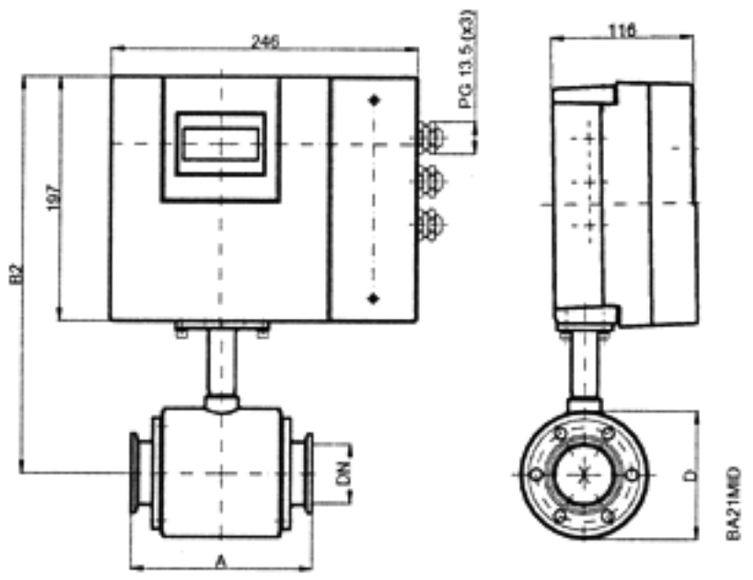
Tri-Clamp® process connection
Primo® wall mounted



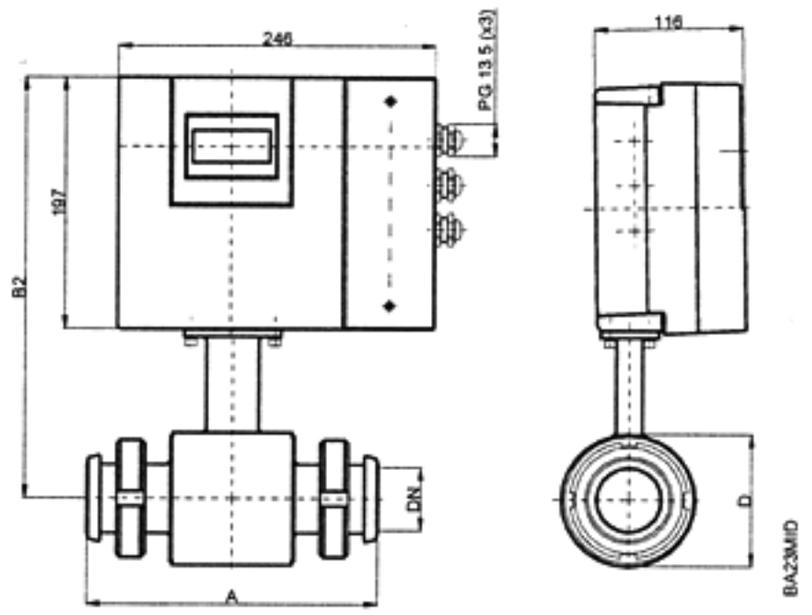
DIN 11851 process connection
Primo® wall mounted



Tri-Clamp® process connection
Primo® meter mounted



DIN 11851 process connection
Primo® meter mounted



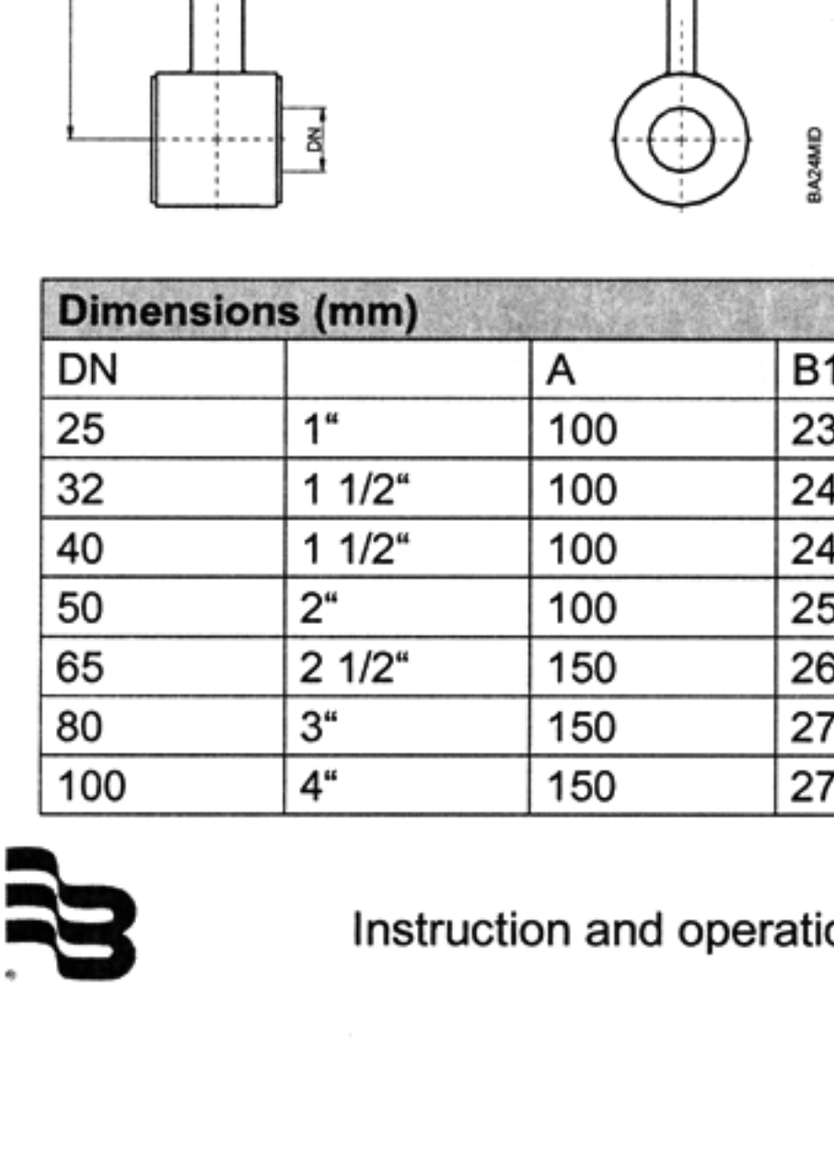
Dimensions (mm) type food Tri-Clamp®					
DN		A	B1	B2	D
10	3/8	145	228	305	74
15	1/2“	145	228	305	74
20	1 1/2“	145	228	305	74
25	1“	145	228	305	74
40	1 1/2“	145	238	315	94
50	2“	145	243	320	104
65	2 1/2“	200	256	333	129
80	3“	200	261	338	140
100	4“	200	269	346	156
Pressure rating PN10					

Dimensions (mm) type food dairy pipe DIN 11851					
DN		A	B1	B2	D
10	3/8“	170	238	315	74
15	1/2“	170	238	315	74
20	1 1/2“	170	238	315	74
25	1“	225	238	315	74
32	1 1/2“	225	243	320	84
40	1 1/2“	225	248	325	94
50	2“	225	253	330	104
65	2 1/2“	280	266	343	129
80	3“	280	271	348	140
100	4“	280	279	356	156
Pressure rating PN10					

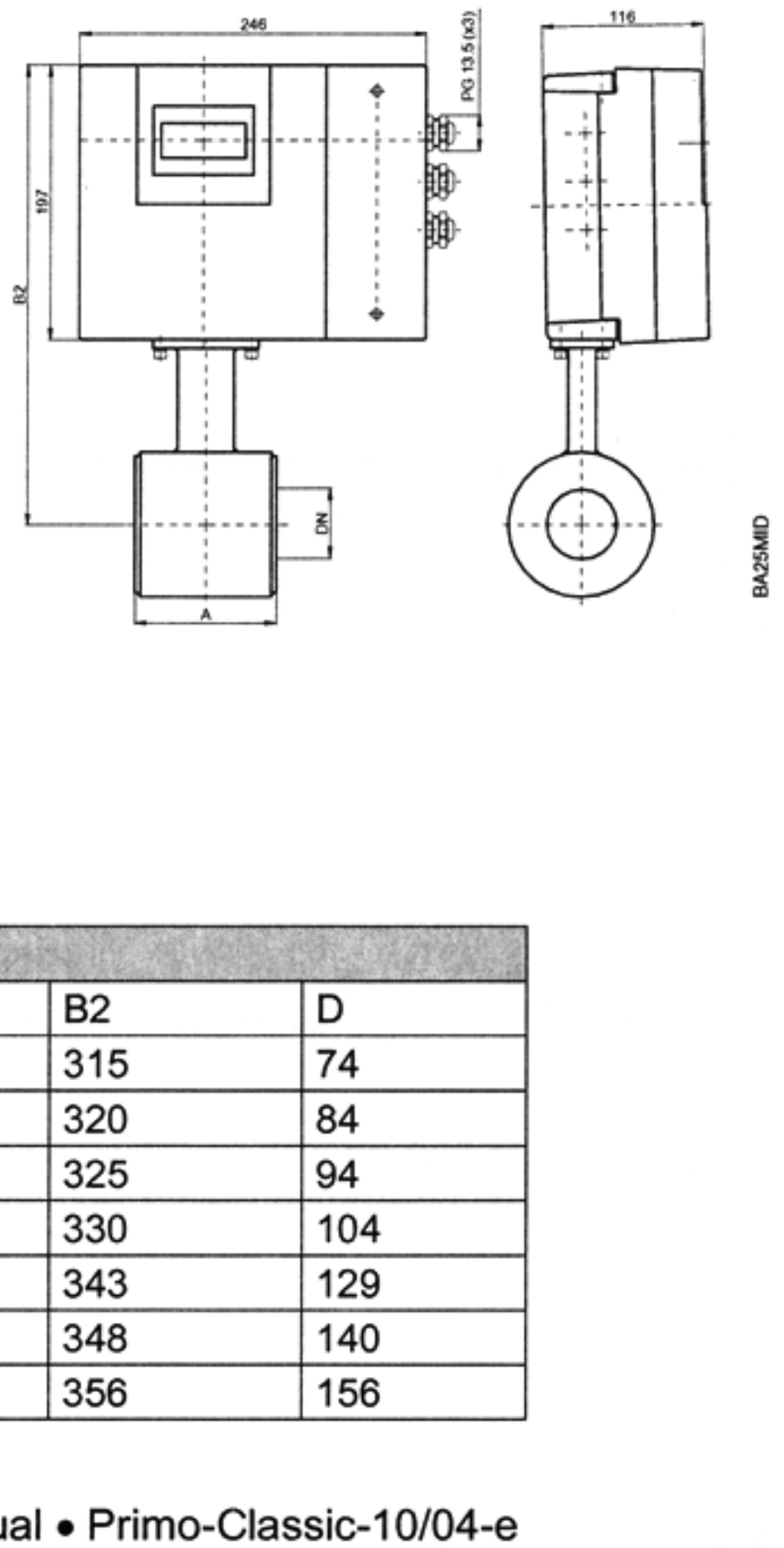
8.3 Detector type III

Technical data		
Size	DN 25 – 100 (1“...4“)	
Process connections	Wafer connection, (in-between flange mounting)	
Nominal pressure	PN 40	
Protection class	IP 65, optional IP 68	
Min. conductivity	5 µS/cm	
Liner materials	PTFE	-40 up to +150°C
Electrodes materials	Hastelloy C (Standard) Tantalum Platinum/Gold plated Platinum/Rhodium	
Housing	Carbon steel/optional stainless steel	
Lay length	DN 25 – 50	100 mm
	DN 65 – 100	150 mm

Wafer connection
Primo® wall mounted



Wafer connection
Primo® meter mounted

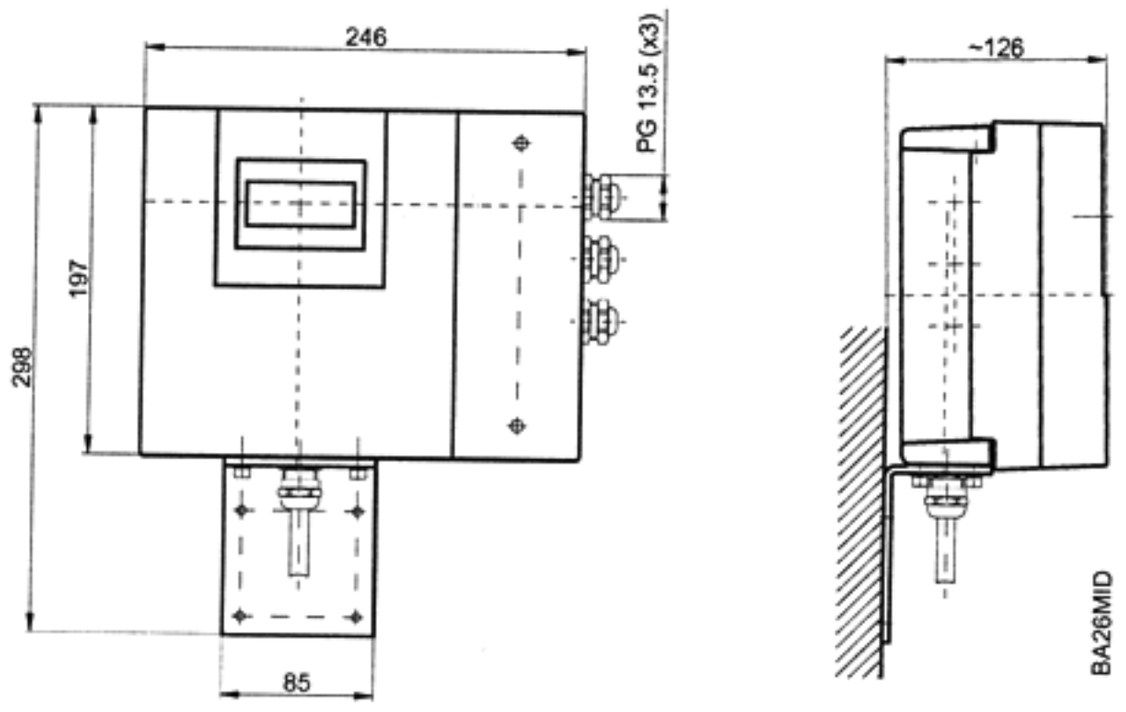


Dimensions (mm)					
DN		A	B1	B2	D
25	1“	100	238	315	74
32	1 1/2“	100	243	320	84
40	1 1/2“	100	248	325	94
50	2“	100	253	330	104
65	2 1/2“	150	266	343	129
80	3“	150	271	348	140
100	4“	150	279	356	156

8.4 Amplifier type Primo® Classic

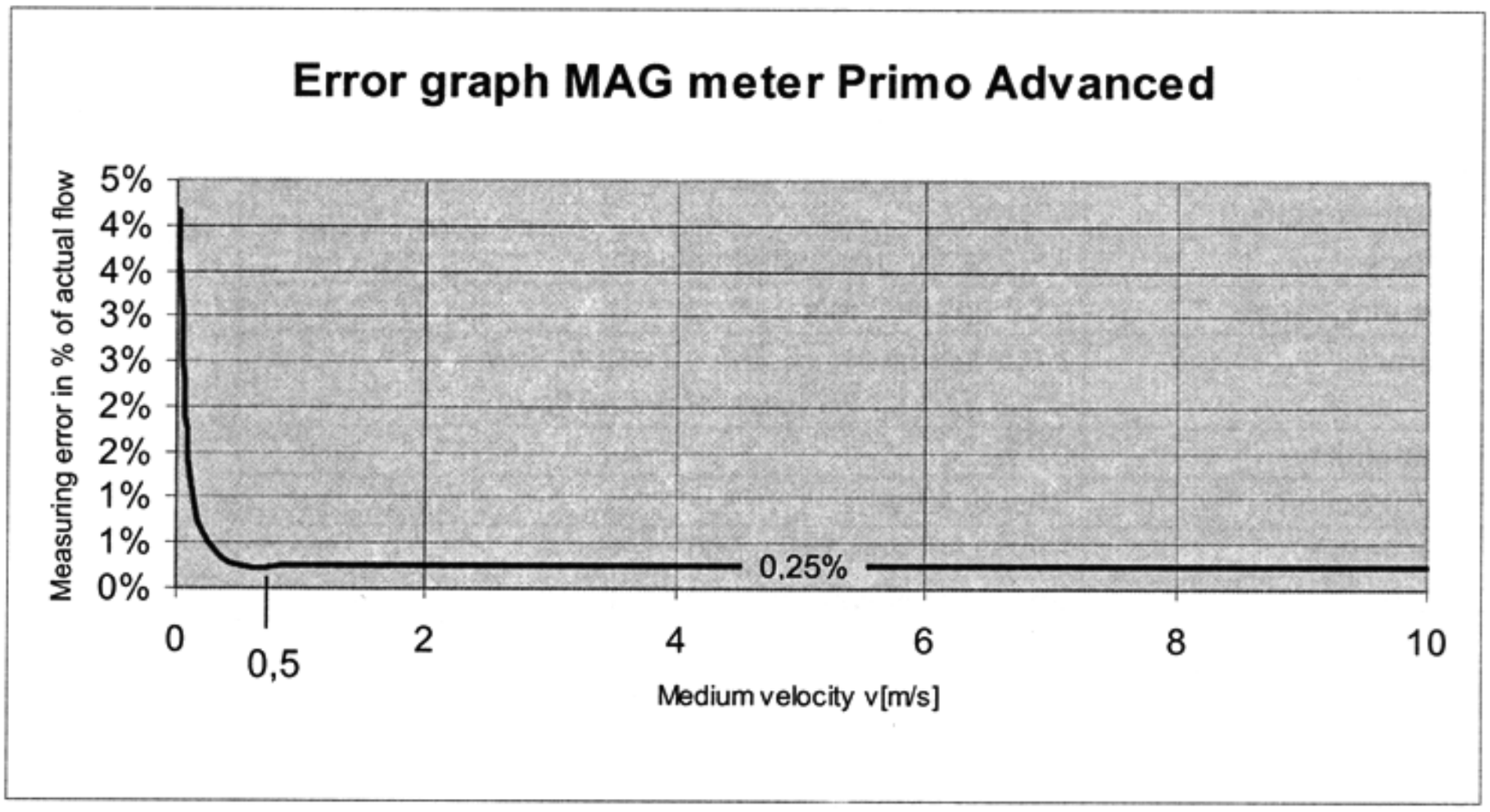
Technical data	
Type	Primo® Classic
Power	230 VAC or 115 VAC, 45 – 65 Hz < 20 VA 24 VDC
Analog output	0/4 – 20 mA, < 600 ohms 0/2 – 10 V, > 1000 ohms
	Flow direction is displayed via sign of the power or voltage output
Pulse output	Active 24 V, 250 mA Passive 30 V, 250 mA max.10kHz
Status output	2 min./max. alarm 1 error message
Medium control	Via measuring electrode
Parameter setting	3 keys
Interface	RS 232 for measuring values
Measuring range	0,03 up to 12 m/s
Accuracy	≥ 0,5 m/s better ±0,25% of actual flow < 0,5 m/s ±1,25 mm/s of actual flow
Repeatability	0,1%
Flow direction	Bi-directional
Pulse length	Programmable up to 500 ms
Outputs	Short circuit safe up to min. 500 V
Low flow cut off	0 – 10%
Display	LCD, 4 lines/16 characters, backlight actual flow, 2 totalizers, status display
Housing	Powder coated aluminium die cast
Protection class	IP 65
Cable insertion	Power- and signal cable (outputs) 3 x PG 13.5
Signal cable	From detector PG 11
Ambient temperature	-20 up to + 60°C

Dimensions
Primo® Classic



8.5 Error limits

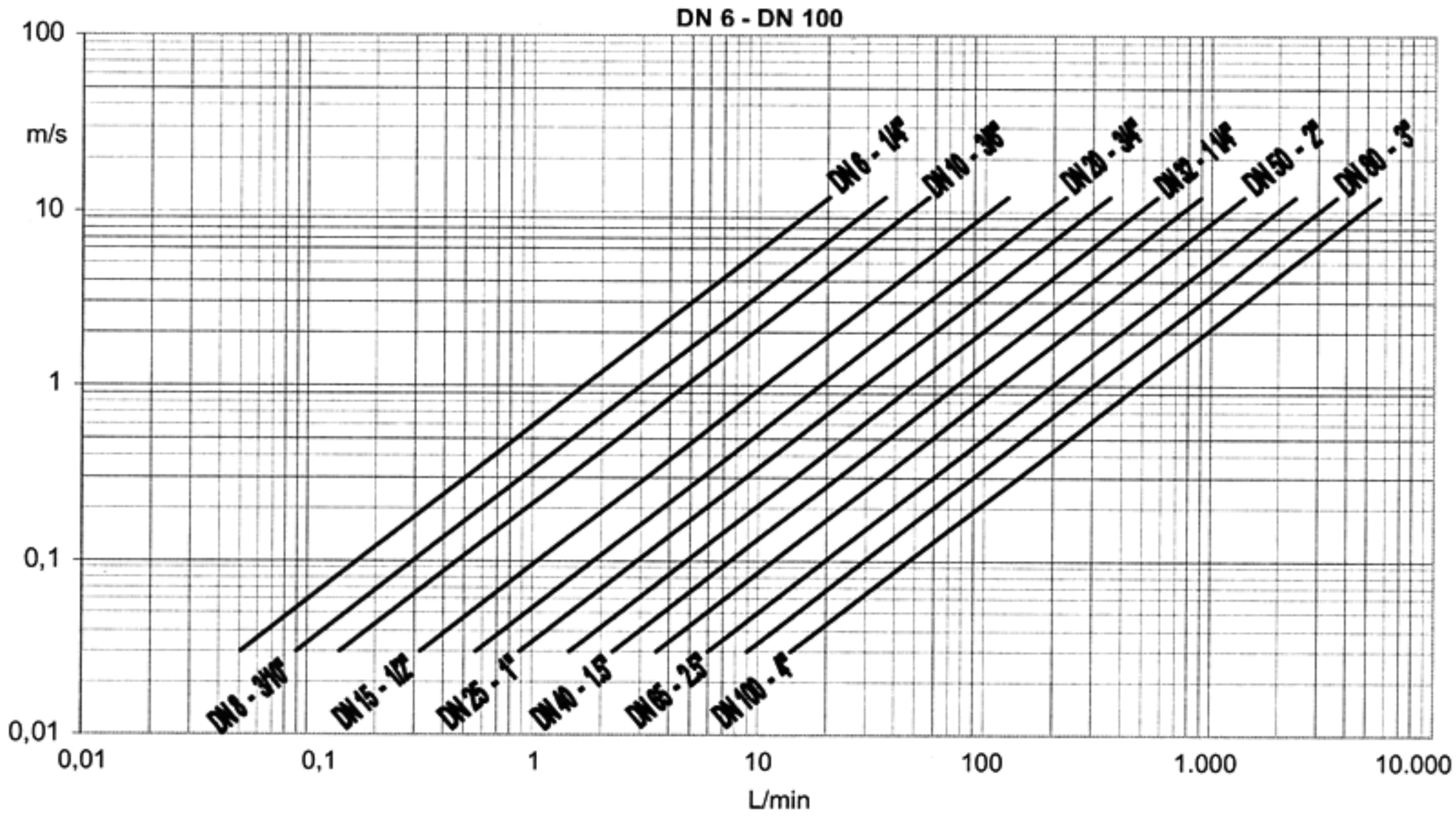
Measuring range	:	0,03 m/s to 12 m/s
Pulse output	:	≥ 0,5 m/s ±0,25% of actual flow < 0,5 m/s ± 1,25 mm/s of actual flow
Analog output	:	Like pulse output, plus ±0,01 mA
Repeatability	:	±0,1% of actual flow

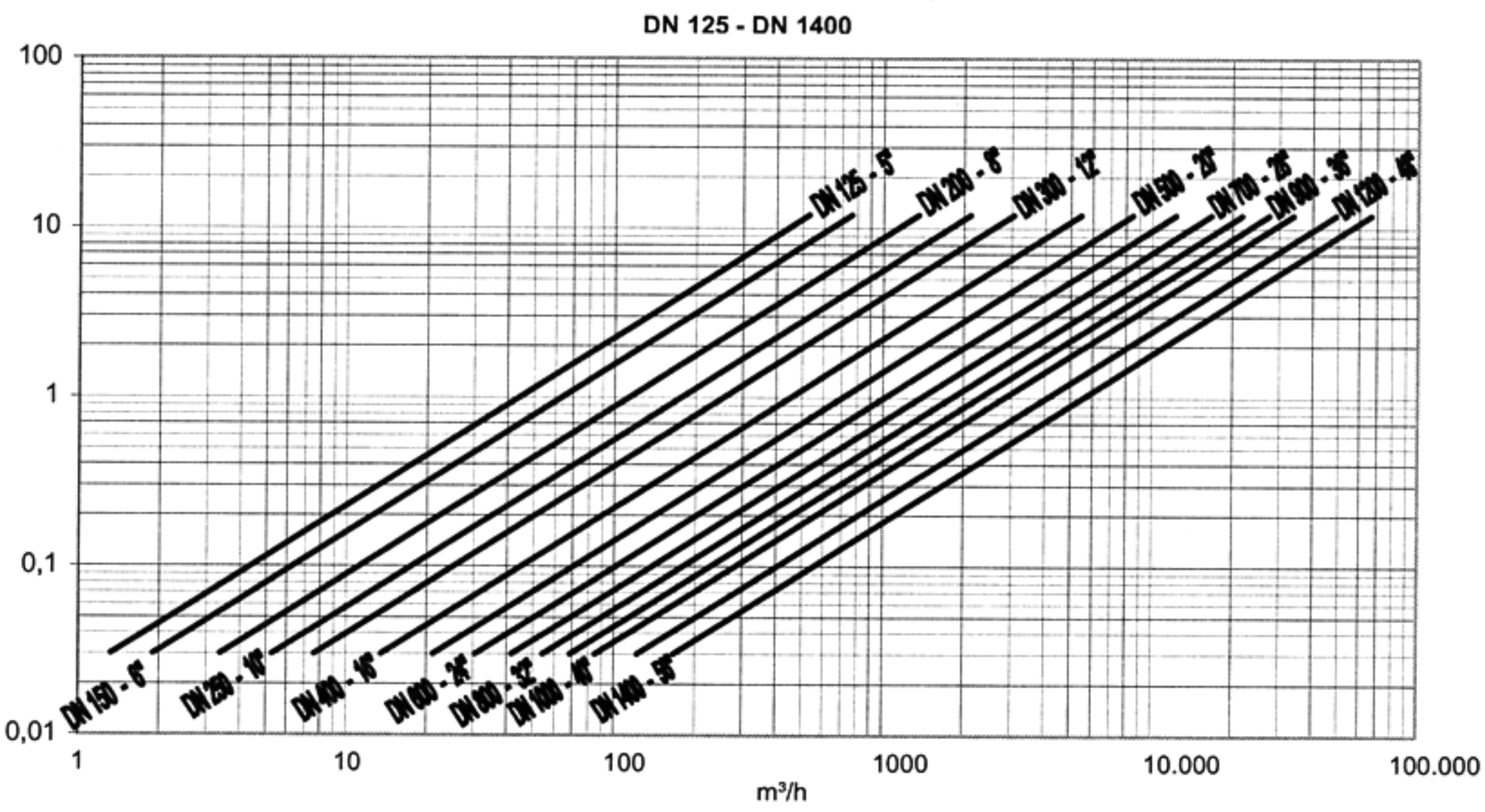


Reference conditions:

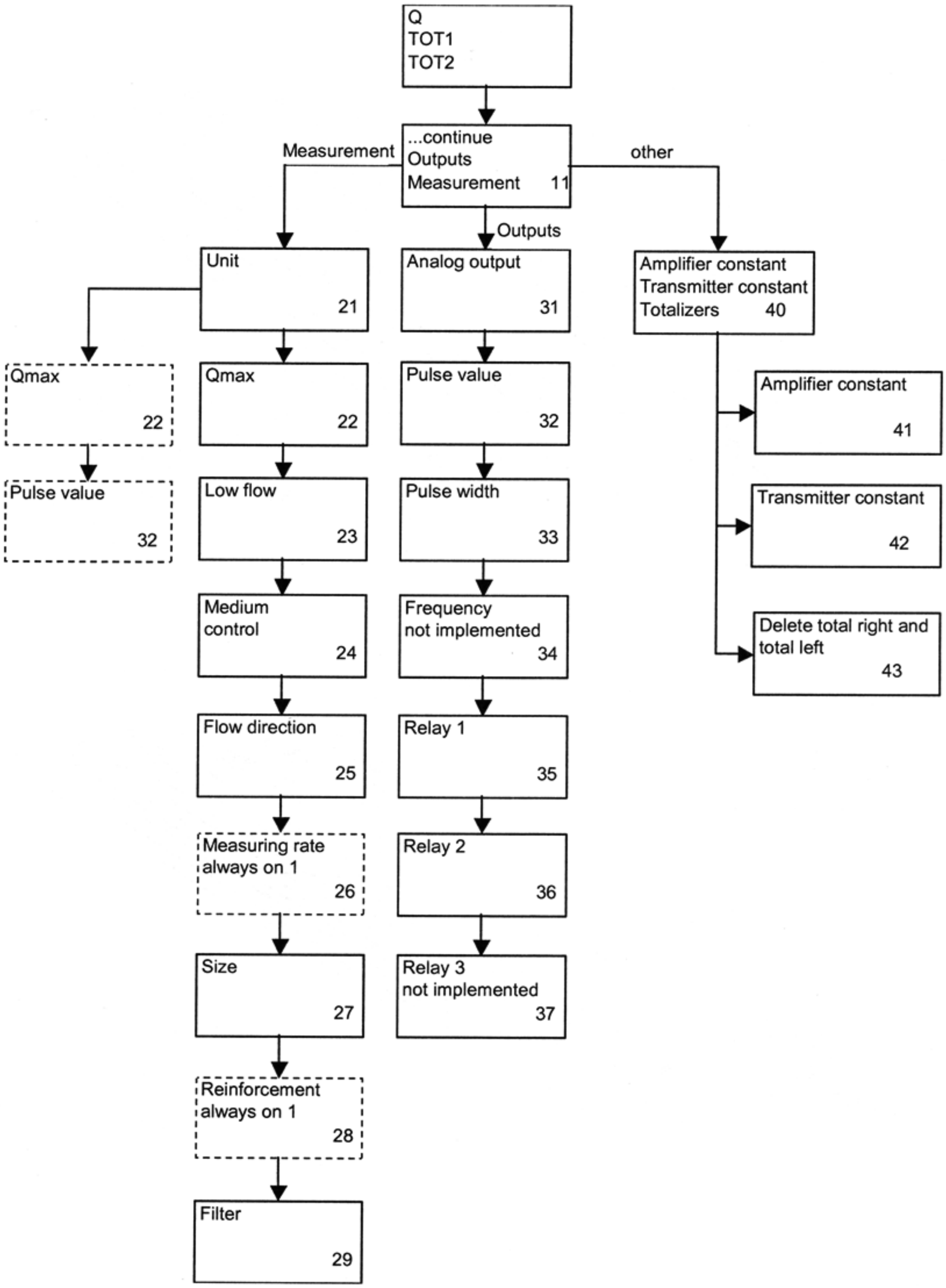
Ambient- and medium temperature	:	20°C
Electr. conductivity	:	> 300 µS/cm
Warm up time	:	60 min
Mounting conditions	:	> 10 DN inlet distance > 5 DN outlet distance Detector correctly grounded and centred.

8.6 Size selection





9. Program structure



10. Return of goods for repair

Please copy, fill in and sign hereafter harmlessness declaration and enclose it for any return of goods you may send back for repair.

No repair will be performed prior to receiving the harmlessness declaration duly filled and signed.

Harmless declaration

To : _____

Attn. : _____

From : _____

Dept. : _____

Please note that no repair will be performed prior to receiving of this declaration duly singed by you!

Please send all parts clean from medium and inform us about possible medium wastes remaining in the part. For this purpose, please use this form. A security specification sheet of the medium must accompany this declaration in the following cases: Toxical, dangerous or objectionable media, or media beloning to any dangerous materials class. We inform you that uncleaned parts lead to additional costs. Extra clean costs will be charged to you. Furthermore, we reserve us the right to send the parts back to you for cleaning!

Declaration

We herewith confirm that the part(s) sent for repair has/have been cleaned and is/are free of any liquid and/or solid wastes of the medium and/or cleaning medium: Any eventually remaining wastes are:

❍ harmless

❍ dangerous, toxic, etc. – Security specifications are attached

Signature of person in charge: _____

Name of the person in charge in capital letters: _____

Date: _____

Company stamp: _____

Hotline

Tel. +49-7025-9208-0 or -30

Fax +49-7025-9208-14

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