SENSORS FOR FOOD AND LIFE SCIENCES.

HYGIENIC BY DESIGN
ANDERSON-NEGELE

30049 / 2.3 / 2024-11-01 / JB-MH / EN-EU

Operating Manual

Electro-Inductive Flow Meter IZMSA

Note

Please read these installation and operating instructions carefully. All instructions in this manual must be followed exactly to ensure proper operation of the unit.

If you have any questions regarding the product, installation or commissioning, please contact Anderson-Negele Support:

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Technical data		
Measurement flow tube	Measuring principle Measurement range Nominal width Pipe standard	Magnetic-inductive 0.15...10 m/s DN 10...DN 100 DIN 11850 Series 2
Process connection (optional)	Pipe standards	DIN 11850 Series 2 OD tube (ASME BPE)
Material	Seal Flow tube housing Flow tube lining Electrodes Transmitter housing Cable gland	EPDM, FDA number 21 CFR 177.2600 1.4301 / AISI 304, blasted PFA, FDA number 21 CFR 177.1550 1.4404 / AISI 316L Cast aluminum (with special anti-corrosion paint) Brass galvanic nickel plated
Pipe connection		1.4404 / AISI 316L
Temperature ranges	Ambient Compact design Remote design	-25...60 °C / -13...140 °F Process: 0...100 °C / 32...212 °F CIP/SIP cleaning: up to 130 °C / 266 °F max. 30 min Process: 0...165 °C / 32...329 °F
Operating pressure	PN16	0.1...17 bar / 1.5...246 psi absolute, vacuum-tight (may be lower depending on the selected process adapter)
Protection class		IP 65
Transmitter	Display Electrical connection Supply voltage Power consumption	2x 20 digits, illuminated LC display Cable gland 3x M20x1.5 and 3x M16x1.5 10...30 V DC / 0.8...0.3 A Max. 15 VA / 8 Watt
Measurement accuracy		±0.5 % ±2 mm/s, under reference conditions as per DIN EN 29104 and VDI/VDE 2641
Product conductivity	Standard Demineralized water	> 5 µS/cm > 20 µS/cm
Digital input	4x optocoupler	Activation: 10...30 V DC Counter interruption (standby) and zero setting
Analog output		0/4...20 mA (active) Burden max. 500 Ω

Communication configuration "S0"		
Digital output	4x optocoupler	Load max. 30 V / max. 20 mA (passive)
Communication configuration "SV"		
Digital output	4x optocoupler	Load max. 30 V / max. 20 mA (passive) Volume pulse, status signal
Communication configuration "T0"		
Digital output	4x active outputs	200 mA, Volume pulse, status signal
Temperature input		Pt100, 4-wire
Communication configuration "TV"		
Digital output	4x active outputs	200 mA, Volume pulse, status signal
Temperature input		Pt100, 4-wire

Table of Contents

1. General Description

1.1. Preface

This documentation includes some information protected by copyright. It is not allowed to be photocopied, copied, duplicated, translated, or recorded on data carriers (neither completely nor in extracts).

This instruction manual should be carefully read before the operation of the equipment is started. It must be deposited in the direct vicinity of the device described, easily accessible to all persons concerned.
It is necessary to strictly observe and follow the safety instructions.
Anderson-Negele cannot assume any liability or legal responsibility for operating errors caused by the non-observance of these directions.

1.2. Construction

This instruction manual is applicable to the following versions of the electro-magnetic flow meters type **IZMSA-S0**

1. Separated design, consisting of:
   a. transmitter Flow Tube
   b. converter in field housing
   c. connection cable for coil supply and electrode signal

2. Integrated design, consisting of:

   The transmitter, which is completely wired to the converter, i.e., it forms one single metering unit.

1.3. Function

The measuring instrument is suitable for metering the flow as well as the quantity of conductive liquids.
The electromagnetic flow meters of the type **IZMSA** determine the flow and the volume of liquids at a high precision.
IZMSA-S0, IZMSA-T0 type converters are microprocessor-controlled devices. They supply the transmitters with a switched and controlled coil current.
The signal generated at the electrodes is amplified and conditioned in the converter and processed in the internal measurement registers as a flow and volume information.
Those values can be indicated on the display unit (option).
In addition, some volume pulses (e.g., 1 pulse per liter) are generated and a flow signal (of 0/4...20 mA for a flow of 0...100%) is released.
Usually, the device is delivered with standard settings, i.e., all you must do is to connect the transmitter, the supply voltage, and possibly existing peripheral devices (such as: digital display, pulse counter).

2. Technical Data

2.1. Converter

Electric power supply: 100 V 115 V 120 V 230 V 240 V 24 V DC 24 V AC	 50-60 Hz 50-60 Hz 50-60 Hz 50-60 Hz 50-60 Hz --- 50-60 Hz	 (0.17A) (0.15A) (0.15A) (0.07A) (0.07A) (0.8…0.3A) (0.8…0.6A)	 85...110 V 98...126 V 102...132 V 195...253 V 204...264 V 10... 30 V DC 21... 26 V AC
Power consumption: **Electric fuse protection:**	15 VA / 8 watts max. (10 VA / 6 watts without display) AC supply T315 mA DC supply M2.5 A 24 V AC M2 A		
Digital outputs:	IZMSA	IZMSA-T0	
	4 x electrically isolated optocoupler output Load: 30 V / 80 mA max., 1000 Hz max.	4 x galvanically isolated transistor optocoupler output Load: 30 V / 250 mA	
Analog output:	0/4...20 mA (active), burden 500 ohms max. Q = 0 % → 0 mA or 4 mA, adjustable Q = ±100 % → 20 mA		
Digital inputs:	IZMA-S	IZMA-T	
	4 x optocoupler; activation: 10...30V DC	2 x optocoupler; activation: 10 ... 30V DC	
Input for temperature sensor Pt100:		4-wire input accuracy: ± 0,1 °C in range -30 ... +100 °C	
Serial interface on JB3 (X12):	IZMA-S	IZMA-T	
		Hardware: RS232 to control PLC	
Serial interface on MB1x (X9):	Hardware: **RS232**		
Display (option):	2 x 20 digits illuminated LC display		
Housing:	Cast aluminium (special coating); system of protection: IP65		
Ambient temperature:	-25°C... +55°C		

2.2. Transmitter

Transmitter		Tube flow
Connections and nominal widths:	Aseptic flange	DN 10, 15, 25, 32, 40, 50, 65, 80, 100
	FG small flange:	optional
	Threaded pipe (DIN 11851):	optional
	Clamp:	optional
Materials:	Meter tube:	Material no.: 1.4301 / AISI 304
	Lining:	PFA
	Electrodes:	Material no.: 1.4404 / AISI 316 L
	Transmitter housing:	Material no.: 1.4301 / AISI 304 (blasted)
	Connecting housing:	Cast aluminium (with special anticorrosive coat of varnish)
	System of protection:	IP65
Electric connection:		Coil supply of the transmitter: 2 x 0.82 mm², shielded. Electrode signal to the transmitter: 3 x 1.31 mm² CY, shielded. Typical standard cable length: 5 m each (separated design) Coil resistance: 100 ohms Calibration data in the MEMbox to be plugged into the converter
Product temperature:		Remote design 165 °C max. / integrated design 100 °C max.
Cleaning temperature:		130 °C for 30 minutes max.
Product conductivity:		5 µS/cm min.
Admissible pressure:		0.1...17 bar / 1.5...246 psi absolute, vacuum-tight (may be lower depending on the selected process adapter)
Flow velocities:		0,1 - 10 m/s

2.3. Measuring Ranges and Error Limits

Nominal width mm	Minimum measuring range *) l/h			Maximum measuring range l/h			Flow rate at a flow velocity of 1 m/s	Measuring tolerance		Unit
								<0.25 %	<1 %	
DN 10	17	-	170	450	-	4500	280	> 60	> 17	l/h
DN 15	25	-	250	600	-	6000	640	> 90	> 30	l/h
DN 25	60	-	600	2000	-	20000	1800	> 240	> 60	l/h
DN 32	100	-	1000	3000	-	30000	2900	> 400	> 100	l/h
DN 40	150	-	1500	3000	-	45000	4500	> 600	> 150	l/h
DN 50	200	-	2000	6500	-	65000	7000	> 800	> 200	l/h
DN 65	400	-	4000	10000	-	100000	12000	> 1400	> 400	l/h
DN 80	600	-	6000	20000	-	200000	18000	> 2400	> 600	l/h
DN100	1500	-	15000	40000	-	400000	28000	> 6000	> 1500	l/h

***)** For Weights and Measures-approved measurements the minimum flow rate is approx. 4 times higher.

3. Safety Instructions

Due to the great variety of possible operating conditions this instruction manual can consider the general application only.
Special cases such as extraordinary ambient conditions or special safety instructions require coordination with the manufacturer.

3.1. General Remarks

3.1.1. Special Diligence of the User

This measuring instrument has been designed and built in consideration of a risk analysis and after a careful choice of the harmonized standards and further technical specifications to be kept. It corresponds to the state of the art and offers an optimum safety.
In practical use, however, that degree of safety can only be obtained when all measures required in this respect will be really taken. It belongs to the diligence of the user of the flow meter to plan such measures and to check and survey if they are really performed.

The user must ensure that:

- the measuring instrument is only used for the intended application as directed (also see the following chapter „Intended Application “)
- the measuring instrument is operated in a perfect and functioning condition and that especially the safety contrivances are regularly checked for their operability
- the personal protective equipment required for the operating, maintenance, and repair staff is kept available and really used
- the complete instruction manual in a legible condition is permanently available at the location of the measuring instrument
- the system is operated, serviced, and repaired by sufficiently qualified and authorized personnel only
- the personnel concerned is regularly trained for all applicable questions of the protection of labour and environment and familiarized with the instruction manual and especially the safety precautions included therein.
- all the safety and warning instructions attached to the measuring instrument are not removed and kept in a legible condition.

In case of any problems that he cannot remove on his own, the user of the system should contact the service department of **Anderson-Negele.**

3.2. Intended Application

The measuring instrument may only be used for the application that it has been designed, dimensioned, and built for:
- for the connection to an earthed monophase network or a direct current network (see type plate).
- in industrial areas according to EN 61000-6-2/4 for reasons of EMC.

The intended purpose of the electromagnetic flow meter is the measurement of conductive liquids in the food processing industry and in the cosmetic, pharmaceutical, and chemical industries.

This flow meter is *not* suitable for the measurement of hazardous, explosive, and combustible liquids of PED group 1.

Any modifications to the system that might have an influence on the function and the safety contrivances of the system are only allowed to be carried out by the engineering specialists or authorized persons of **Anderson-Negele.**

3.3. Possible Misuse

Any utilisation being in contradiction to the above-mentioned application means an inadmissible misuse of the measuring instrument! In such a case **Anderson-Negele** does not assume any responsibility for the safety.

Anderson-Negele, and after a careful investigation of all facts **Anderson-Negele** could possibly release the flow meter for the intended new application.

3.4. General Safety Instructions

These safety instructions must be strictly observed in order:

- to not endanger the safety of persons and environment,
- to avoid any damages to the measuring instrument,
- to prevent any faulty batches upon the production.

The electrical connection may only be carried out by persons who have got the necessary expert knowledge (e.g., trained electrical fitters or persons instructed in electrical engineering) and the necessary authorization from the user.

Warning against
dangerous electrical voltage!

Unauthorized persons are not allowed to.
open a housing bearing the above symbol!

The wiring of the voltage supply and the inputs and outputs of the control circuits must be carried out professionally in consideration of the up-to-date state of the art. Also refer to chapter 4 “Installation”/” Electrical Connection”.

In particular, the following directives must be observed:

- Safety instructions
- Electrical connection data

1. All persons who are involved in the installation, commissioning, operation, service, and maintenance of the flow meter must be qualified accordingly.
2. This instruction manual must be strictly observed. The user of the flow meter must guarantee that the personnel concerned has read and fully understood the instruction manual.
3. All kinds of work must be done with utmost care and may be carried out by accordingly authorized and trained personnel only.
4. The instruction manual must be available close to the flow meter, easily accessible to the operating staff.
5. Before any cleaning, conversion, service, and maintenance work is started, the measuring instrument must be switched off and separated from the mains supply. The main switch must be secured against unauthorized switching on.

6. Before any service and maintenance work is started, the system must be discharged and flushed with water. If the measuring instrument must be removed from the pipe system, all pipelines will have to be previously emptied by application of some appropriate emptying and shut-off measures.
7. Never remove or put out of action any safety contrivances by modifications to the device.
8. Do not touch any parts flown through by the medium while the measuring instrument is cleaned. Otherwise, you run the risk of getting burnt!
9. To minimize the danger of injury, the working area of the operator must allow sufficiently free space.
10. The technical data according to the instruction manual, type plate and, if available, the performance specification must be considered.

If damages are caused due to an inexpert performance of work any warranty claims will extinguish.

Dangers not resulting from the functionality of the device, but from the ambient and operating conditions prevailing at the place of application, must be referred to by appropriate instructions to the operators and by the attachment of some danger signs!

The user of the flow meter/system is exclusively responsible for the compliance with these instructions!

3.5. Special Safety Instructions and Contrivances

The following dangers could be directly or indirectly caused by the measuring instrument type **IZMSA-S0** during operation or commissioning:

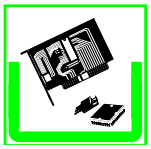
- Electrical shock in case of an inappropriate opening of the electronic housing.
- Burns by touching hot pipe sections.
- Scalds and/or chemical burns by hot liquids or gas coming out through leaking flange connections or because of an inexpert opening of the pipe system.

The following safety contrivances are available for flow meters type **IZMSA-S0:**

- Earthing/grounding of the supply voltage
- Protection against accidental contact of the plug-in bridges on the power supply unit

Explanation of the Safety Symbols Used in this Manual

	 **Hot caustic solution can cause serious chemical burns**	
 **Beware of hazardous electric tension**	 **Beware of hand injuries!**	 **Beware of hot surfaces!**

 **Beware of hot liquids and steams**	 **Beware of media detrimental to health or irritating substances!**	 **Beware of an increased risk of skidding in wet areas!**
 **Electrostatically endangered system component**	 **Electronic scrap**	

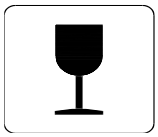
4. Transport

4.1. General Remarks

The following points must be strictly observed to avoid any damages to the measuring instrument or very serious injuries during the transport of the device:

Transport work is only allowed to be carried out:
- **by accordingly qualified and authorized persons,**
- **by the aid of appropriate load suspension and fastening devices,**
- **when any risk upon lifting and/or conveying the device can be fully excluded.**

The packing of the measuring instruments is subject to the following labelling:

 Fragile goods

 Keep dry!

Check the added packing list before you will start opening the packing!
Compare by means of the packing list if all parts are available or not!
Treat sensitive parts with special care!

Please do not fail to dispose of the packing material according to the appropriate regulations.

4.2. Special Remarks

The pipe ends of the transmitter are provided with protective caps to protect the plastic liner of the meter tube against damages.

Do not remove the protective caps until the installation of the transmitter.

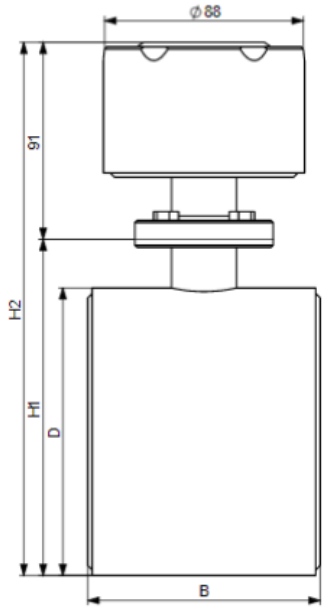
Transport

Unless any protective caps are available during transport, take care that no sharp-edged objects will be pressed against the plastic surfaces of the transmitter.

Re-attach the protective caps before each transport!

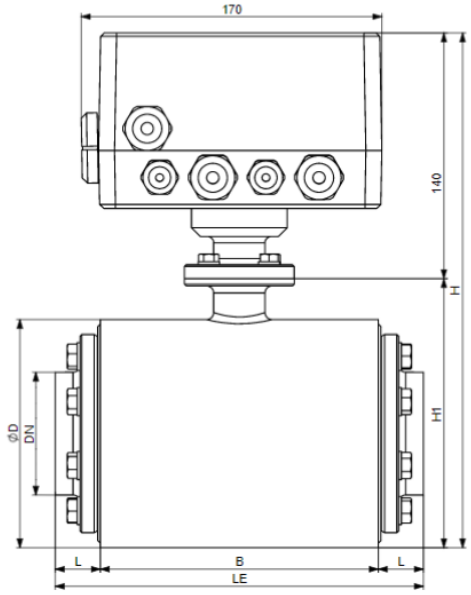
When removing the packaging film, see to it that no components of the device (such as display or keyboard) are damaged or destroyed.

5. Separate design



DN	B [mm]	D [mm]	H1 [mm]	H2 [mm]	Weight [kg]
10	104	90	110	201	4
15	104	90	110	201	4
25	104	90	110	201	4
32	104	105	125	216	5
40	104	105	125	216	5
50	104	130	150	241	6
65	160 *)	130	150	241	7
80	160 *)	155	175	266	10
100	200 *)	170	190	281	12

5.1. Compact design



DN	B [mm]	D [mm]	H1 [mm]	H [mm]	Weight [kg]
10	104	90	110	250	6
15	104	90	110	250	6
25	104	90	110	250	6
32	104	105	125	265	7
40	104	105	125	265	7
50	104	130	150	290	8
65	160 *)	130	150	290	9
80	160 *)	155	175	315	12
100	200 *)	170	190	330	14

*) Version with a shortened installation length possible on request.

6. Arrangement

6.1. Conditions for the Transmitter

The installation of the measuring instrument depends on the delivered version. In any case the transmitter must be installed in the product line and the converter must be supplied by electric tension.

After the installation of the measuring instrument, you should in any rate ensure an optimum earthing/grounding, if some welding work must be performed.
Crossflows should be absolutely avoided, as they could cause some damages to the electronic part.

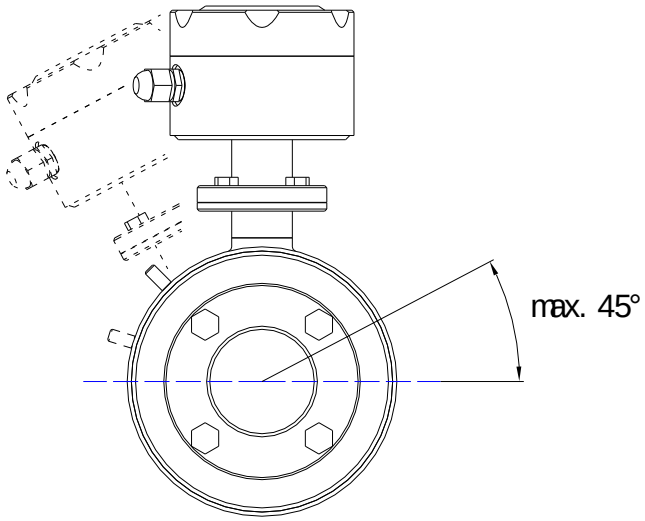
Caution

To protect the transmitter against damages, select the place of installation so that:

- the process pressure is always kept below the admissible operating pressure.
- the product temperature is always kept below the admissible temperature.
- the transmitter is not cleaned by means of hot steam.
- the transmitter is mechanically levelled out (e.g., to avoid vibration)
- the transmitter is not operated at negative pressure.
- the meter tube can be emptied in case of the danger of frost.
- integrated devices with built-in display are not permanently subject to direct insolation.
- the measuring instrument is not arranged straight above a gully or sink hole.
- the connection housing is not permanently exposed to drip water.

6.2. Fitting Position

Due to the principle described, the fitting position (to a certain extent) can be selected any way desired. The basic condition for accurate measuring results is, however, a full and gas-free meter tube.

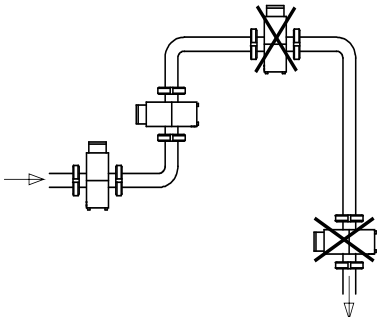


If possible, the electrode axis should be arranged horizontally, to avoid a deposition of gas bubbles or solid particles on the surface of the electrodes. Therefore, a slightly ascending pipeline is advisable, preferably with a deaerating possibility at its highest position.

The fitting position should be chosen in such a way that a good readability and handling of the operating unit is guaranteed.

The pipelines within the inlet and outlet pipe sections must not show any unevenness, e.g., welding beads.

6.3. SUGGESTIONS FOR MOUNTING

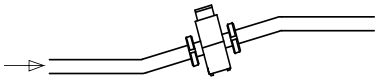


free outlet

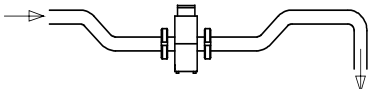
Wrong
Highest point of the pipeline. Gas bubbles accumulate in the transmitter - measuring error!

Correct
Preferred mounting position:
Rising pipeline and horizontal pipe section before an ascending pipeline.

Wrong
Descending pipe:
At the end of the conveyance of the metered product the pipe runs empty - measuring errors!

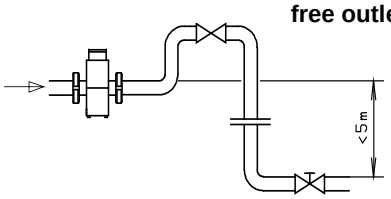


Correct
In case of a horizontal pipe conduct the mounting, position is placed in slowly increasing sections of the pipe.

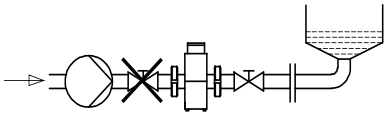


free outlet

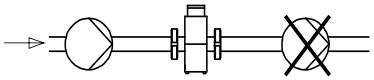
Correct
For free inlet or outlet provide drain. Transmitter is permanently filled with liquid as demanded.



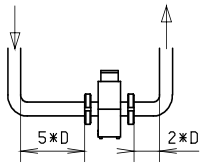
Descending pipelines of a length of more than 5 m must be equipped with a deaeration valve after the flow meter.



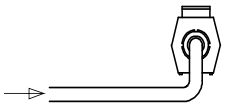
Long lines after the flow meter always must be equipped with a shut-off device. If it is placed before the flow meter, there will be a vacuum in the metering pipe when shutting off due to the big kinetic energy in the liquid column. This will damage the lining of the tube.



Do not place the flow meter on the suction side of the pump. Danger of negative pressure!



Keep the recommended inlet and outlet sections (Mind the longer sections for official usage applications (see 6.4).



Avoid curvatures of space before the electromagnetic flow meter.

6.4. Inlet and Outlet Pipe Sections

For the installation of electromagnetic transmitters DIN 1944 recommends an inlet pipe section of 5 x DN and an outlet pipe section of 2 x DN in case of an undisturbed flow. In case of official usage applications (certifiable version acc. to 2014/32/EU) the inlet is extended to 10 x DN, the outlet to 5 x DN. For an irregular flow (e.g., distorted rotational flow profile) the inlet and outlet pipe sections must be extended accordingly or a rectifying device for the flow must be installed to guarantee the specified measuring accuracy.

6.5. Conductivity Conditions

The minimum conductivity of the product may not fall below 5 µS/cm.

A count suppressor for empty meter tubes belongs to the standard equipment of the converter. That function will have to be switched off at conductivities below 50 µS/cm.

6.6. Interference Fields

Straight at the transmitter no masses of iron or strong permanent or electromagnetic fields may exist which could influence the defined exciting magnetic field, thus falsifying the signal.

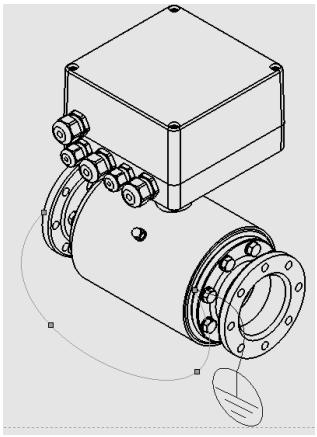
6.7. Earthing/Grounding Conditions

A perfect earthing/grounding of the transmitter is an essential requirement for a reliable and accurate measurement.

“Inductive measuring method” means that the metered liquid itself acts as an electric conductor, i.e., a correct and careful earthing/grounding ensures that no additional potentials will falsify the extremely low metering signal.

For that reason, the earthing/grounding resistance must be smaller than 10 ohms. The earth/ground wire used must not transfer any interference voltages, i.e., no other electric devices may be connected to that line.

In case of the separated design, the earthing/grounding between transmitter and converter is achieved by means of the shielding braid of the electrode cables and the coil supply cables with the metal cable gland provided for that purpose.



Transmitter with threaded milk pipe fitting:
Assembly into a metal pipeline without lining. Through the pipe the threaded milk pipe fittings form the earth/ground connection to the liquid.

Transmitter with flange connection, mounted into a metal pipeline without internal coat or insulating lining:
There is no need to provide any earth/ground wires to the mating flanges, if these are made of stainless steel and not lacquered.

Transmitter with flange connection, mounted into a plastic pipeline or a pipeline with insulated internal lining:
Some additional earthing/grounding rings are required in the inlet and the outlet of the transmitter. Those rings form the connection to the liquid.

7. Meter Tube Lining

A damaged lining will always cause measuring errors or even a failure of the flow meter.

8. Flow Direction

The arrow on the type of plate shows the calibrated flow direction from MINUS to PLUS.

Inflow from the right to the left results in a **negative** flow indication	→	Inflow from the left to the right results in a **positive** flow indication

In principle, the flow meter can measure in both directions.

Provided that the recommended inlet and outlet conditions are kept, the accuracy of the measurement in both directions is only slightly different.

The effect of the internal measuring registers and of the volume and flow signals depends on the selected parameterization.

9. Operating Conditions of the Converter

Caution

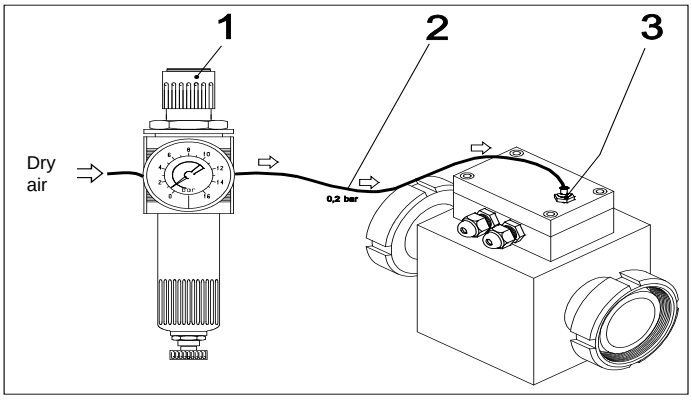
To protect the converter against damages, always select the place of installation so that:

- the ambient temperature is within a range from –20...+55 °C.
- the field housing is fastened free from any mechanical distortion.
- no moisture can enter the field housing through the cable glands.
- the housing is not permanently strained by drip water.
- Devices with built-in display are not permanently subject to direct insolation.

10. Prevention of Condensation

If the measuring instruments are permanently subject to very high air moisture at varying ambient or product temperatures (e.g., hot cleaning), humidity can develop in the connection housing of the transmitter or even of the converter due to occurring negative pressure.

The most efficient remedy recommended against that effect is a pressurization of the housings with dry air of approximately 0.2 bars or a forced-air ventilation of the housings with dry air.



11. Cable lengths for the separated transmitter version

The transmitter is integrated straight into the pipeline.
For reasons of EMC, the transmitter must be installed at a possibly small distance from the converter, i.e., the connection cable should be kept as short as possible.
The standard coil and electrode cables delivered are destined to cover 5 m each.

The following conditions must be considered for larger distances:

a. The cables must be laid into a separate cable duct.

b. Laying the cables near to frequency converters or motors must be absolutely avoided.

c. The maximum distance between transmitter and converter depends on the conductivity of the product. The following approximate values are recommended:

Conductivity	Maximum cable length
15 - 50 µS/cm	5 m
50 - 200 µS/cm	20 m
> 200 µS/cm	50 m

d. The shielded cables prescribed by the manufacturer must be used.

e. The shielding must be connected to the transmitter and the converter.

12. Special conditions for official measuring instruments

In the case of official measuring instruments in resolved design, it must be ensured that the transducer and transmitter belong together in accordance with the official verification certificate, i.e. arbitrary interchangeability is not possible here.
For the installation and operation of official equipment, the country-specific regulations must be taken into account.
In most European countries, for example, an inlet length of at least 10 x DN (nominal diameter) and an outlet length of at least 5 x DN must be observed for the installation of the measuring transducer. Sensor type applies here correspondingly 2 x DN for the inlet, whereby no minimum installation lengths are necessary on the outlet side.
The buffer battery (order no.: E1-282759) must always be installed in custody transfer meters.
Legal for trade meters must be operated in the specified flow direction.
Calibration marks, security stamps and seals on custody transfer meters and measuring systems must not be damaged or removed, otherwise the validity of the calibration will be invalidated.

13. Installation

13.1. Installation Instructions for the Transmitter

Caution

Consider that the threaded fittings, clamps, or flanges are perfectly tightened. Otherwise, hot, or caustic solutions or gasses could come out of the gaps or clearances.
Pay attention to the fact that the threaded fittings, clamps, or flanges are perfectly tightened! Otherwise, hot, or caustic solutions or gasses could come out of the gaps and clearances.

CAUTION! The bead is neither allowed to be damaged nor separated!

Do not omit to insert the seals into the screwed counter fittings!
In case of leaky pipe connections, you should not neglect to check the seal. Never overtighten the screwed pipe connections!

13.2. Installation of the Converter

For the separated design the field housing is typically delivered for wall mounting.
In case of the integrated design the converter is installed straight into the pipeline.
Cable glands always must point downwards.

When installing the flow meter pay special attention to the fact that no moisture (e.g., by drip water or splash water) can get onto the electronic board.

Metal particles, such as scobs or residues, must be removed from the boards before the electric power supply is switched on.

13.3. Installation of the Electric Supply Voltage

The following safety precautions must be followed for the performance of the electric installation work:

14. Use as directed:

The measuring instrument type **IZMSA-S0** is exclusively destined for:

- the connection to an earthed/grounded monophase network
- the use in industrial areas for reason of EMC (according to definition EN 50 081-2)

15. Staff Qualification

Necessary work to the flow meter type **IZMSA-S0** is only allowed to be performed by trained and qualified personnel in consideration of the relevant regulations for industrial work safety.

The type of plate of the flow meter must be observed before the electrical connection is started. The distribution voltage is connected to terminal Xp and has to correspond to the specified connection voltage of the POWER unit!

The cable shield has to be installed according to Figure 1 (see page -23-) in order to guarantee an optimum operation of the device according to the EMC directives.

Caution

For hard-wired devices without any main switch, it is necessary to install a switch or power switch in the structure of the building. That switch must be fixed in the direct vicinity of the device, easily accessible to the user and marked as a disconnecting or isolating link.

The measuring instrument can be supplied by different voltages. Table 1: shows the possible nominal voltages and admissible tolerances.

Voltage type	Tolerance	Changeable	Tolerance	Fuse protection
12 V DC	10 ... 30 V	-----	-----	M 2.5 A
24 V DC	10 ... 30 V	-----	-----	M 2.5 A

Table 1: Synoptic Chart of Available POWER Units

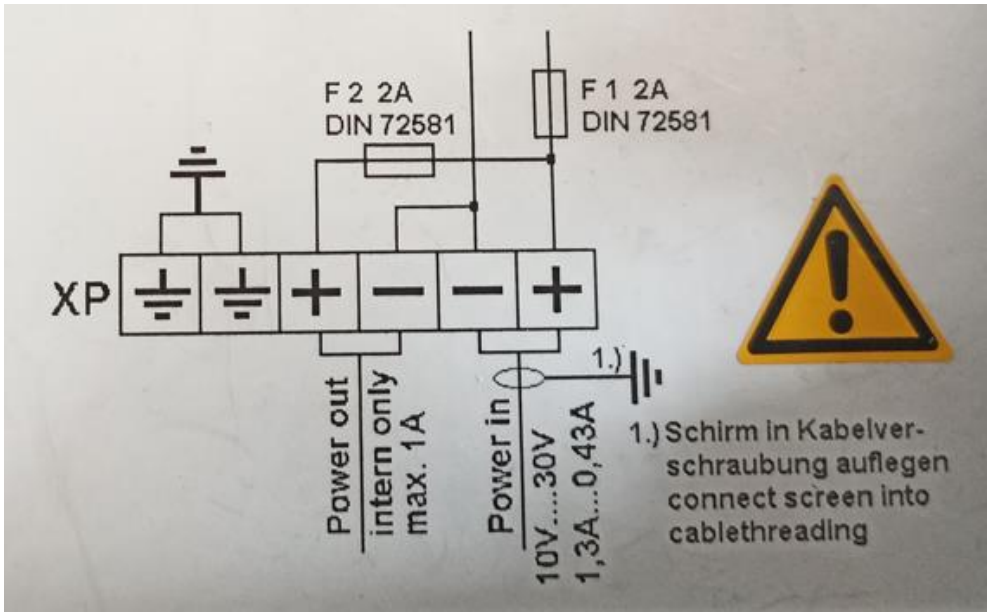
The supply voltage valid for the device is indicated on a yellow sticker on the POWER unit. Apart from that, the supply voltage is shown on the type of plate.

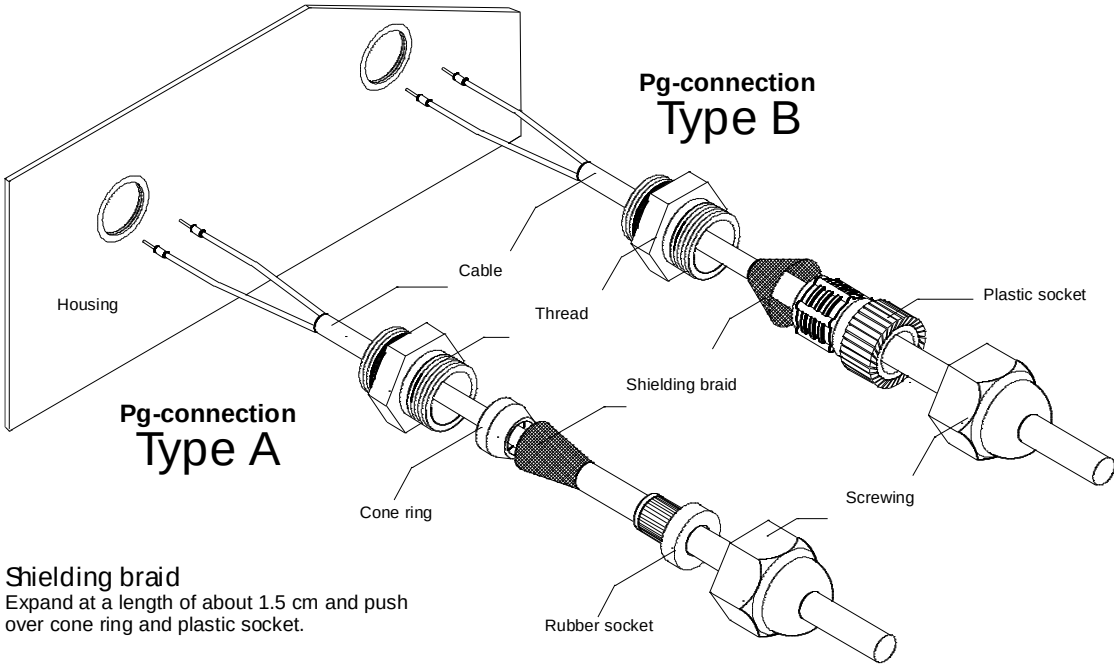
The connection is made straight inside the cover of the transmitter to plug connector “**Xp**” of the POWER unit.

15.1. Connection of the Transmitter

In case of the separated design, the installation of the coil cable and the electrode cable must be done after the integration of the transmitter into the pipeline and after the fastening of the converter housing.

Disconnect the power supply during the electric installation work.





Shielding braid
Expand at a length of about 1.5 cm and push over cone ring and plastic socket.

Attention !
Put shielding on the cable connection as shown in the figure.

Figure 1: Assembly of the Screwed EMC Cable Gland

For reasons of EMC the shielding braid of the cables must be connected on the converter side only!

15.2. Brief Instructions

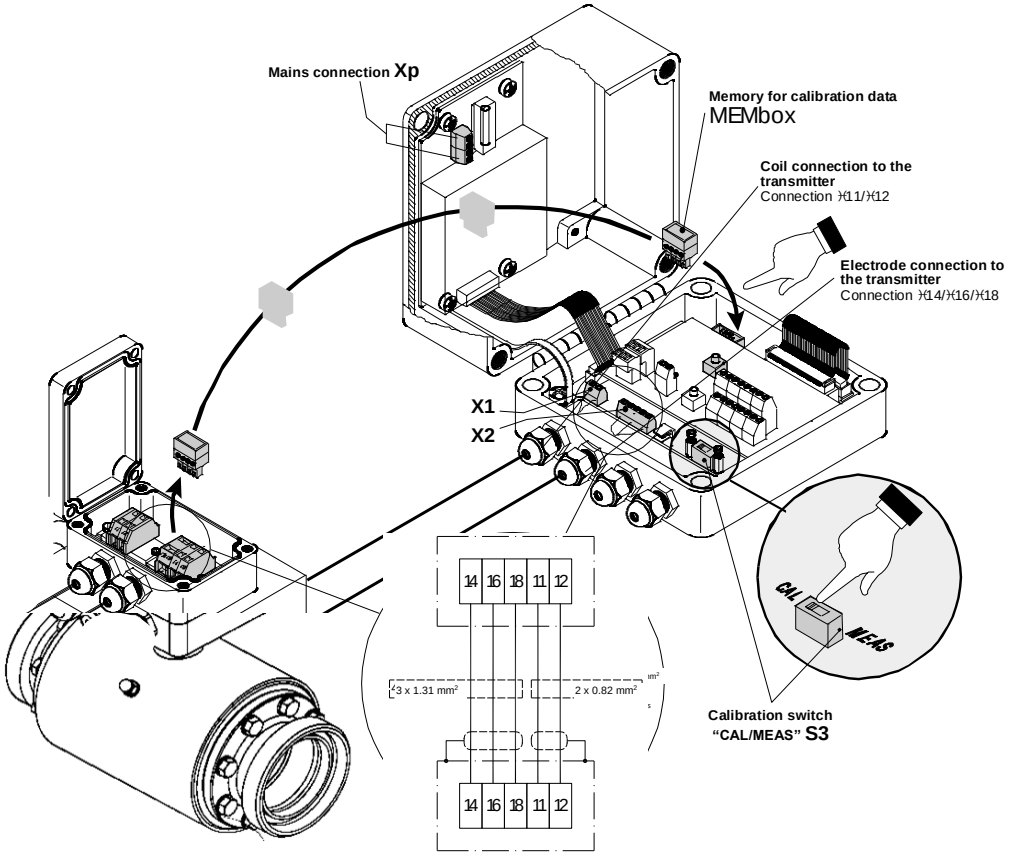


Figure 2: Electrical Connection of the Separated Version

(1) Connect the **coil cable** (2-wire, simply shielded / 0.82 mm²) in an electromagnetically compatible manner to the transmitter (terminals #11 and #12) and the converter (terminals **X1** #11 and #12).

(2) Connect the **electrode cable** (3-wire, simply shielded / 1.31 mm²) in an electromagnetically compatible manner to the transmitter (terminals [brown] #14 / [white] #16 / [green/yellow] #18) and the converter (terminals **X2** #14 and #16 and #18).

(3) Pay attention to a correct connection of the **power supply** (according to the type of plate) inside the converter.

(4) Remove the calibration data memory (**MEMbox**) from the transmitter and plug it into the **4-pole slot** of the converter.

(5) Switch S3 must be set to "**CAL** ". Switch on the power supply after the correct wiring. To protect the parameters against any unauthorized modifications, wait at least for 10 seconds and push **switch S3** to "**MEAS**".

(6) Now the flow meter is ***calibrated*** and ***ready to measure***.

15.3. Electrical Connection of Peripherals

The flow meter offers different inputs and outputs for the transmission of the measured data and for control purposes. The functionality of the inputs and outputs can partially be changed through the parameter settings.

The following output possibilities belong to the standard equipment:

a. analog output of 0/4 – 20 mA for a flow rate of 0 – 100 %
b. digital outputs for quantitative pulses (e.g., 1 pulse per litre)
c. digital output for recognizing the "**forward**"/ "**backward**" metering direction.
d. digital output for the device status or fault output
e. serial BUS connection for the data exchange with a PC
f. serial BUS connection for a printer or remote display

The following input functions belong to the standard equipment:

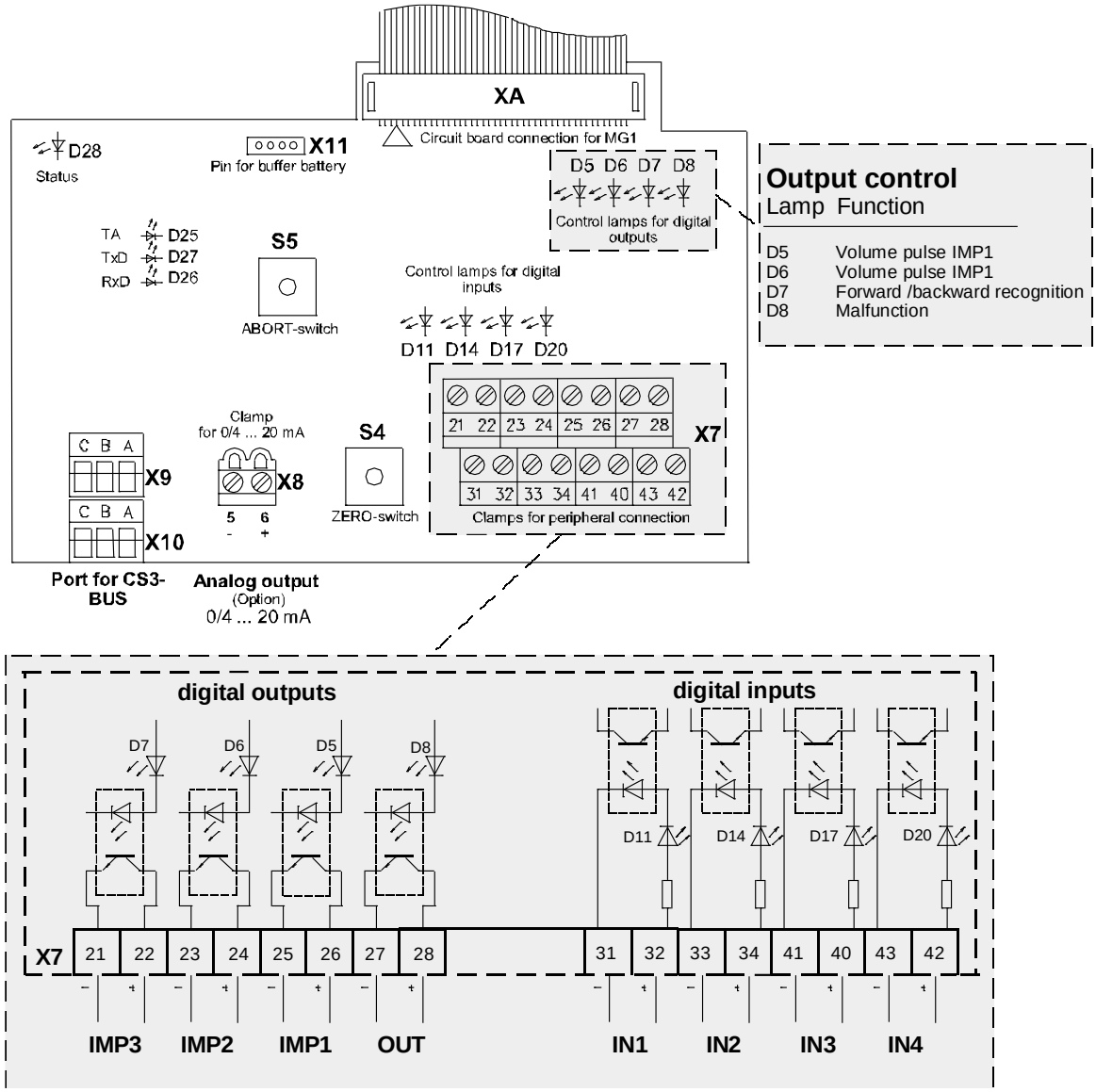
a. digital input for interrupting the counting function ("**ZÄUB**")
b. digital input for resetting the quantity counter to zero.

Terminal X7	Functional Description	Input/output	Designation	Lamps
#21/#22	Forward/backward recognition	Output	**IMP3**	**D7**
#23/#24	Volume pulses - pulse value pv2	Output	**IMP2**	**D6**
#25/#26	Volume pulses - pulse value pv1	Output	**IMP1**	**D5**
#27/#28	Device error or" BUSY"	Output	**OUT**	**D8**
#31/#32	Count interruption "ZÄUB"	Input	**IN1**	**D11**
#33/#34	Reset to zero	Input	**IN2**	**D14**
#41/#40	No function	Input	**IN3**	**D17**
#43/#42	No function	Input	**IN4**	**D20**

Table 2: Input and Output Functions

The digital inputs and outputs are passive and must be supplied with an external **direct-current voltage** which is typically 10 ... 30 V.
The maximum load for each digital output can be 80 mA.
The analog output is active and supplies 0/4 – 20 mA dependent on the flow rate.

Figure 5: Electrical Connections of the Converter



15.4. Connection of a Quantity Counter

For the indication of quantity, a simple pulse counter can be connected as follows:

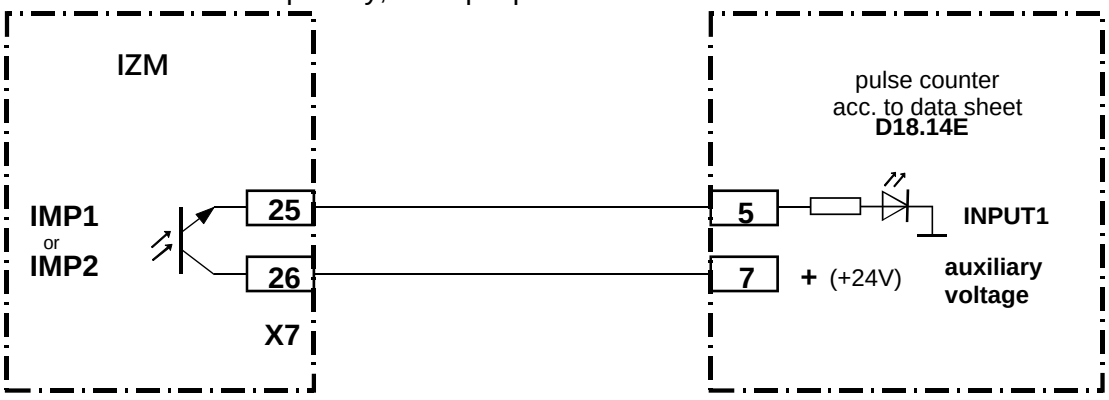


Figure 3: Example for the Connection of a Pulse Counter

The value of the output pulses (e.g., 100 pulses per litre) must be input by parameters.
See to it that the resulting maximum output frequency can really be processed by the connected counter (e.g., <100 Hz = 100 pulses/sec.).

15.5. Connection of a Digital Indicator

The analog output of the flow meter type **IZMSA-S0** supplies an active current.

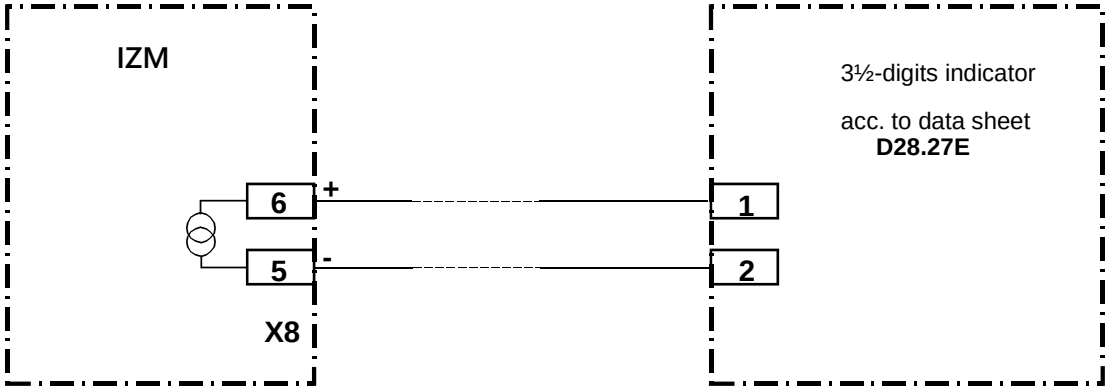
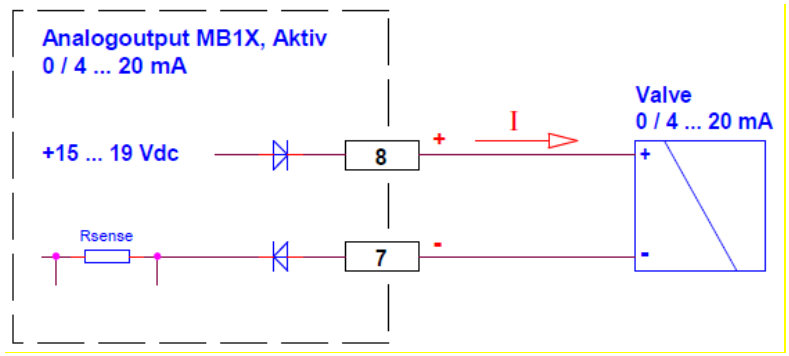


Figure 4: Example for the Connection of a Digital Indicator

15.6. Analog output

There is an analog output available on terminal X7.

	Activ - Mode
Range	0 / 4 … 20 mA
max. current	20 mA
max. hurdle	500 Ω



Analog output diagram in active mode

16. Commissioning

16.1. General Remarks

16.1.1. Safety Measures for the Commissioning Work

Caution

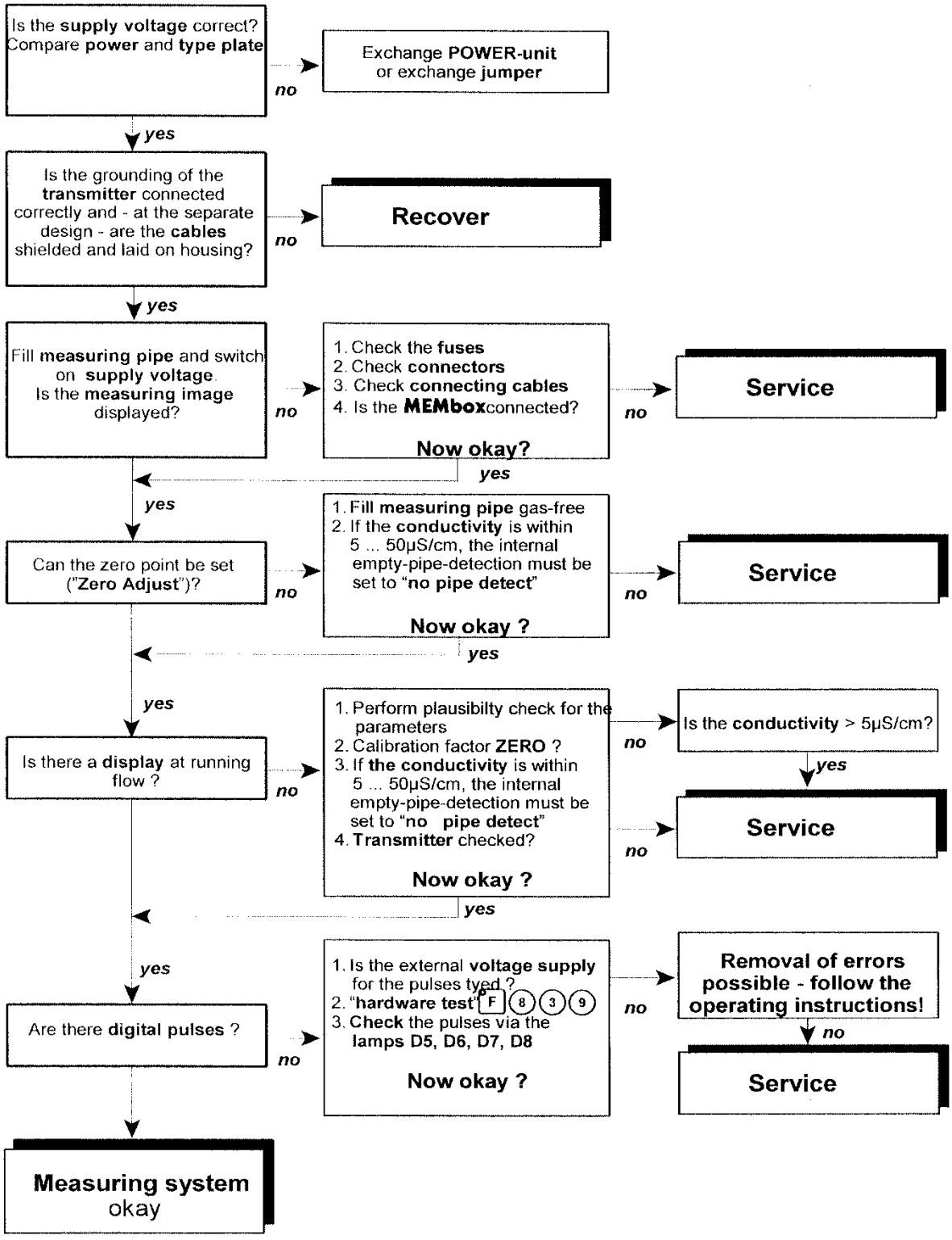
An orderly performed installation and a correct electrical connection are absolute prerequisites for the commissionin

Caution

Pay attention to the following points for the initial start-up of the flow meter:

- Close the housings of the transmitter and the converter.
  - Personal injury by electric shock could be caused if the electric lines are touched.
  - Instrument damages could be caused by moisture on the electronic unit.
- Ensure that all threaded joints at the measuring instrument and in the direct vicinity are tight.
- If parameter settings must be made through the service display unit ST6X, the connector is only allowed to be plugged in while the device is switched off.
- Any possibly existing dehydrating agents must be removed from the housings before the commissioning is started.

16.2. Check List before the Initial Start-up



16.3. Basic Settings upon the Commissioning

At the factory the electromagnetic flow meter is calibrated by means of water or subject to a preliminary factory test in the presence of a Weights & Measures inspector.

The so-called **MEMbox** as a read-only data storage element contains the transmitter-specific calibration data.

In case of devices in the separated version the **MEMbox** must be taken out of the transmitter and inserted into port **X6** of the converter. Otherwise, no measurement is possible.

The typical settings for the outputs refer to:

- Pulse value for the quantity pulses (pulses per volume unit)
- Analog flow rate output of 0/4 – 20 mA for 0 – 100 %

These parameters are already input at the factory according to the customer's specification.

Modifications can only be carried out by a possibly integrated display or by a service terminal ST6.

17. Structure and Operating Elements

The flow meter type **IZMSA-S0** always consists of:

a. the transmitter that is integrated in the product line and
b. the converter that makes available the measured values

The electronic unit of the converter consists of 3 basic boards:

- the power supply unit (included in the cover)
- the main board (**MB1x**) with computer (lower board)
- the junction board (**JB2a**) for peripheral connections (upper board)
- Battery circuit board

In addition, the following options can be supplied:

- Integrated 2x20-digits display unit with a special housing cover.

The following controls and connections are available on the motherboard:

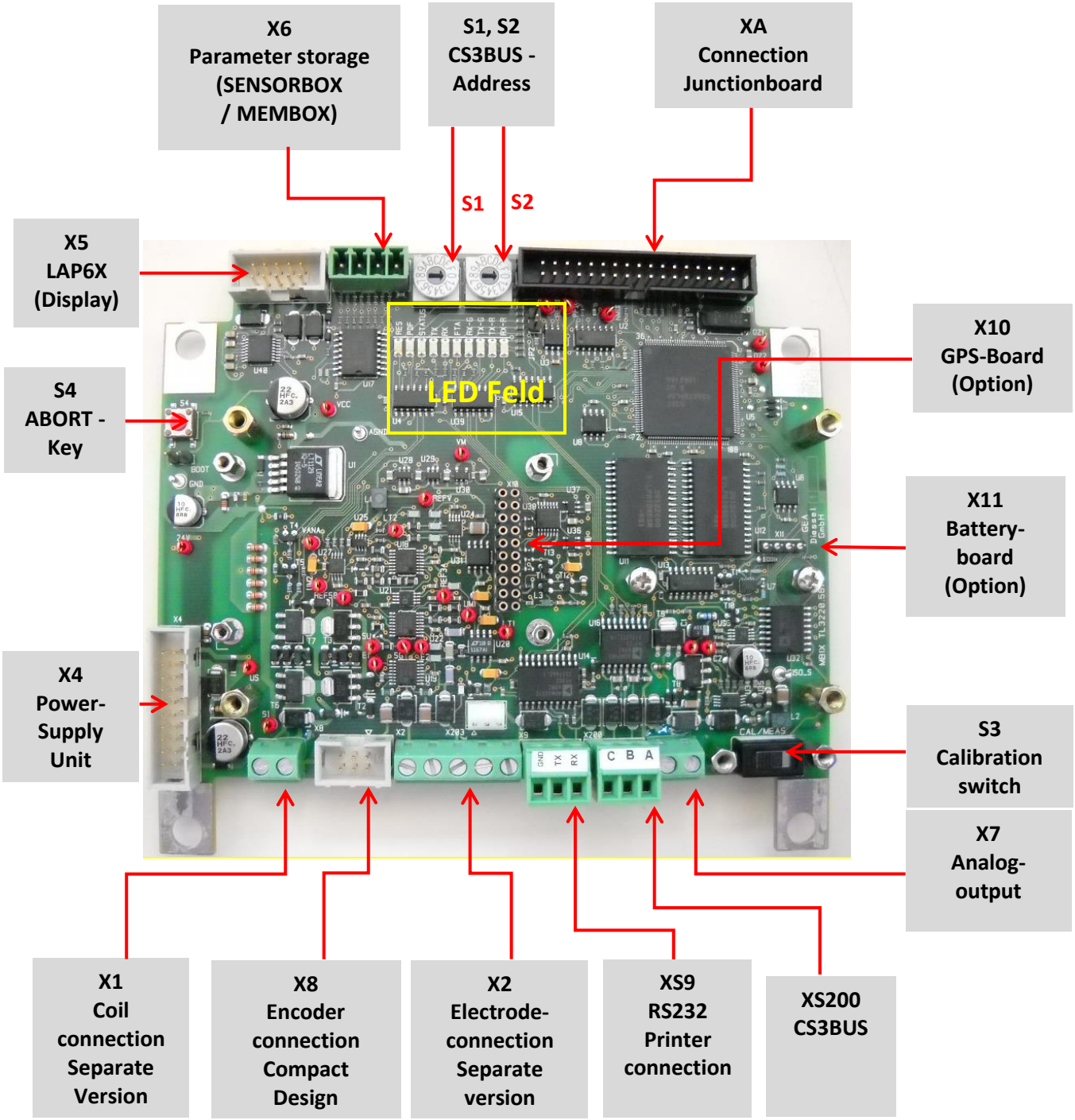


Figure 5: MB1X motherboard

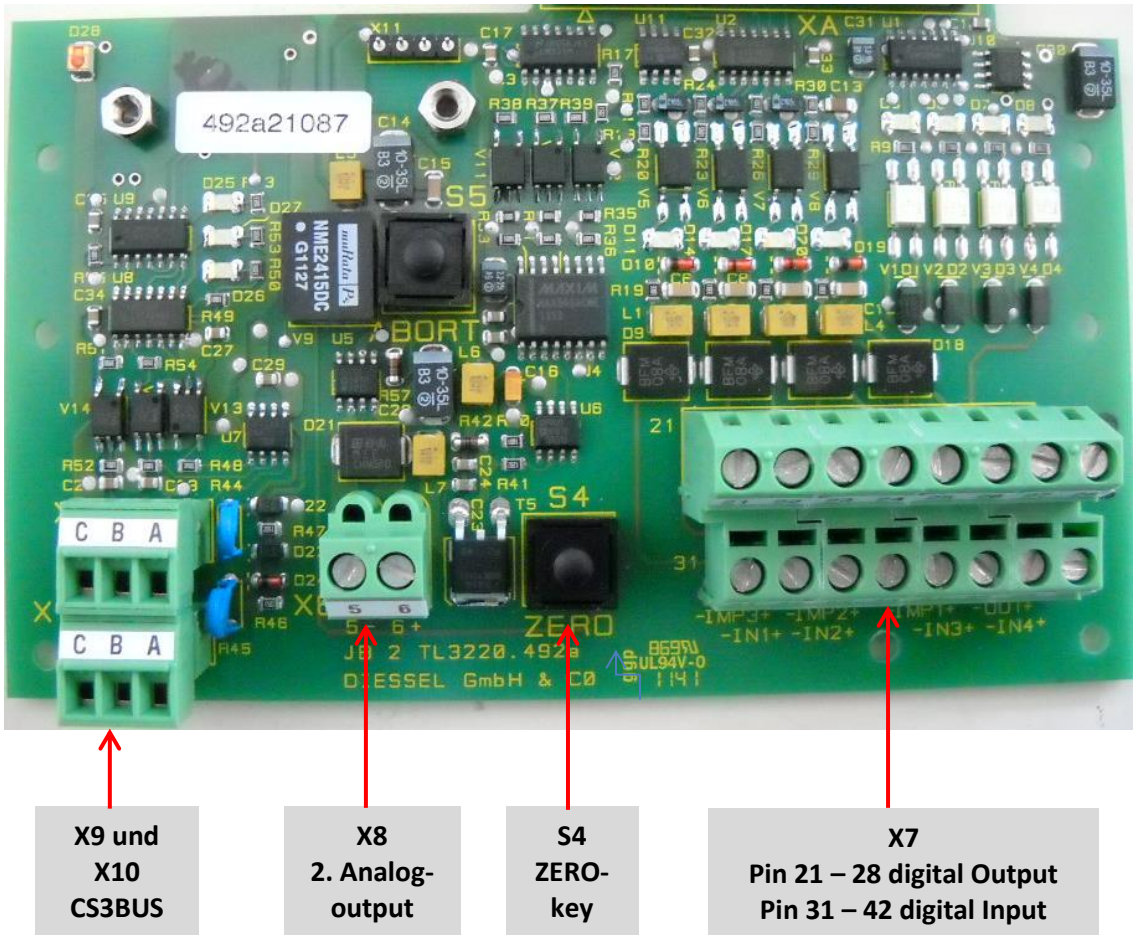
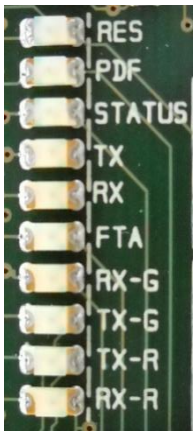


Figure 6: JB2a connection boa

17.1. LED array

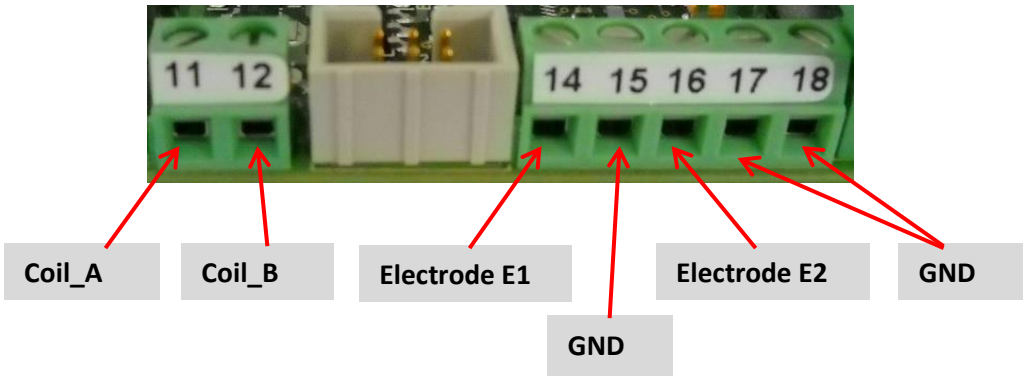
The status of the device can be monitored by means of the LED array. The LEDs have the following meanings:



RES	RESET-State
PFD	PFD-State (Power fail)
STATUS	Controller-Status
TX	TXD, CS3BUS (Transmit)
RX	RXD, CS3BUS (Receive)
FTA	Fieldbus devices active, CS3BUS
RX-G	RXD, GPS-Interface (Receive)
TX-G	TXD, GPS-Interface (Transmit)
TX-R	TXD, RS232 (Transmit)
RX-R	RXD, RS232 (Receive)

Name	Description
RES	Glows at POWERON, when the WATCHDOG is triggered, or the ABORT key is pressed.
PFD	Glows at POWERON, when the input voltage is too low, or the ABORT key is pressed.
STATUS	Controls the Controller. Flickers in normal operation. When no program is present the LED glows continuously.
TX	Glows when data are sent to the CS3BUS.
RX	Glows when data are received from the CS3BUS.
FTA	Glows when the user can send data to the CS3BUS.
RX-G	Glows when the Controller receives data from the GPS board. (Option)
TX-G	Glows when the Controller sends data to the GPS board. (Option)
TX-R	Glows when data are sent to the RS232.
RX-R	Glows when data are received from the RS232.

17.2. Transmitter connection in the separated version



In the separated version the shielded coil cable from the transmitter is connected to terminal X1 and the screened electrode cable is connected to X2.

18. Calibration Switch

By means of calibration switch S3 the flow meter can be protected against unauthorized access and manipulation of the parameters.

During the adjusting and calibrating phases, it is recommendable to set the calibration switch S3 to "**CAL**".

Position	Meaning	Operating Status
"**CAL**"	- Data change is possible, i.e., <u>all</u> parameters are changeable. - Zero adjustment "**ZERO-Adjust**" is possible: The automatic adjustment with the transmitter is carried out when the values stored in the MEMbox are taken over.	Calibrating phase. during the commissioning if need, be.
"**MEAS**"	- It is not possible to change any of the data which is relevant to the metering process (calibration data). - Uncritical parameters can be changed by F 9 8 (release). - Zero adjustment "**ZERO-Adjust**" is disabled (only the control function "**ZERO Test**" is possible)	Normal state **MEASURING** (sealed). The message “Protected Mode” appears briefly when trying to change the calibration data.

Table 3: Function of the Calibration Switch

19. ABORT Key

By the activation of the "**ABORT**" key the system is reset to the initial state of the program run.

The "**ABORT**" key should be activated in case of malfunction only. It has got the same effect as switching off the power supply.

20. Calibration Data Storage „MEMbox “

The **MEMbox** contains the calibration data of the transmitter:

- Nominal width → DN (in millimetres)
- Steepness calibrating value → SPAN
- Offset calibrating value → OFFSET
- Measured value of the zero point → ZERO

In case of flow meters in separated design the metering system is automatically calibrated (and thus ready to meter) by inserting the **MEMbox** into the slot of the converter.

Usually, the other parameters such as the pulse value or the allocation of the analog output of 0/4 ... 20 mA are kept unchanged.

ATTENTION! **If the calibration switch is in the “MEAS“position, the values stored in the MEMbox are not taken over. In that case the switch has to be set to “CAL“ and the ABORT key has to be activated.**

After at least 10 seconds the calibration data will be taken over. The calibration switch can be reset to “**MEAS**“.

Display Unit

Optionally, the **IZMSA-S0** can be delivered with a built-in illuminated double-line display unit.
The 1st line always shows the main quantity totalizer “**V**”.
The 2nd line indicates the other metering registers or the different types of parameters, if required.
Service functions are processed by means of the display unit and the keyboard.
For the commissioning of flow meters without integrated display unit it is also possible to use service terminal ST6x which offers the same functions.

20.1. ZERO key

The hydraulic zero-point adjustment is activated by pressing key S4 on circuit board JB2a.
Synchronisation takes place automatically and lasts approx. 1 minute.
The way the zero-point measurement takes place is dependent on the position setting of calibration switch S3:

- Calibration switch S3 in position CAL → Zero point is adjusted (= "**ZERO Adjust** ")
- Calibration switch S3 in position MEAS → Zero point is tested (=" ZERO" Test)

21. Converter without Display Unit

Unless the flow meter is equipped with an integrated display unit and unless a service terminal **ST6x** is available, the function can be checked by the aid of the pilot lamps D7 and D8 on the junction board (upper board type **JB2**) only.

Please consider that the following tests are only valid, if the flow meter type **IZMSA-S0** has been supplied with the standard values set at the factory, i.e.:

- usual quantity measurement and no quantity preselection function
- recognition of the forward/backward flow direction

Conditions	D7	D8
Normal state when switching on the power supply: Filled meter tube, steady flow	Flashing	"on" D8 goes out after 40 sec. max.
No coil current (e.g., converter not connected)	Flashing	1 sec." on**"** 1 sec." off**"**
No MEMbox included in the converter (error !)	Off	2 sec." on**"** 1 sec." off**"**

Table 4: Pilot Lamps D7 and D8

At the standard settings, lamp **D7** serves as an indicator of the flow direction.
In case of steady flow and a correctly adjusted zero point **(**"**ZERO Adjust** "**),** lamp **D7** must be flashing. If that pilot lamp is permanently" on**"** or **"off"**, it will either be necessary to determine the zero point anew or the functionality of that output does not correspond to the standard settings.
In case of running flow, pilot lamps **D5** and **D6** show the volume pulses according to the set pulse value.

22. Flow Direction

The flow meter type **IZMSA-S0** detects both flow directions.

The main flow direction is shown by means of an arrow on the flow meter.

In the standard setting the digital outputs transmit the volume pulses independently of the flow direction.

The flow direction is signalized by digital output **IMP3**:

PLUS, flow ➔ digital output **IMP3** is permanently activated.

MINUS flow ➔ digital output **IMP3** is permanently deactivated.

Other functionalities can be input by parameter settings.

Although the transmitter has been calibrated in the main flow direction, the measurement is possible in both directions.

The **display unit** shows the following effect:

PLUS, flow	➔	Flow is displayed without any preceding sign. The volume register has got an adding effect. PLUS, quantities do not show any preceding sign.
MINUS flow	➔	Flow is displayed with a NEGATIVE preceding sign. The volume register has got a subtracting effect. MINUS quantities are shown with a preceding MINUS sign.

22.1. Change of the Flow Direction

The following possibilities can be used to reverse the effect of the flow detection:

- Turning around the transmitter in the product line:
  - ➔ That case does not necessitate any further measures.
- Input of the calibration factor "**m spe**" with a negative preceding sign:
  - ➔ Upon the delivery the factor is set to "**m spe 1.0000**"!
  - ➔ When changed to "**m spe -1.0000**" the flow is reversed by the software.
  - ➔ After that, no further measures are required to be taken.
- Exchange of the electrode inputs in the converter:
  - ➔ Switch off the electronic unit before changing the terminals.
  - ➔ Exchange terminal no. 14 and terminal no. 16.
  - ➔ After the exchange of the electrode cables, it is necessary to carry out a new "ZERO Adjust".

22.2. Zero Adjustment ("ZERO Adjust")

To adapt the flow meter to the conditions prevailing in situ it is recommendable to carry out a **zero adjustment** ("**ZERO Adjust"**) before the initial start-up.

That adaptation can usually be dropped in case of the integrated version.

ATTENTION! The following conditions must be fulfilled for carrying out a "ZERO Adjust ":

(1) The calibration switch must be set to "**CAL** ".
(2) The flow meter must be heated up to its operating temperature, i.e., it should be switched ON at least 5 minutes before the zero adjustment.
(3) The cables between transmitter and converter must be firmly laid according to the EMC rules.
(4) The transmitter must be filled with the typical liquid free of gas.
(5) During the whole "**ZERO Adjust** „procedure no flow is allowed to occur.

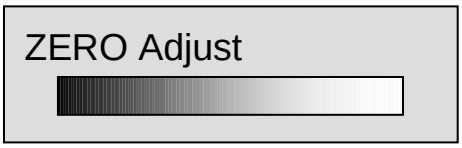
In case of transmitters which are not Weights & Measures-approved the "**ZERO Adjust** „measurement can be carried out without opening the housing, just by entering the key sequence F 9 8 before the zero adjustment.

Table 5: “ZERO Adjust „Measurement via the Keyboard

Key sequence	Displayed text	Remarks
F 9 8	V 54.9 l **PROG switch on**	Data modification is now possible although the calibration switch is set to “**MEAS** “.
F 0 0	ZERO Adjust ▬▬▬▬	Automatic measurement is running for 1 minute max.
	ZERO Adjust New zero -15.83	Measurement completed. New **ZERO** value.
ENTER	V 54.9 l Q 0.0 %	New **ZERO** value is accepted as a correction value.

If the CLEAR key is depressed instead of the ENTER key, the measured **ZERO** value will be rejected and the previously used **ZERO** value will be taken for the correction.

When activating the **"ZERO"** key on the upper board, the “ZERO Adjust „measurement is started, too. During the



automatic run the display shows the following message:

The black bar that is moving backwards in the second line shows that the **ZERO** adjustment is still active.

After completion of the zero adjustment the display shows the determined zero value in the

following way for about 5 seconds:
Then the display returns to the original measured value. The displayed **ZERO** is simultaneously taken over as a correction value.

In case of devices without display the zero measurement can be carried out by means of the "**ZERO**" key only. Another supervision of that function is not possible.
After a maximum period of 1 minute the process is finished and pilot lamp **D7** for the output of the direction should be flashing, on the condition that the standard setting has been parameterized before.

23. Metering Operation with Digital and Analog Outputs

In addition to the simple indication, the flow meter can output the measured values as a digital pulse sequence for the volume or as an analog signal for the flow.

Output	Terminal X7 ⊖ ⊕	Effect in the Standard Parameter Setting	Control LED
IMP1	#25 / #26	Volume pulses (pulses per litre)	**D5**
IMP2	#23 / #24	Volume pulses (pulses per litre)	**D6**
IMP3	#21 / #22	Forward/backward recognition	**D7**
OUT4	#27 / #28	Status indication MALFUNCTION	**D8**

Table 6: Standard Configuration of the Digital Outputs

23.1. Digital Outputs IMP1 – IMP3

Up to 3 digital outputs are available for the output of volume pulses.
On the upper board the electrical connection of outputs **IMP1**, **IMP2,** and **IMP3** is made to terminal **X7** / **#21**...**26**.

The digital outputs **IMP1** and **IMP2** normally release volume pulses. According to the chosen pulse value the outputs are activated for the pulse duration (lamp **D5** or **D6** shortly flashes up).

The digital output **IMP3** is used as a standard direction indicator.
In case of a positive flow direction the output is switched through (lamp **D7** on).

In addition to the aforesaid standard function the allocation for those 3 digital outputs can be changed.
The different functional modes are set via the parameter:

output mode

Most important functions:

- "output mode 1" → simple quantity pulses plus direction indication
- "output mode 3" → quantity preselection function
- "output mode 5" → direction-dependent quantity pulses for output **IMP1** (forward) and output **IMP2** (backward)
- "output mode 6" → 3-channel pulse pattern, offset by 120° each
- "output mode 7" → exclusively positive quantity pulses with pulse offset in case of negative flow.

23.2. Output "OUT"

The output "**OUT**" serves as a standard fault output. Now when a malfunction is recognized, the output (lamp **D8**) is activated. Further functionalities are set via parameter "**out4-mode**".

Most important functions:

- "out4-mode 0" → current operational status indicator: ON = device is o.k.
- "out4-mode 2" → malfunction indicator: OFF = no fault did occur
- "out4-mode 4" → status identifier: Empty Pipe: ON = empty

- "out4-mode 5" → status identifier: Flow: ON = flow

23.3. Analog Output

The analog output "**20 mA**" (terminal: **X8 / #5 (-) #6 (+)** on the upper board) supplies an active current dependent on the current flow rate according to 0…100%.
The setting can be changed between **0 ... 20 mA** and **4 ... 20 mA**.
The analog output is allocated to the absolute flow by parameter "**Qmax**".

The states of outputs **IMP1**, **IMP2**, and **IMP3** as well as output **OUT** can be checked by means of the 4 lamps D5 ... D8 on the upper board (junction board **JB2**):

Lamp is lighting – Output is switched through (switch is closed)

23.4. Allocation of the Digital Inputs

On the upper board (junction board **JB2**) the flow meter type **IZMSA-S0** is equipped with 4 digital inputs.

Only the two digital inputs "**IN1**" and "**IN2**" are provided with firm functions in the standard version.

Input	Terminal X7 ⊖ ⊕	Effect in the Standard Parameter Setting	Control LED
IN1	#31 / #32	Count interruption (" on" = flow is zeroed)	D11
IN2	#33 / #34	Reset of main counter V	D14

Table 7: Digital Inputs IN1 and IN2

The input is activated by a DC voltage between 10V ... 30V DC.

The additional digital inputs do not have any function for standard devices.

24. Measurement with Empty Meter Tube

Metrologically correct flow measurements are only possible when the meter tube is always obviously filled with liquid.

The **IZMSA-S0** are equipped with both an **internal** and an **external** suppression possibility to avoid an undefined count in case of an empty meter tube:

24.1. Internal "EMPTY Pipe Detection"

The **IZMSA-C** are equipped with a special "**EMPTY Pipe Detection**" ("**pipe detect**"). Usually, the "**EMPTY Pipe Detection**" is switched on, i.e., an undefined count is suppressed in case of an empty meter tube.

The **internal** "**EMPTY Pipe Detection**" must be switched off via the parameter setting ▭ 0 2 by" no **pipe detect"** on the following conditions:

- The conductivity of the product is below 50 µS/cm.
- The flow is pulsating (e.g., reciprocating pump).

24.2. External "EMPTY Pipe Detection

An **external** "**EMPTY Pipe Detection**" can be achieved by an appropriate wiring of the digital input "**IN1**" e.g., by an additional level probe or a system-specific control contact etc.

In that case you switch off the internal "**EMPTY Pipe Detection**" (**"no pipe detect"**).

From the metrological side of view the external "**EMPTY Pipe Detection**" does in any rate lead to a better accuracy.

25. Measurement at Low Conductivities

The **IZMSA-S0** can meter liquids of a minimum conductivity from 5 µS/cm.

Please consider that the internal "**EMPTY Pipe Detection**" has already got an influencing effect on the measurement at conductivities of less than 50 µS/cm.

To obtain perfect results that function can be switched off via the parameter setting ▭ 0 2 by **"no pipe detect"**.

26. Measurement at Pulsating Flow

The **internal** "**EMPTY Pipe Detection**" must be switched off in any rate at a pulsating flow, e.g., caused by a peristaltic pump or a reciprocating pump:

(**"no pipe detect"**).

For those conditions the **IZMSA-S0** are additionally equipped with an automatic pulsation detector for the analog output of 0/4 ... 20mA.

The activation of that function requires the following settings to be made:

MENU 02	→	Average:	32	Averaging of the flow (maximum setting: 64)
	→	LFS:	0.5 %	Low flow suppression
	→	no pipe detect		Internal "**EMPTY Pipe Detection**" switched off
MENU 03	→	tp 3	3.0 sec.	Attenuation of the analog output
MENU 73	→	measnumber 64		Adaptation of the metering frequency
	→	currnumer 16		Adaptation of the coil clock pulses

Carry out a new zero adjustment ("**ZERO-Adjust** ") after the conversion!

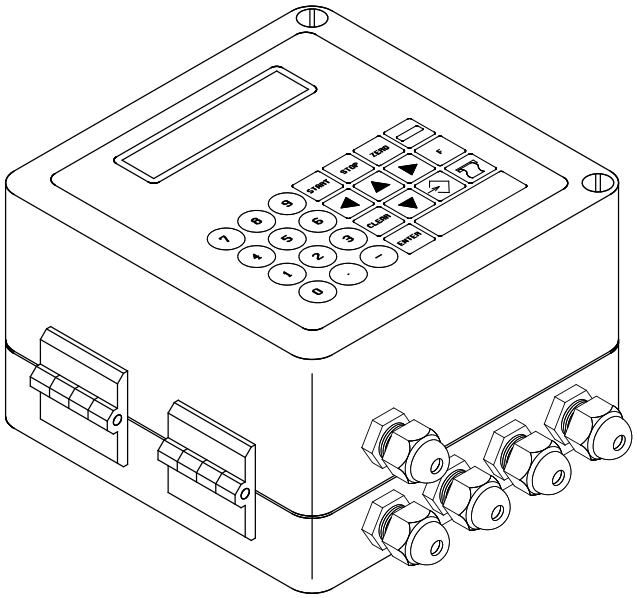
Whereas the individual customer-specific programs are identified by a special designation.

27. Operation

When the operating voltage is switched on, the **IZMSA-S0** is usually in the metering operation.

The following conditions are valid for flow meters with integrated display:

- indication of different flow values
- indication and zeroing of the main counter.
- indication and zeroing of the daily quantity counter.

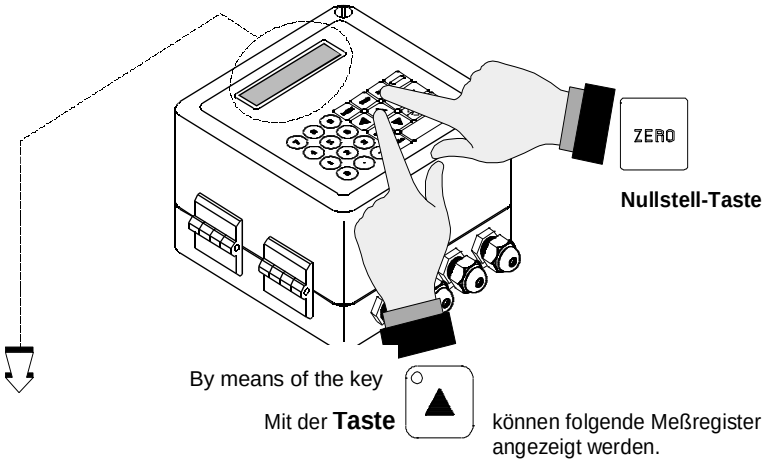


Further operations via the keyboard are possible for adjusting and service purposes:

- special settings for peripherals (parameter settings)
- special operation for the use of a printer
- special test and simulating functions for service purposes.

27.1. Display Operation in the Metering Mode

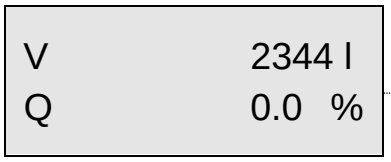
Flow meters type **IZMSA-S0** with display always show the main counter "**V**" in the first line. Possible faults are displayed in a flashing mode:



V 0.00 l Q 0.0 %	**Main counter: Volume** (The main counter is reset to zero by means of the ZERO key.) **Flow value in %** (referred to the set 100 % flow Q_{max})
V 0.00 l Q 0 l/h	**Main counter: Volume** (The main counter is reset to zero by means of the ZERO key.) **Flow value per hour** (or per minute)
V 0.00 l V2 0.00 l	**Main counter: Volume** **Daily quantity counter** (The daily quantity counter can be reset to zero by means of the ZERO key. At the same time the main counter is reset to zero, too.
V 0.00 l SV 5847 l	**Main counter: Volume** (The main counter is reset to zero by means of the ZERO key.) **Quantity totalizer** The quantity totalizer cannot be reset to zero.
V 0.00 l 31.01.17 15:05:46	**Main counter: Volume** (The main counter is reset to zero by means of the ZERO key) **Date and time** The format can be adjusted in menu 04 with the parameter “dateformat”.

28. Main Counter

Main counter **V** is reset to zero via the keyboard by means of the ZERO key.
Simultaneously with the zero reset any possibly existing error message is erased.



Main counter
The main counter is reset to zero by means of the ZERO key.

Flow value in % (referred to the set maximum flow Q_{max})

If a printer is connected, the zero reset of the main counter releases a print-out, whereby the current metering number is increased by 1.

With the start of the quantity preselection process in the “quantity preselection” mode the main counter is reset to zero automatically.

Via the digital input **IN2** or via a serial BUS command the main counter can be zeroed, too.

28.1. Daily Quantity Counter

The quantity counter **V2** can be reset to zero via the display unit only.

For that purpose, the counter must be selected in the 2nd display line.

The reset to zero is carried out by activation of the ZERO key.

If a printer is connected, the contents of the daily quantity counter are printed out simultaneously with the zero reset. At the same time the current metering number is reset to zero, too.

It must be considered that with the zero reset of the daily quantity counter **V2** the main counter **V** is automatically zeroed, too.

In the “quantity preselection” mode the statistics of the packing drums is reset to zero simultaneously with the zeroing procedure of the daily quantity counter.

28.2. Totalizing Counter

In the normal operation the totalizing counter **“SV”** cannot be reset to zero.
The total quantity is formed from the sum “**in figures** “(**I V I**) of the main counter **V**:

SV = SV (old) + I V I

That means: If the flow direction is changed during a running measurement, i.e., before the main counter **V** is reset to zero, the totalizing counter will be subtracted, too!

Examples:

(1)

Reading of the main counter:	V 0 l	
Reading of the totalizing counter:	**SV 34087 l**	Metering start
Flow start/stop:	V 2344 l	Zero reset of **V**
Reading of the totalizing counter:	**SV 36431 l**	
Flow start/stop:	V -3948 l	
Reading of the totalizing counter:	**SV 40379 l**	

(2)

Reading of the main counter:	V 0 l	
Reading of the totalizing counter:	**SV 34087 l**	Metering start
Flow start/stop:	V 2344 l	No zero reset
Reading of the totalizing counter:	**SV 36431 l**	
Flow start/stop:	V 2327 l	
Reading of the totalizing counter:	**SV 36414 l**	Quantity of -17 L

29. Reset of Error Messages

Possible error messages are indicated in the flashing mode in the 1st line of the display. Usually, they are cleared by means of the ZERO key when the main counter **V** is reset to zero or by the activation of the digital input **IN2**.
In case of flow meters non approved by the Weights & Measures authorities' informative messages such as "**warning 901**"are automatically cleared after 30 seconds max.

29.1. Reset of the Running Counter

The consecutive number is always reset to zero when the daily quantity counter (second volume counter **V2**) is zeroed.

30. Parameterization

The flow meters type **IZMSA-S0** supplied by **Anderson-Negele** have been preset at the factory to the parameters (pulse value, flow range, etc.) desired by the customer.

Modifications of the parameter settings can be carried out straight by the integrated display unit or the service terminal **ST6X**. The different groups of parameters are stored in so-called **menus**.

The individual menus are called by the ▭ key.

Table 8 (see page -49-) shows the possible types of parameters of each **menu** and the typical data of the factory settings.

30.1. Protection of the Parameters against Unauthorized Modification

Inadvertent modifications of the parameter data might result in malfunctions thus requiring cost-intensive servicing.
For that reason, the **IZMSA-S0** is equipped with different safety devices against unintended changes.

In principle, the calibration switch "**CAL/MEAS**" on the lower board serves for that purpose. In the normal measuring operation, the switch should be set to "**MEAS**".
Combined with the standard setting "**parameter mode 2**" the following protection against the change of parameter data becomes active:

- The calibration data of the transmitter can only be changed in the "**CAL**" position of the calibration switch. In addition, the correct code number must be entered.
- The calibration switch is sealed after the entire system has been metrologically tested by the system manufacturer or a notified body. If the remote design, the connecting cable between the sensor and the transmitter may also need to be sealed.
- All the other parameters can also be modified in the "**MEAS**" position of the calibration switch on the condition that the protection has been removed by key sequence F 9 8.

31. Function 98

After the completion of the assembly and commissioning work the calibration switch should be in the "**MEAS**" position.
Without any knowledge of the device a change of parameters is thus not possible anymore. For some parameter types the protection can be removed to enable the qualified personnel to modify some certain parameters nevertheless, without having to open the housing for that change.

For that purpose, the key sequence F 9 8 must be activated. For a short time, the display shows the following message:

V 158922.4 l
PROG switch on

Now the parameters marked by "**function 98**" in Table 8 (see page -49-) can be modified.

This access will be closed again by a repeated activation of the keys F 9 8 or automatically after 3 minutes.

It has to be taken into account that "**function 98**" is only active at "**parameter mode 2**" and in the "**MEAS**" position of the calibration switch!
Otherwise, the message "**function 98 ignored** „will appear on the display.

31.1. "CAL" Position

The parameters which are not protected by "**function 98**" can be modified by setting the calibration switch to "**CAL**".
Except the calibration data of the transmitter stored in the **MEMbox**, **all** parameters can be modified now.

Whenever the calibration switch is in this position, "**function 98**" has no effect.

If "**parameter mode 1**"is set, the calibration switch must be set to "**CAL**" for **each** modification.

32. How to Modify the Parameters

The following sequence should be followed for the modification of a parameter:

(1) The required parameter type is indicated in the 2nd line of the display by [▭] (0) (2) ... (5) ("**menu 02**" up to "**menu 05**") and the key [▲] or [▼].

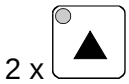
(2) Key sequence [F] (9) (8) disables the parameter protection.

(3) Key [⇨] renders it possible to change the value of the displayed parameter type.

(4) The new value is acknowledged by means of the [ENTER] key.

Example 1: Modification of the Value of the Pulse Output

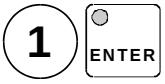
V 4.7 l Q 0.0 %	e.g., current metering image
V 45.7 l Qmax 30000 l/h	1st parameter of “**menu 03**"



V 45.7 l pv2 10.00000 p/l	Set pulse value: 10 pulses per litre

V 45.7 l PROG switch on	Possible modification of the parameters

V 45.7 l pv _____ p/l	



V 45.7 l pv2 1.00000 p/l	New pulse value: 1 pulse per litre

V 45.7 l PROG switch off	Modification of the parameters blocked

V 45.7 l Q 0.0 %	

32.1. Overview of the Parameters

Keys		Basic settings (Valid for the protective function "**parameter mode 2**") and the **MEAS** position of the calibration switch		Parameter protected by: function 98	CAL/MEAS	Code	Standard setting
00 (menu 00)		**Reading of the measured values**					
		- no data modification possible					
	▲	Q%, SV, V2, Q per hour or Q per minute					
02 (menu 02)		**Device parameters**					
		Nominal width of the pipe	**"DN"**		X	X	MEMbox
	▲	Volume unit	**"unit"**		X		litres
	▲	Low flow suppression	**"LFS"**	X			2.0%
	▲	Functional mode of the digital outputs	**"output mode"**	X			1
	▲	Number of averaged values	**"average"**	X			8
	▲	Mode for the analog output	**"currmode 0/4 ... 20 mA"**	X			4 - 20
	▲	EMPTY pipe detection	**"pipe detect"**	X			pipe detect
	▲	Function of the digital input **IN1**	**"standby mode"**	X			2
	▲	Protection against modification of parameters	**"parameter mode"**		X		2
	▲	Function of the digital output "**OUT**"	**"out 4 mode"**	X			2
03 (menu 03)		**Input/output parameters**					
		100% flow value for the measuring range	**"Qmax"**		X		
	▲	Value of the digital pulse output **IMP1** (also valid for the 2- and 3-channel pulse output)	**"pv1"**		X		
	▲	Value of the digital pulse output **IMP2**	**"pv2"**	X			
	▲	Maximum duration of the output pulses of outputs **IMP1** and **IMP2**	**"tp1 / tp2"**	X			125 ms
	▲	Attenuation of the analog output	**"tp3"**	X			1
	▲	Minimum pulse length for the activation of inputs IN1 ... IN4	**"it1 ... it4"**	X			125 ms
04 (menu 04)		**Display parameters**					
		Selection of the flow rate indication (l/h or l/min)	**"Q-Typ"**	X			l/h
	▲	Digits after the decimal points of the main counter	**"V-Format frac"**		X		1
	▲	Digits after the decimal points of the daily counter	**"V2-Format frac"**	X			1
	▲	Decimal symbol displayed by	**"decimal point"**	X			**.**
	▲	Date format	**"dateformat"**	X			DD.MM.YY
	▲	Display monitoring	**"display mode"**		X		0
	▲	Activation of the printer output	**"printer mode"**	X			0
	▲	Nature of the printout format	**"ticket mode"**	X			0
	▲	Device number for ticket printout	**"unit id"**	X			0
	▲	Transfer speed of the RS232-Schnittstelle	**"baudrate 8N1"**	X			9600
	▲	Text for freely selectable flow meter	**"free unit text"**	X			kg
	▲	Text for the 1st printout line (header)	**"H 1"**	X			
	▲	Text for the 2nd printout line (header)	**"H 2"**	X			
		Calibration parameters					

Keys		Basic settings (Valid for the protective function "**parameter mode 2**") and the **MEAS** position of the calibration switch		Parameter protected by: function 98	CAL/MEAS	Code	Standard setting
05 (menu 05)		Transmitter constant - type plate	"**Span**"		X	X	MEMbox
	▲	Transmitter constant - type plate	"**Offset**"		X	X	MEMbox
	▲	Calibration factor	"**m spe**"		X		1.000
	▲	Evaluation factor for the positive flow	"**p spe**"		X		1.000
	▲	Evaluation factor for the negative flow	"**n spe**"		X		1.000
	▲	Adaptation value for low flow rates	"**b spe**"		X		0.000
	▲	Conversion factor for the volume unit	"**m dim**"		X		1.000
	▲	Smallest metering quantity (for W&M-approved systems)	"**Vmin**"		X		20.000
	▲	Input of any freely definable unit	"**free unit text**"		X		
06 (menu 06)		**Check Values** (will be activated automatically)					
		Program checksum (officially W&M approved checksum)	"**eprsum**"	-	-	-	**201402**
	▲	Parameter checksum (checksum) of the **CAL/MEAS** data	"**eparasum**"	-	-	-	
	▲	Parameter checksum (checksum) of the other data	"**nparasum**"	-	-	-	
	▲	Sensor type	"**sentyp**"	-	-	-	**12289**
	▲	Sensor number	"**senno.**"	-	-	-	
	▲	Position of the calibration switch	"**switch position**"	-	-	-	**MEAS**
	▲	State of the MEMbox	"**MEMBOX**"	-	-	-	**ok**
	▲	Version number of the user program	"**User IZMSA** "	-	-	-	
	▲	Version number of the system program	"**System SS**"	-	-	-	
	▲	Version number of the application program	"**Appli SA**"	-	-	-	
	▲	Date of the recent download	"**download**"	-	-	-	
08 (menu 08)		**Date / Time**					
		Input: day	"**day**"	X			
	▲	Input: month	"**month**"	X			
	▲	Input: year	"**year**"	X			
	▲	Input: hour	"**hour**"	X			
	▲	Input: minute	"**minute**"	X			
	▲	Input: second	"**second**"	X			

Table 8: Parameters and Basic Settings

32.1.1. Device Parameters (Menu 02)

<table>
<tr><th>Type of Parameter</th><th>Meaning</th><th>Remarks
Standard settings</th></tr>
<tr><td>DN</td><td>determines the nominal width of the transmitter</td><td>is stored in the MEMbox</td></tr>
<tr><td>Unit</td><td>determines the unit for the volume

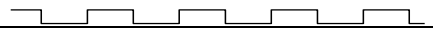
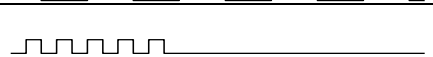
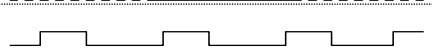
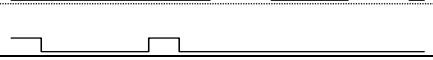
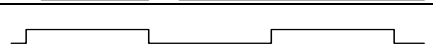
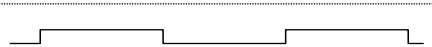
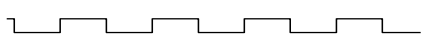
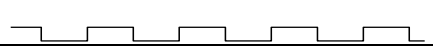
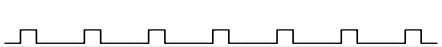
- When the unit is changed, the factor "m dim" is changed <u>automatically</u> according to the conversion factor.
- The setting "free unit" results in a blank after the volumetric value; only in that case the factor m dim can be freely changed as desired. In "menu 04" under the parameter "free unit text" it is possible to input 3 characters for the selected volume unit.</td><td>
<table>
<tr><th>Sign</th><th>Unit</th><th>m dim</th></tr>
<tr><td>l</td><td>litres</td><td>1</td></tr>
<tr><td>m³</td><td>cubic meters</td><td>0.001</td></tr>
<tr><td>hl</td><td>hectolitres</td><td>0.01</td></tr>
<tr><td>ml</td><td>millimetres</td><td>1000</td></tr>
<tr><td>gal</td><td>U.S. gallons</td><td>0.2642</td></tr>
<tr><td>gal</td><td>gallons (CDN)</td><td>0.21997</td></tr>
<tr><td>gal</td><td>Imperial gallons</td><td>0.21997</td></tr>
<tr><td>lb</td><td>lb raw milk</td><td>2.27189</td></tr>
<tr><td>bbl</td><td>beer barrels</td><td>0.00611</td></tr>
<tr><td>dm³</td><td>cubic decimetres</td><td>1</td></tr>
<tr><td></td><td>free unit</td><td>free</td></tr>
</table>
</td></tr>
<tr><td>LFS</td><td>Low Flow Suppression:

- Threshold from which on the flow is accepted.
- The setting refers to the flow of 100 % "Qmax".
- Hysteresis of 50% of the set value upon the change-over to the flow stop.</td><td>possible data: 0 ... 10.00%
<u>standard setting:</u> 2.00 %</td></tr>
<tr><td>output mode</td><td>determines the functional conditions for the digital outputs IMP1, IMP2, and IMP3</td><td>possible data: 0...15
- function: see table
- <u>standard:</u> → 1</td></tr>
<tr><td>average</td><td>determines the number of individual measurements required for the calculation of the measured value, i.e., that value determines the attenuation (time constant) of the flow rate indication</td><td>
<table>
<tr><th>Value</th><th>Time constant</th><th>Application</th></tr>
<tr><td>1 ... 8</td><td>0.05 ... 0.4 s</td><td>short filling times</td></tr>
<tr><td>8</td><td>0.4 s</td><td>standard setting</td></tr>
<tr><td>17 ... 64</td><td>1 ... 4 s</td><td>in case of irregular flow conditions, e.g. at a pulsating flow</td></tr>
</table>
</td></tr>
<tr><td>Currmode 0/4...20 mA</td><td>determines the range of the analog output</td><td>0 ... 20 mA or 4 ... 20 mA
<u>standard:</u> 4 ... 20 mA</td></tr>
<tr><td>“pipe detect“</td><td>activates or deactivates the internal EMPTY pipe detection to suppress undefined measurements</td><td>pipe detect → function active (standard)
no pipe detect → count suppression switched off.
To be entered in case of low conductivity and pulsating flow!</td></tr>
<tr><td>Standby mode</td><td>determines the function of the digital input IN1</td><td>0 → Switches off the display and the coil current
2 → <u>Standard setting</u>
Count interrupted by activation of IN1
4 → In case of quantity preselection only:
Stop function via IN1
5 → In case of quantity preselection only:
Extended selection of quantities via IN1 (= high-byte)
(8 quantities max., binary coded)</td></tr>
</table>

Type of parameter	Meaning	Remarks Standard settings
Parameter mode	**Protection against the modification** of parameters determines how the parameters are protected against unauthorized change (see column "**function 98**"/ "**CAL/MEAS**")	0 → Only the calibration parameters are locked by means of the calibration switch "**CAL/MEAS** ". 1 → "**CAL/MEAS**" locks <u>all</u> parameters. **2** → <u>Standard setting:</u> a. The calibration parameters are protected by the calibration switch. b. Possible modification of the other types of parameters by F 9 8.
out 4 mode	determines the function of the digital output **OUT**	0 → Output is set, if device is okay. 1 → Only in case of quantity preselection: Signal, when the filling process is finished. **2** → <u>Standard setting</u>: = Error message off: no error on or flashing error status 3 → Only in case of quantity preselection: (horn function) Signal, when the throttled quantity has been reached before the end 4 → Empty pipe message Signal, when the "internal"empty-pipe message is active 5 → Flow message Signal, when the flow is different than zero. (Irrespective of the flow direction!) 6 → Zeroing signal for the remote counter An output signal is generated upon the zero reset

Table 9: Device Parameters

32.2. Output Mode

Output mode	Output	Pulse diagram	Max. frequency	Pulse duration or Pulse-to-pause ratio	Direction V ⇒ +	Pulse value	Function	Function IMP3
1	IMP1		1000 Hz	Max. pulse duration tp1/tp2 can be programmed in ms / at “0 ms”: Pulse-to-pause ratio 1: 1	⇔	pv1	2 independent pulse counters with different values **pv1** and **pv2**; pulse output independent of the flow direction	⊕ flow “on “
	IMP2					pv2		
2	IMP1		1000 Hz	Pulse-to-pause ratio 1: 1	⇔	pv1	2-channel antivalent (shifted by 180°) pulse transmission (W&M-approved) with the pulse value **pv1**; in case of malfunction **IMP2** is switched off	⊕ flow “on “
	IMP2					---		
3	IMP1		1000 Hz	**IMP1** with **pv1** and tp1	⇔	pv1	Quantity preselection function (QPS). **IMP2** and **IMP3** switch valves?	main contact
4	IMP1		1000 Hz	Pulse duration 0.5 ms	⇔	pv1	Pulses are (quickly) output as a package	⊕ flow “on “
	IMP2			Max. pulse duration tp2 can be programmed in ms		pv2	Independent pulse transmission with the pulse value **pv2** in both directions	
5	IMP1		1000 Hz	Max. pulse duration tp1/tp2 can be programmed in ms / at “0 ms”: Pulse-to-pause ratio 1: 1	⇨	pv1	Pulse count with both an arbitrary pulse value **pv1** / **pv2** and pulse duration tp1/tp2	⊕ flow “on “
	IMP2				⇦	pv2		
6	IMP1		333 Hz	Pulse-to-pause ratio 1: 1	⇔	pv1	3-channel pulse transmission shifted by 120° (W&M-approved) with the pulse value **pv1**; in case of malfunction **IMP2** is switched off	
	IMP2					---		
	IMP3					---		
7	IMP1		500 Hz	Pulse-to-pause ratio 1: 1	⇔	pv1	2-channel pulse transmission, shifted by 90°; in case of malfunction **IMP2** is switched off	parallel to **IMP2**
	IMP2					---		
8	IMP1		1000 Hz	Pulse-to-pause ratio 1: 1	⇨	pv1	2-channel pulse transmission (pulse shape as “**output mode 2**”) with storage and suppression of 16,383 reverse pulses max.; **IMP2** is switched off in case of malfunction	⊕ flow “on “
	IMP2					---		
9	IMP1		1000 Hz		⇨	pv1		⊕ flow “on “

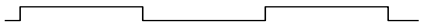
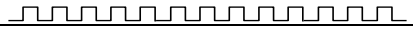
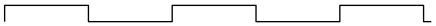
Output mode	Output	Pulse diagram	Max. frequency	Pulse duration or Pulse-to-pause ratio	Direction V ⇒ +	Pulse value	Function	Function IMP3
	IMP2			Max. pulse duration tp1/tp2 can be programmed in ms / at “0 ms”: Pulse-to-pause ratio 1: 1		**pv2**	2 independent pulse counters with different values **pv1** and **pv2**; with storage and suppression of 16,383 reverse pulses max.; **IMP2** is switched off in case of malfunction	
10	**IMP1**		1000 Hz	Pulse duration 0.5 ms	⇨	**pv1**	Pulses are (quickly) output as a package. storage and suppression of 16,383 reverse pulses max.	⊕ flow “on “
	IMP2			Max. pulse duration tp2 can be programmed in ms / at “0 ms”: Pulse-to-pause ratio 1: 1		**pv2**	Pulse transmission with the pulse value **pv2.** storage and suppression of 16,383 reverse pulses max.	
13	**IMP1**		100 Hz	Programmable in ms by tp1	⇔	**pv1**	Low-frequency pulse output	⊕ flow “on “
	IMP2		1000 Hz	Pulse duration 500 µs - 4		**---**	Frequency output 1 kHz · max. flow	
15	**IMP1**		500 Hz	Pulse-to-pause ratio1: 1	⇔	**pv1**	For terminal board MIF 98	Error
	IMP2		1000 Hz			**---**		

Table 10: Survey of Functions of the Digital Outputs

32.3. Input/Output Parameters (Menu 03)

Type of parameter	Meaning	Remarks Standard setting
Qmax	determines the maximum flow value referred to the calibrated metering range. Allocation for the analog value Q_{max} = 20mA.	Final value of the metering range for the flow per hour or per minute. The automatic conversion of the metering range is effective up to 10 m/s.
pv1	determines the **value** of the pulse output **IMP1** in pulses per volume unit (unit). For the modification the calibration switch must be set to "**CAL** ".	In case of several channels (2 or 3 channels) the value of **pv1** is relevant (see "**output mode**").
pv2	determines the **value** of the pulse output **IMP2** in pulses per volume unit (unit). Without having to open the housing, you can carry out a modification via "**function 98**".	Only effective at "**output mode**" 1, 4, 5, 9, 13.
tp1 ... tp2	determines the maximum pulse duration for pulse output **IMP1**.	Standard setting: **125 ms** - Only effective at "**output mode**" 1, 3, 5, (1-channel pulse transmission) - **tp1** = 0 results in the pulse-to-pause ratio of 1:1.
	determines the maximum pulse duration for pulse output **IMP2**.	Standard setting: **125 ms** - influence possible at "**output mode**" 1, 4, 5, 10, 13 (1-channel pulse transmission) - **tp2** = 0 results in the pulse-to-pause ration of 1:1.
tp3	attenuates the analog output of **0/4 ... 20 mA**	Standard setting: **1s**
it1 ... it4	**Debouncing time** Duration of the activation of the associated digital inputs **IN1 ... IN4** required for the activation of the function.	Standard setting: **125 ms**

Table 11: Input/Output Parameters

it1: Default setting 125 ms for input IN1 until activation of the set function. In **standby mode 4** (STOP function), when **it1 = 0,** the input IN1 is continuously monitored. Starting quantity preselection is prevented when IN1 is set.

it2: Time for input IN2 until activation of the preset function.

it3 and **it4** have no function except for special applications.

32.4. Display Parameters (menu 04)

Type of parameter	Meaning	Remarks Standard setting
Q-Typ	determines the indication for the flow in the volume unit "**per minute**" or "**per hour**".	Standard setting: per hour (e.g., l/h) for the USA: per minute (e.g., gal/m)
V Format frac	determines the number of digits after the decimal points of the main counter "**V**".	Possible data: 0 ... 6
V2 Format frac	determines the number of digits after the decimal points of the daily quantity counter "**V2**".	Possible data: 0 ... 6
decimal point	determines the display of the decimal point	"**,**" general default "**.**" e.g., for USA
date format	defines the format for the date display	default: DD.MM.YY e.g., 01.02.17 USA MM/DD/YY e.g. 02/01/17
display mode	determines whether the display unit is additionally checked (W&M application).	**0** → Standard a.) "**Error**" message is reset automatically. b.) Possible reset to zero of counters **V** and **V2** at existing flow (Q→0). 1 → **as a main counter** in W&M-approved systems 2 → W&M-approved version without main counter 3 → W&M-approved version without main counter with flow control between 10 – 100 % of Qmax
unit id	device number for ticket printout	**0** → **default**
baud rate 8N1	determines the transfer speed of the **RS232**-interface. 8N1 means: 8 data bits, no parity, 1 stop bit in printer mode 4, 5 and 6 even parity	**default** → **9,600 bit/s,** smallest value: 300 bit/s doubling in each case up to a value of 38,400 bit/s. Also 57,600 and 115,200 bit/s
free unit text	3-character text for any unit of measurements	is displayed when the parameter "**unit**" (**menu 02**) has been changed to "**free unit"**. The value of this unit can be set in "**menu 05"** with "**m dim**" as a factor
H1	1st line as header	Input of a 28-character text which is printed on the first line of the individual record
H2	2nd line as header	Input of a 28-character text which is printed on the second line of the individual record

Table 12: Display Parameters

33. Structure of the Data Memory

The data memory of flow meter type **IZMSA-S0** is structured as follows:

- The measured values (of the main counter, the daily quantity counter, and the totalizing counter) are stored in a volatile memory of a typical data retention period of one week.
  Weights & Measures-approved flow meters with an integrated display are equipped with a battery which permits a typical data retention period of 7 years.

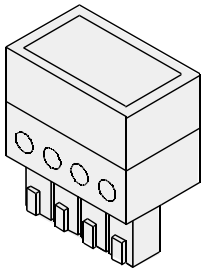
- If suitable for the operational mode "**quantity preselection**" ("**output mode 3**"), the flow meter is also equipped with a battery that allows the calculated data:
  - automatic switch-off compensation (valve closing time)
  - statistics of packing drums

  to be stored for a typical period of 7 years.

- All parameters which are important for the metering point (such as volume unit, pulse value, flow range etc.) are kept on the main board in an EEPROM.

- The calibration data of the transmitter like **SPAN**, **OFFSET**, **DN** (nominal width), and **ZERO** (zero signal) are kept in the pluggable read-only memory, the so-called **MEMbox**.

After the commissioning of the **IZMSA-S0** the **MEMbox** is normally inserted into the appropriate plug of the electronic unit.



In that condition, the special data of the measuring point is automatically copied from the read-only memory of the board into the **MEMbox** in addition to the calibrating data of the transmitter. The same applies to the calibration data of the transmitter which is automatically stored into the read-only memory of the board.

This procedure allows a double data storage with the effect that the replacement of the transmitter or converter is simplified.

33.1. Determination of Parameters and Calibration Data

33.2. Calibration Factor "m spe"

A shifting of the measured value determined on site (e.g., during the calibration) is corrected by the calibration factor "**m spe**":

$$m\ spe\ (new) = \frac{V_{ref}}{V_{dis}} \cdot m\ spe\ (old)$$

Formula 1: m spe

V_{ref} → Volume setpoint (e.g., calibration vessel, balance, or something similar)

V_{dis} → **IZMSA-S0** display volume

Example 2: Calibration Factor “m spe”

A deviation **dF%** of +0.2 % is determined upon the calibration of a flow meter type **IZMSA-S0**

Calibration vessel: V_{ref} **= 500 l**

Display: V_{dis} **= 501 l**

$$m\ spe = \frac{500}{501} \cdot 1.0 = 0.9980$$

33.3. Positive Flow Factor "p spe"

The flow can be separately revaluated in the arrow direction of the transmitter in the same way as the calculation of the calibration factor "**m spe**". The calculation corresponds to that of the calibration factor “**m spe**“:

"**p spe** “> 1.0000 → positive flow value is increased.

"**p spe** “< 1.0000 → positive flow value is decreased.

33.4. Negative Flow Factor "n spe"

The flow can be separately revaluated opposite to the arrow direction of the transmitter in the same way as the calculation of the factor "**p spe**". The calculation corresponds to that of the calibration factor “**m spe**“:

"**n spe** “> 1.0000 negative flow value is increased.
"**n spe** “< 1.0000 negative flow value is decreased.

33.5. Dimensioning Factor "m dim"

The dimensioning factor "**m dim**" (e.g., density factor) serves for the conversion into freely selectable measuring and volume units.

V	45.7 l
unit	free unit

This factor can be freely set only if the unit “**unit free unit** „is set in [▭] (0) (2) (“**menu 02**“).

Example 3:

Measurement of US gallons, but the displayed reading shall be in “**lbs** “.

Density factor: 8.34 $^{lbs}/_{gal}$ „m dim 8.340"

33.6. Fine Adaptation by “b spe”

Corrections can be realized at low flow rates by means of “**b spe**”. For that purpose, the measured volume “**V dis**” is compared with the volume setpoint “**V ref**” at the small flow “**q%**”.

The “b spe” value results from the following calculation:

$$b\ spe = \frac{V_{dis} - V_{ref}}{V_{ref}} \bullet q\ \%$$

Formula 2: b spe

Example 4: “b spe” Value

(a) At a flow of 100% the displayed quantity and the contents of the calibration vessel are equal.

(b) However, at a flow of 8% only and an exact content of the calibration vessel of 100 litres, flow meter type **IZMSA-S0** will show a value of 100.39 … 100.45 litres:

The average value of 100.42 litres results in the following correction value:

$$b\ spe = \frac{100.42 - 100}{100} \bullet 8\% \rightarrow b\ spe = -0.0336$$

34. Help in Case of Malfunction

34.1. Error Messages

The converter type **IZMSA-S0** is equipped with an integrated self-diagnosis, i.e., malfunctions are automatically detected and, if necessary, removed.
Dependent on the parameter type "**display mode**" the message on the display or on the service terminal **ST6X** is permanently shown in a flashing way, and it is only acknowledged when the main counter is reset ("**display mode 1**") or the message extinguishes automatically, if the malfunction removed itself ("**display mode 0**").

Error no.:	Diagnosis	Corrective actions
901	Continuation of the measurement after an interruption due to: - power fade (POWER-FAIL) - change of parameters - activation of the digital input "**IN1**" - reset/abort	Signalization that the measured result could be falsified by the interruption. The message is erased either by resetting the individual quantity to zero or automatically after 40 seconds.
903	Signal overflow within the electronic unit by: - too high flow rate (> 12 m/s) - electrical influences that might occur when the meter tube is empty. - electronic unit defective	a. Check the flow. b. If the meter tube is empty, the verification can be carried out by short-circuited electrodes only. c. Exchange the main board.
905	Disturbance by EMC irradiation or faults found upon an internal examination of the quantitative registers.	a. The measured result could be falsified by the interfering radiation. - The message is reset when the individual quantity is reset to zero. b. Examination of the whole installation for EMC interferences; frequency converters must be laid into separate cable channels. - Ensure good shielding and earthlings/groundings for all devices. - Use the compact flow meter version for critical installations.
922	Fault in the checking routing.	Replace the main board.
923	Examination of the chain of electric amplifiers: Exceeding the tolerance by more than 0.25 %.	- In case of a short-time malfunction the message is either reset automatically or must be acknowledged by a reset to zero of the individual quantity. - Switch the power supply ON and OFF. - In case of a permanent malfunction the main board should be replaced.
924	Defective amplifier chain	Exchange the main board.
928	Coil current out of tolerance	Exchange the main board or the POWER unit.

Error no.:	Diagnosis	Corrective actions
932	Message → "**no current** " No coil current available	- Check the coil cable or the coil contacts no. 11/no. 12. - Check the coil resistance (approx. 50 – 150 ohms) - Exchange the main board or the POWER unit.
963	Exceeding the pulse output of output channel **IMP1**	- Adapt the flow rate. - Reduce pulse value "**pv1**".
964	Exceeding the pulse output of output channel **IMP2**	- Adapt the flow rate. - Reduce pulse value "**pv2**".
3045	Message is only shown when the 2-stage quantity preselection function is activated: „Too short throttling phase at the end of filling ".	- Reduce the flow rate in the throttling phase. - Increase the duration of the throttling phase by parameter "**vc**".
3046	Message is only shown when the 2-stage quantity preselection function is activated: „Too high flow rate in the throttling phase ".	- Reduce the flow rate in the throttling phase. - Change over to the 1-stage quantity preselection function.
3049	Message is only shown when the 2-stage quantity preselection function is activated: „No automatic switch-off compensation possible ".	- Adapt the tolerance range for the calculation of the switch-off compensation. increase parameter "**vn** ".
3050	The set maximum flow rate "**Qmax**"is too large.	- Adapt parameter "**Qmax** ".
3063	The pulse value "**pv1**" set for counting output **IMP1** is too high (>1.000 Hz).	- Reduce pulse value "**pv1**".
3064	The pulse value „**pv2**" set for counting output **IMP2** is too high (>1.000 Hz).	- Reduce pulse value "**pv2**".
3070	One of the calibration factors is set to zero.	A faulty or wrong MEMbox has been installed: - Insert the correct MEMbox. - Put in the factors (e.g., SPAN) by hand.
3083	Faulty zero point ("**ZERO-Adjust**").	Determined value is out of tolerance and has not been stored: - Manual **ZERO** input is possible in "**menu 70**".

Table 13: Error Messages

35. Typical Effects or Possible Malfunctions

35.1. The Display Shows "warning 901"

This flashing message only serves for the information that an interruption occurred during the running measurement.

Normally the message is automatically deleted after 40 seconds or in case of W&M-approved flow metres when the individual quantity is reset to zero.

During the Commissioning the Display Shows an Unexplained Message or the Permanent Message "Auto Test":

(a) Short-circuit the electrode input terminals 14, 16, 18 of **MB1**:

- If the display is in order now, the transmitter should be reconnected, and the meter tube should be refilled with liquid.
- If the same effect occurs again, the complete flow meter type **IZMSA-S0** will have to be exchanged.

- If the electrode input is short-circuited and the display is not yet okay, check whether there are metal pieces (shielding braid, scobs) on the boards and/or check the boards for humidity. In case of moisture the board will have to be replaced by a new one. If no striking features are ascertained, it is recommendable to exchange the complete converter.

(b) Generate flow and observe the pilot lamps on the **JB2** board. If pulses are transmitted, the fault must be searched on the display board or on the **MB1** board, i.e., those boards will have to be replaced.

35.2. If Existing Flow is Not Displayed:

(a) Is the flow direction opposed to the direction of the arrow and has the factor "**n spe 0**" been set?

(b) Is the chosen parameterization not favourable, i.e., has for example a large volume unit ("**m3**" or "**bbl**") to be measured by a device of a small nominal width? Or is the final value of the metering range too high, thus causing the low flow suppression "**lfs**" to become active?

(c) Is the conductivity higher than 5 µS/cm?

(d) Has the internal **EMPTY-pipe detection** to be switched off,

- if the conductivity falls below 50 µS/cm?
- if the nominal width of the connected type of transmitter is smaller than DN15?
- if there is a heavily pulsating flow?

35.3. The Pulse Transmission is Disturbed Although Flow is Displayed

(a) Check the electric circuit (the **IZMSA-S0** outputs must be supplied by an auxiliary direct voltage of 24 volts).

(b) Is the polarity of the pulse counter correct?

(c) Check the user parameters for:

-	pulse value ("**pv1**"/ "**pv2**")	too low frequency?
-	pulse length ("**tp1**"/ "**tp2**")	too short pulse duration?
-	functionality ("**outputmode**")	which reaction should the outputs show?

The diagnosis for this kind of error is supported by functions "**838**"and "**839**":

It is advisable to make a "**hardware test**" to check the pulse transmission (hardware) from the measuring instrument to the display/counter. The "**hardware test**" is activated by key sequence F 8 3 9.

The simulating function activated by the key sequence F 8 3 8 suggests itself for the examination of the function and setting.

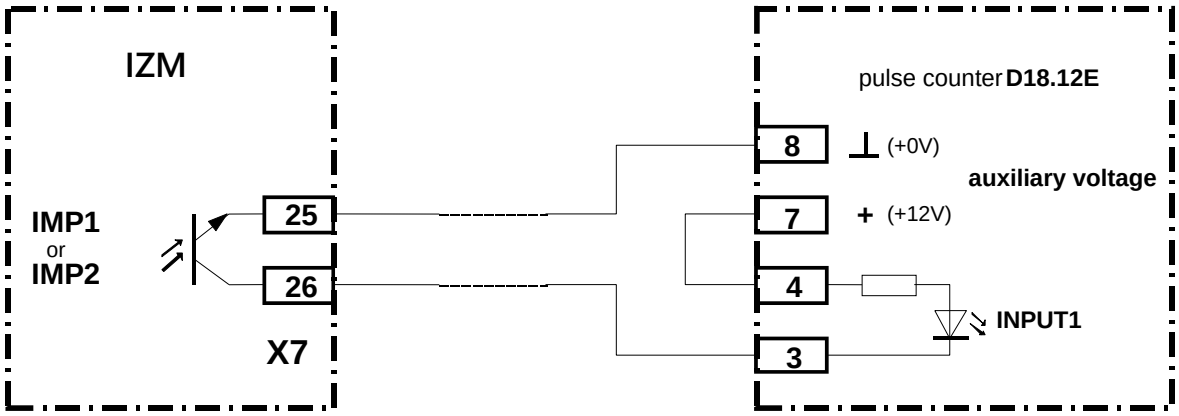


Figure 7: Example for the Connection of a Pulse Counter

35.4. No Analog Signal Available

Unless an analog signal is available or if a faulty analog signal is measured, it is recommended to carry out the following checks:

a. First, the connected measuring system (digital indicator, PLC, or similar devices) has to be completely disconnected from the **IZMSA-S0**, and the analog output signal has to be checked by means of an ammeter by application of the simulating function F 8 3 8:

- If the analog output is ZERO at a 50% simulation, the electronic part is defective, i.e., it is necessary to exchange:
  - the junction board **JB2** *or*
  - the main board *or*
  - the whole converter
- If the analog output is constantly kept at 20 mA, it should be checked whether the parameter in "**menu 02**"is set to "**currmode 20 - 20 mA** ".

b. If the differences only occur after the connection of the external evaluating device, the following points should be checked:

- Does the burden of the whole loop exceed 500 ohms? (Observe the technical data sheets of the connected devices!)
- Has the input of the external evaluating device been set to „**active**"by error?
  Especially the connection to a PLC could cause some errors due to the fact that the configuration can both be "**active**„ and "**passive** ".

c. If some nonlinear conditions occur over the whole range from 0 - 100%, it should be checked,

- whether the burden of the whole loop is higher than 500 ohms?
  If those values are in order, the junction board **JB2** must be replaced because there is no adjusting possibility.

35.5. Strong Fluctuations of Measured Values

(a) The measuring signals can be checked by means of the **ZERO-Test** function while the liquid is steady and at rest:

- Normally the value of this measurement should be between -300 and +300 units.
- Between the repeated measurements, the displayed value may not change by more than 10 units. If there is no stability, check the earthing/grounding of the transmitter. The cabling between transmitter and converter must be shielded by means of the metal cable gland.

(b) The same check can be carried out while the transmitter is removed, and the meter tube is filled.

(c) Check the whole pipeline for possibly existing bypass lines or any spots allowing the inclusion of air (faulty seals).

(d) Verification of the reference devices or the procedure (reference meter, balance without temperature compensation, different products compared to the measured value of the balance, utilisation of different calibration vessels with different volumes, start and stop of the measurement while the meter tube is empty, etc.).

(e) Low conductivities or pulsating flow upon the application of the internal **EMPTY pipe detection**.

(f) Humidity or any other faults in the transmitter or in the converter.

35.6. Reset of Error Messages

An error message is reset:

(a) by the activation of the ZERO key at the same time when the main counter is reset to zero.

(b) by the activation of the digital input **IN2**.

(c) automatically after 40 seconds max, provided that no further error occurred (in case of W&M-approved flow meters only).

35.7. Displayed Messages

The following messages could be displayed because of operating errors or certain functions:

Display	Remark
change not allowed	Attempt to make an input that is not allowed: a.) for a data type that cannot be modified (e.g., "**eprsum**") or b.) for a data type that can be set at the factory only (MEMbox).
parameter locked	Attempt to modify a protected parameter: Possible change: a.) by F 9 8. b.) Set switch **S3** to "**CAL**". c.) MEMbox values require the additional input of a special code:
code _ _ _ _	This parameter type (MEMbox data) requires the input of a code number.
wrong number	The entered value is not defined or allowed.
protected mode	This parameter type is protected by the calibration switch "**CAL/MEAS**".
use type free unit	Attempt to input **m dim** which is not allowed; **m dim** (**menu 05**) can only be changed if the volume **unit** (**menu 02**) has been set to **free unit**.
menu _ _	Selection of the parameter types by key −.

Display	Remark
function 98 ignored	F 9 8 cannot be carried out, as a.) the "**CAL/MEAS**"switch is set to "**CAL**". b.) "**parameter mode 0**"or "**parameter mode 1**"is set.
standby mode 3	Attempt to activate an inadmissible count interruption by key sequence F 9 9.
print - -	0 1 printer activation for printing out the parameters.
insert MEMbox quit with <enter>	MEMbox from the transmitter has to be plugged into the converter.
printer not ready quit with <enter>	Upon a zero reset it is not possible to print out a voucher, because the printer is not connected or not switched on or defective. Depress ENTER to delete the message. If necessary, reset the parameter "**printer mode 0**" to stop the message from being displayed.
warning 901	Information that the measurement was interrupted due to an external operation.
function ignored	Function not allowed.
preset in progress	Message upon the quantity preselection function, stating that the filling process is instantaneously running and that it is not possible now to input a preselection quantity.
no current	Coil connection to the transmitter does not correct or not linked.

Table 14: Plaintext Messages

36. List of Possible Key Functions

F 0 0	Zero-point measurement "**ZERO Adjust**"("**ZERO Test**")
F 0 1	Only possible when the quantity preselection function is set: "**CIP**"function (deactivation by means of the STOP key).
F 0 2	Only possible when the quantity preselection function is set: "**CIP**"function with suppressed quantity count.
F 0 3	Only possible when the quantity preselection function is set: Valve opens upon a normal measurement.
F 9 8	Opens the parameter input protection ("**PROG-switch ON**").
F 6 2 7	Resets a parameter to its defined original status ("**insert** MEMbox").
F 8 3 5	Resets all volume registers, the automatic switch-off compensation, and the statistics of packing drums (only possible when the quantity preselection function is preset).
F 8 3 8	Service function "**output simulation** "
F 8 3 9	Service function "**hardware test** "

37. Output Simulation

Using the **"Output Simulation"** service function, the digital outputs and the analog output are simulated with the flow rate set on the display.

This function can only be carried out if the calibration switch is in the **CAL** position.

The output simulation function is called by key sequence F 8 3 8.

The display shows:

Output simulation
Pulseout 50 %

At the set parameters, the outputs now supply the signals that are corresponding to a flow rate of 50 %.

The simulated flow rate can be changed by the arrow up ▲ and the arrow down ▼ keys.

The output simulation is ended by pressing the “CLEAR” key.

38. Hardware Test

The “**hardware test program**” can be used for testing both the inputs and outputs of the **IZMSA-S0** and the connected peripherals. The function is called by key sequence F 8 3 9:

	2nd line of the display	Function	D11	D14	D17	D20	D5	D6	D7	D8
	all outputs off	all digital outputs are switched off					o	o	o	o
▲	**OUT1 on**	only output **IMP1** is through-connected					x	o	o	o
	OUT2 on	only output **IMP2** is through-connected					o	x	o	o
	OUT3 on	only output **IMP3** is through-connected					o	o	x	o
	OUT4 on	only output **OUT4** is through-connected					o	o	o	x
▲	**Anaout 4 mA**	4 mA at terminal **X8** #5/#6								
	Anaout 20 mA	20 mA at terminal **X8** #5/#6								
	IN1=0 IN2=0 IN3=0 IN4=0	no input is activated	o	o	o	o	o	o	o	o
▲	**IN1=1 IN2=0 IN3=0 IN4=0**	only input **IN1** is activated	x	o	o	o	o	o	o	o
	IN1=0 IN2=1 IN3=0 IN4=0	only input **IN2** is activated	o	x	o	o	o	o	o	o
	IN1=0 IN2=0 IN3=1 IN4=0	only input **IN3** is activated	o	o	x	o	o	o	o	o
	IN1=0 IN2=0 IN3=0 IN4=1	only input **IN4** is activated	o	o	o	x	o	o	o	o
▲	**Curr1 on**	The coil current is constantly kept at approx. +100 ... 110 mA, metered at terminal #11/#12.								
	Curr2 on	The value of the metered coil current must be <u>almost equal</u> to “**Curr1 on**” (±0.3 mA), but with the reversed polarity.								

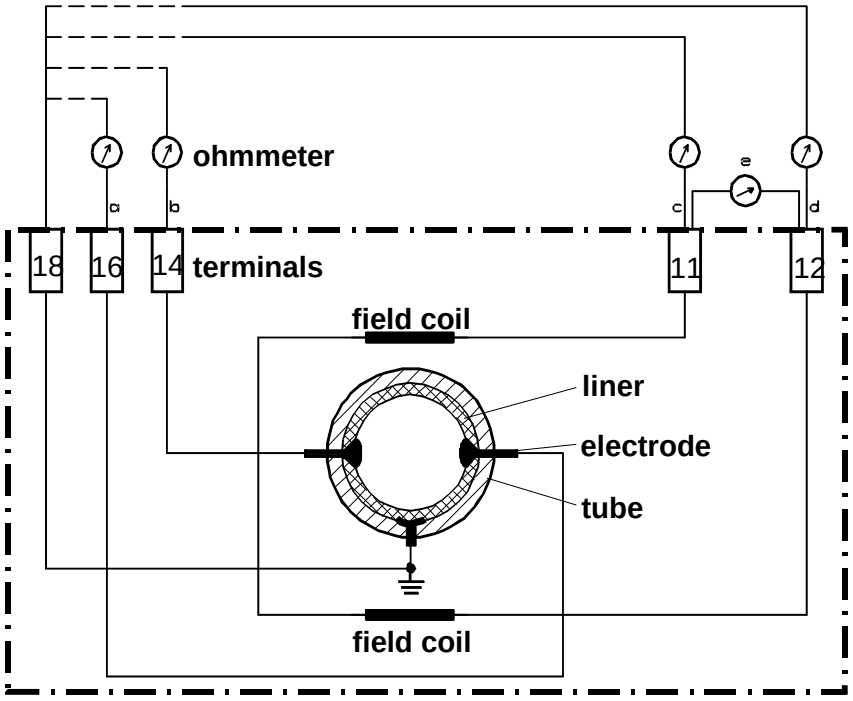
Table 15: Hardware Test

The hardware test is ended by pressing the “CLEAR” key.

39. Transmitter Test

39.1. Insulation Test

The test is carried out by means of an ohmmeter. First, the meter tube of the transmitter must be emptied completely. The internal pipe must be entirely dry, especially for measurements a.) and b.).



	Ohmmeter to terminal	Desired resistance
a	14 / 18	> 20 MΩ
b	16 / 18	> 20 MΩ
c	11 / 18	> 20 MΩ
d	12 / 18	> 20 MΩ
e	11 / 12	70...120 MΩ

Figure 8: Insulation Test

39.2. Symmetry Test

For the symmetry test the transmitter must be filled with the liquid to be metered and connected as shown in the figure below. The metered alternating currents of measurements 2 (electrode 1 - ground) and 3 (electrode 2 - ground) must be equal within a tolerance of ±3 %.

On no account the individual current values may be drifting over a longer period (5 minutes) during the measurement!

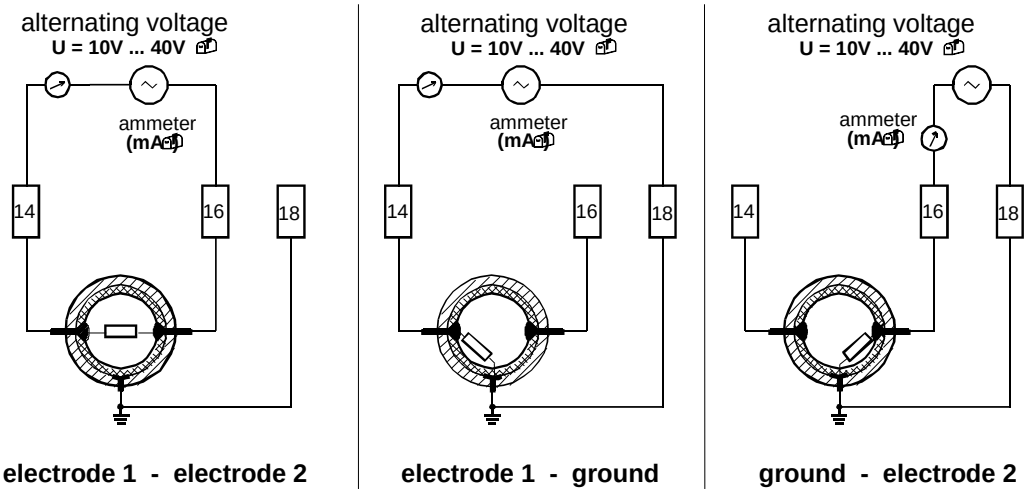


Figure 9: Symmetry Test

39.3. Visual Check

In the built-out status the transmitter can be subject to a visual check:

Findings	Action
Humidity in the connection housing.	Dry the housing and perform an insulation test.
Damaged PFA liner	Replace the transmitter; check the seal!

Table 16: Visual Check

40. Maintenance

40.1. Upkeep

On normal operating conditions the flow meter type **IZMSA-S0** does not require any special maintenance work.

Cleaning

Deposits in the meter tube or at the electrodes cause measuring errors or malfunctions.

Thus, ensure a regular and careful cleaning of both the pipelines and the flow meter.

During the external cleaning see to it that e.g., no high-pressure steam-jets are directed to the housing parts.

In case of flow meters with integrated display the external cleaning temperature may not exceed 50 °C.

Keyboard and display should only be cleaned by means of clear water and a soft cloth.

Seals

Usually, the flow meter itself is no equipped with any pipe seals. However, the fitting ambience of the flow meter (measuring spot) always must be equipped with a seal.

That seal must be replaced from time to time.

In case of threaded milk pipe fittings, the sealing of the pipeline may on no account be carried out by force. There is the risk that the screwed counter connection will destroy the insulation of the meter tube.

40.2. Safety Precautions for Maintenance

Maintenance and repair work may be carried out by skilled and accordingly trained personnel only.

CAUTION:
First ensure your personal safety before you will start with any service and maintenance work!

- Appropriate measures must be taken to guarantee a safe stability (approved ladders, lifting platforms, safety harnesses, etc.).
- Applicable tools and personal protective measures are necessary.
- Before you start working at electrical or rotating equipment, make sure that the equipment concerned is disconnected from the power supply network. An unintended restart must be avoided by suitable safety precautions (e.g., information sign, padlock).
- Fittings and instruments and their contents can be hot! First permit them to cool down before you will start working at such parts.
- If fittings and instruments must be removed from the pipe system, the whole pipe system must be completely emptied, depressurized, and protected by some appropriate shut-off measures.
- To remove possible residuals of chemicals, rinse the pipe system with clear water before the disassembly of fittings or instruments.

40.3. Preventive Maintenance Steps

A regular and careful maintenance of the measuring spot (flow meter in its fitting situation) is indispensable in order:

- to avert any danger for persons and the environment,
- not to endanger the product quality,
- not to reduce the service life of the system and its components.

The preventive maintenance steps for the flow meter type **IZMSA-S0** refer to the following parts:

a) storage battery

b) seals of the pipe connections

The recommended maintenance intervals result from the experience in other systems. However, the really required maintenance intervals can considerably differ from that experience for the following reasons:

♦ Daily running time and number of the annual production days

- ♦ Aggressiveness of the media
- ♦ Frequency of cleaning phases, especially with hot water and caustic solution as well as disinfectants
- ♦ Duration and temperature of the cleaning phases
- ♦ Possible beginning to dry of product residuals.

Anderson-Negele proposes to proceed in the following way:

a) Continuous control of the measuring spot

The **operators** of the system should **permanently** pay attention to:

- occurring leaks
- unusual measuring results

b) Regular maintenance:

3 different strategies suggest themselves:

1. A consequent replacement of **all** seals and wearing parts in regular intervals, e.g., every year. Exceptions must be allowed as a matter of course.

2. Replacement of heavier stressed seals and wearing parts in short intervals (e.g., once a year) and of less stressed parts in larger intervals (e.g., every 2 years). It is important that the serviced components are marked accordingly.

3. Exchange of the seals and wearing parts when required (e.g., when leaks occur). On that occasion it is reasonable to replace the wearing parts in the whole adjoining area, especially of the strongly stressed parts. It is indispensable to mark the serviced components accordingly.

4. Accuracy tests of the measuring instruments of the system in regular intervals in the frame of the in-house quality assurance. Moreover, the measuring instruments should be regularly calibrated at the manufacturer's workshop.

Of course, the aforesaid regular maintenance work can be carried out by the specialists of our service department, if preferred. If so, the desired date should be co-ordinated in good time, to combine any predictable production pauses of the system with the schedule of our service staff.

41. Repairs

41.1. Sending in the Flow Meter to the Manufacturer

If repairs must be carried out at the factory, the following conditions will have to be fulfilled to enable a quick and cost-effective settlement.

The components/devices must be packed in such a way that a damage in transit is excluded.

- The forms "**Fault Location Report**" and „**Declaration of Product Safety** „which you will find in the appendix of this instruction manual have to be completed and added to the delivery of the components/devices to be repaired.

- Without those form the handling of the repairs could be subject to a delay due to superfluous queries.

41.2. Repair Work

Repairs are allowed to be carried out by skilled and accordingly trained personnel only. Interventions in the electronic boards are impossible. It is only possible to exchange complete boards.

For each repair it is indispensable to strictly observe the general maintenance safety instructions.

A replacement of components in the fitting position should be avoided for the following reasons:

- Lock washers could drop out and be left on the electronic part when the fastening screws are loosened.
- Metal particles could destroy the electronic part when the power supply is switched on.
- When the electronic housing is open, there is the risk that moisture could drip down onto the electronic boards. Moisture will immediately destroy the electronic part when the power supply is switched on.

For all kinds of repairs the flow meter must be separated from the power supply.

41.3. Replacement of the Fuse for Feeble Currents

The fuse for feeble currents **F1** serves for the protection of the electronic part against the distribution voltage. That fuse is located on the cover board of the power supply unit.
For the replacement of the fuse, it is first necessary to remove the protecting cap. Only use fuses according to the specified data (e.g., "**315mA/T** ").
After the exchange of the fuse clip the protecting cap over the fuse again.

41.4. Replacement of the Main Board

The main board (**type: MB1**) has been precalibrated at the factory.
The memory must be switched "**data free** "(defined original status) to transfer all parameter data of the measuring spot and the specific calibration data of the transmitter into the new main board:

Function „F627":

Before the power supply is switched on, no **MEMbox** may be plugged onto the main board.
Software function "**F627**"resets all parameters of the internal data memory to their defined original status. After input of that key sequence the lighting of the display is switched off and the display shows the following message:

insert membox

In addition, the utmost right lamp on the upper board is flashing in intervals: 2 seconds ON / 1 second OFF.
In that status the electronic part is waiting for the **MEMbox** to be plugged in.
With the plug-in action of the **MEMbox** all values of that measuring spot are automatically loaded, and the flow meter is ready for operation without requiring any further settings.

41.5. Status upon the Delivery of a Spare Main Board

In case of a normal delivery of a spare main board the status has already been set at the factory, i.e., the aforesaid procedure using "**Function F627**"is not necessary. The flow meter is immediately ready for operation when the **MEMbox** is inserted.

10.4.1.Replacement of the Junction Board

The exchange of the junction board (**type JB2A**) does not require any additional settings to be made.

41.6. Replacement of the Power Supply Unit

The power supply unit can be replaced without necessitating any additional settings.
However, you should check before the replacement whether the power supply range of the spare part is equal to that of the original POWER unit.

41.7. Replacement of the Storage Battery

Metering devices with integrated quantity preselection are equipped with a lithium battery for the storage of the measured data.

On normal operating conditions the typical float life of such batteries is 7 years.
Nevertheless, it is recommendable to replace the battery every 4 years at the latest.
In case of an empty battery the measured data (volume counter) existing before the last switching-off could be erased and error messages could occur.
However, the device data such as the calibration data and the parameters of the measuring spot will not be lost.

Replacement of the Display
The exchange of the display board (**type LAP6**) does not require any additional settings to be made.

41.8. Replacement of the Housing Cover

The housing cover must be replaced in case:

- the keyboard is defective.
- the flow meter must be retrofitted with a display.

In addition to the mechanical assembly, the existing POWER supply unit must be converted, too.
Further settings are not required.

41.9. Replacement of the Transmitter

Before replacing the transmitter, ensure that the pipe system is empty and unpressurized.
Flush the pipe system before the removal of the transmitter with clear cold water to avoid any residues of chemicals or elevated temperatures.

The distribution voltage for the electronic part must be switched off.
After the installation of the new transmitter the pertaining new **MEMbox** must be inserted into the electronic part and the measuring device is immediately ready for operation.

Carry out a zero-point measurement (“**ZERO Adjust** “) with the new transmitter to optimize the accuracy of the flow meter.

41.10. Spare Parts to be Kept Available on Stock

The spare parts lists compiled in the appendix of this instruction manual represent a survey of the spare parts lists included in the detailed sets of documentation.

The recommended spare parts result from the experience in other systems. However, the required spare parts may be deviating from it for the following reasons:

- Daily running time and number of the annual production days.
- Aggressiveness of the media.
- Frequency of the required cleaning phases, especially with hot water, caustic solution, and disinfectants.
- Duration and temperature of the cleaning phases.

The following details are necessary in case of a spare parts order:

- Quantity and unit
- Designation

The appendix of this instruction manual includes some lists for wearing parts or spare parts.

42. Decommissioning

42.1. Temporary Decommissioning

Should the device be put out of operation for a temporary period only, no special measures must be observed for the later recommissioning.

If the transmitter is removed out of the process line, the pipe system has first to be emptied and depressurized.

Flush the pipe system before the removal of the transmitter with clear cold water to avoid any residues of chemicals or elevated temperatures.

Attach the protecting caps for the protection of the liner.

42.2. Final Decommissioning / Disposal

If the whole device was defective beyond repair, it should be considered for the final decommissioning that wastes, contrivances, and system components to be scraped will have to be disposed of according to the valid laws, decrees, and regulations for waste disposal.

43. EC Certificate of Conformity

44. FDA Confirmation

45. Spare parts

Spare parts
Replacement IZMSA Remote DC Converter w/ Display (all electronics)
Replacement IZMSA Remote AC Converter w/ Display (all electronics) (Input Range 100…240VAC)
Replacement IZMSA Remote DC Converter no Display (all electronics)
Replacement IZMSA Remote AC Converter no Display (all electronics) (Input Range 100…240VAC)
IZMS Display Board - LAP6X (2015 units or after)
IZMSA keypad
IZMSA Output Board - JB2
IZMSA DC Power Supply
IZMSA AC Power Supply
IZMSA Main Board MB1X
Service Terminal for IZMS (2105 or After)
Service Terminal for IZMS (Before 2015)
IVON USB interface
IZMSA Battery Board
Junction Board 3 for IZMSDT
Order number for calibration certificate Connectorboard CB2
power supply 85...264 VAC, Output: 24..28 VDC, 50W, 2,1A

46. Description T0 Version

The measuring instrument is suitable for metering the flow as well as the quantity of conductive liquids.
The electromagnetic flow meters of the type IZMSA-C determine the flow and the volume of liquids at a high precision.
IZMSA-C -type converters are microprocessor-controlled devices. They supply the transmitters with a switched and controlled coil current.
The signal generated at the electrodes is amplified and conditioned in the converter and processed in the internal measurement registers as a flow and volume information.
Those values can be indicated on the display unit (option).
In addition, some volume pulses (e.g., 1 pulse per litre) are generated and a flow signal (of 0/4...20 mA for a flow of 0...100%) is released.
Usually, the device is delivered with standard settings, i.e., all you must do is to connect the transmitter, the supply voltage, and possibly existing peripheral devices (such as: digital display, pulse counter, printer).

Quantity preselection devices must be equipped with a buffer battery.

47. Electrical connection

47.1. Intended use:

The **IZMSA-T0**
- is only suitable for the connection to an earthed/grounded monophase network
- may only be used within industrial areas for reasons of EMC (according to the definition EN 50 081-2

Special note for custody transfer meters: Calibration marks, security stamps and seals must not be damaged or removed from custody transfer meters and measuring systems, otherwise the validity of the calibration will be invalidated. The buffer battery must be installed in custody transfer meters and in volume preselection applications.

47.2. Connecting the transmitter

The transmitter is connected to the converter depending on the design of the device.

a.) Integrated design:
Electrode and coil connections are already connected internally. The device is immediately ready to meter. The **MEMbox** (memory for the calibration data of the transmitter) is already plugged into the connector of the board.

For the assignment of the digital inputs and outputs for the junction board JB3 refer to **Fig. 4**!

The digital outputs must be supplied with +24V (direct voltage) via the terminals 59/60/61/62 and with GND via the terminals 71/72/73/74. The maximum load for the pulse outputs is approx. 250 mA

Electrical Connection See Chapter 15.1.

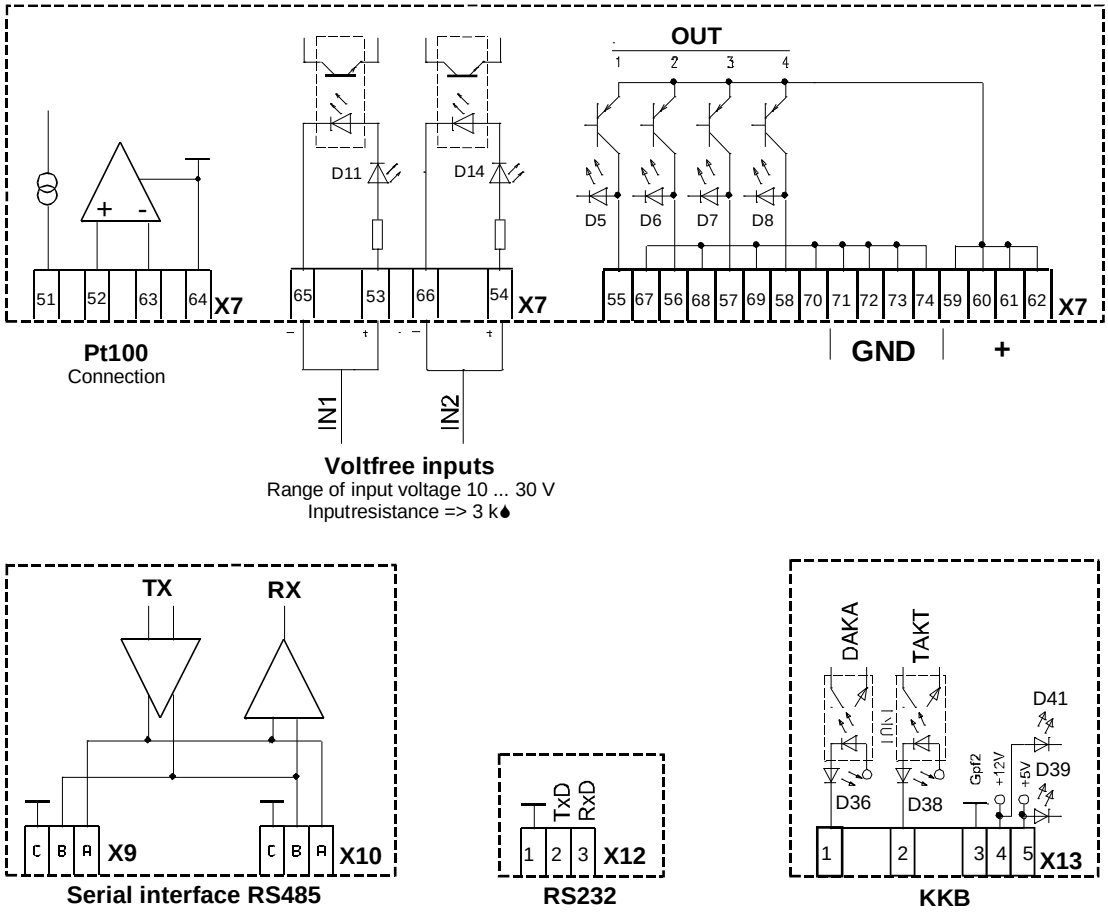


Figure 1: Terminals JB3

47.3. Connection of a temperature sensor Pt 100

The **Anderson-Negele** temperature sensor Pt100 is designed according to the 4-wire technology.

The pin assignment on the **JB3** board at terminal X7 is:

JB3 terminal X7	Cable colour	Pt100
# 51 (PT1)	brown	supply line to the resistor
# 52 (PT2)	yellow	metering tap at input Pt100
# 63 (PT3)	white	metering tap at output Pt100
# 64 (PT4)	green	return line from the resistor

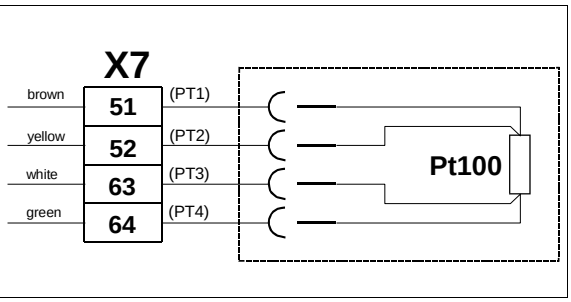


Table 1: Pin assignment Pt100 to JB3

48. General remarks - T0 Version

48.1. Operating elements

The converter **IZM-T0** consists of a power unit in the housing cover, the main board **MB1X** and the junction board **JB3**.

Apart from the input and output terminals the following operating elements are available:

1. **"ZERO" key S4**
2. **Calibration switch S3 "CAL/MEAS"**
3. **Display unit**
4. **"ABORT" key S5**
5. **MEMbox**

There are additional pilot lamps on the upper board which indicate the conditions of the inputs and outputs.

48.2. "ZERO"-Taste

The "ZERO" button S4 is located on the upper circuit board (Junction board JB3). A hydraulic zero adjustment is activated by activating the key.

The adjustment is automatic. The mode of operation of the zero-point measurement is dependent on the position of the calibration switch S3 "CAL/MEAS":

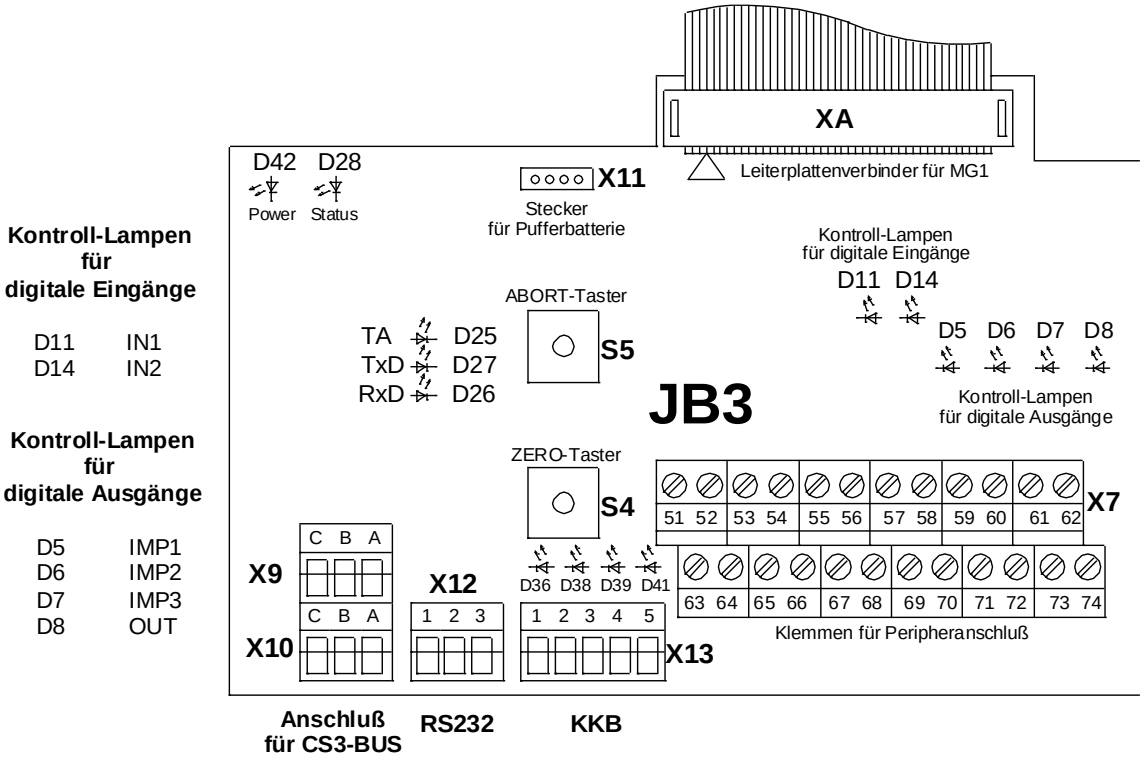


Figure 2: Junctionsboard JB3

48.3. Switching on the supply voltage

After a proper assembly and a correct electrical wiring, the following display sequence must be shown when the supply voltage is switched on:

Auto Test **IZM-T – C3 Type V1.00**	2 seconds
V XXX.XX l **Q X.X %**	Permanent display

49. Measuring mode

When the operating voltage is switched on the **IZMSA-T0** is always in the measuring mode.

Apart from the display for the metered value the **IZMSA-T0** is additionally equipped with external input and output possibilities (see **figure 4**):

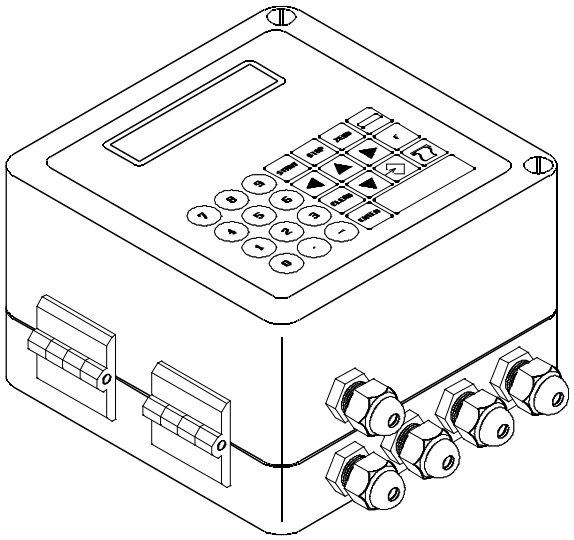
1. 4 x digital outputs **OUT1** ... **OUT4** for volume pulses, malfunction etc.
2. Serial interface **RS232** to activate a printer
3. 2 x digital inputs **IN1** and **IN2** for external zero position and count interruption
4. 4-wire input for external Pt100 temperature sensor

49.1. Operation

The **IZMSA-T0** flow meter always displays the volume register V in the first line.

For officially approved measurements the **IZMSA-T0** display serves as the main counter. Occurring messages are displayed in a flashing mode.

The second line shows the current flow rate, volume, date/time and, if available, the temperature.



49.2. Zero position of the volume counters

The internal volume counters **V** and **V2** are reset to zero by selecting **ZERO**.

When resetting the counter for the daily quantities **V2**, the main counter **V** is reset to zero, too. When resetting the main counter **V**, possible error messages are reset, too.

warning 901l Q 0.0 %	**Error message (error 901 = power failure)** **Flow value in %** Reset of the message via key **ZERO**

If a printer is used, the current number is set to zero at the same time when the daily quantity counter **V2** is reset.

By default, the digital outputs of the **IZMSA-T0** have the following effect:

Output	Terminal X7 "+" "-"	Effect in standard parameterization x)	Control LED xx)
OUT1	#55 / #67	Volume pulses with the value **pv1** (pulse/litre)	D5
OUT2	#56 / #68	Volume pulses with the value **pv2** (pulse/litre)	D6
OUT3	#57 / #69	Identification of the flow direction ("on" = forward)	D7
OUT4	#58 / #70	Error output ("on" = malfunction)	D8

Table 2: Digital outputs

x) The described functions are only valid for the standard parameterization of the **IZMSA-T0**; the digital outputs can be changed via the parameter "**output mode**".

xx) The pilot lamps on the junction board JB3 (see page 75) is only possible if terminal X7 is supplied with an auxiliary voltage:
+24V to #59 ... #62 and 0V to #70 ... #74

49.3. Serial interface

The **IZMSA-T0** temperature input has an isolated serial interface on the JB3 which can optionally be used as **RS485** or simply as **RS232**.

Usually, it is operated as **RS485** with the **Anderson-Negele** CS3 BUS protocol.

This allows all types of communication to be realized:

- Data exchange
- Troubleshooting
- After-sales service
- Program download

The parameter "s**erial mode 1**" in "**menu 04**" is used to change-over this interface to the **RS232** operation. Then a simple **RS232** interface (only transmission and reception line) is available.

49.4. RS232 connection

The interface is potentially separated by optocouplers and so interferences or damages caused by potential differences do not occur.

You perform the connection to the PC following this scheme:

IZMSA-T0 X12			PC COM connection (9-pole DSub)		
1	GND	End of operation	→	5	GND
2	TxD	Transmitted data	→	2	RxD
3	RxD	Received data	→	3	TxD

Table 3: Electrical connection RS232

49.5. RS232 parameter

The transmission speed is set by means of the parameter "**baudrate**" in "**menu 04**". Possible settings are: 300, 600, 1200, 2400, 4800, 9600, 19200 bits per second.

The start, stop and parity bits cannot be changed; the values are set to 8 data bits, 1 stop bit and no parity (**8N1**).

49.6. Scope of data via the serial interface

Only a limited scope of commands is realized. For applications with more complex requirements to the interface we recommend using the interface **RS485** with CS3 BUS protocol.

The following values and functions can be queried and released via the **RS232**:

Function	String
Display the main counter	**V1**
Display the daily counter	**V2**
Display the total quantity	**VT**
Display the flow	**Q%**
Current temperature	**TA**
Date/time	**DT**
Set the main counter to zero	**V10**
Set the daily counter to zero	**V20**

49.7. Implementation of the protocol of the serial interface

A rather simple protocol was implemented to keep the expenditure of programming of the PC as low as possible, but to guarantee at the same time a safe data transmission.

The following method is applied:

* The data blocks start with **STX** and end with **ETX** and a checksum.
* The checksum is calculated by simply adding the individual characters.
* The lengths of the data blocks are constant.
* The orders and metering values are transmitted in the ASCII format.
* Only correctly received requests are answered.

49.8. Types of data blocks

1. Read request from the PC Read Request 9 characters

2. Read response from the **IZMSA-T0** — Read Response — 27 characters
3. Write request from the PC — Write Request — 9 characters
4. Write response from the **IZMSA-T0** — Write Response — 27 characters

Requested value	Start	Command	Type	End	Check	Check
Main counter V1	STX	RQ	V1	ETX	01	4F
Daily counter V2	STX	RQ	V2	ETX	01	50
Total quantity VT	STX	RQ	VT	ETX	01	72
Flow rate in %	STX	RQ	Q%	ETX	01	3E
Current temperature	STX	RQ	TA	ETX	01	5D
Date and time	STX	RQ	DT	ETX	01	60
Metering error	STX	RQ	ERR	ETX	01	91
Length	1	2	3	1	1	1

Table 4: Read request from the PC.

Requested value	Start	Command	Type	Value	Unit	End	Check	Check
Main counter V1	STX	RQ	V1		l	ETX	01	4F
Daily counter V2	STX	RQ	V2		l	ETX	01	50
Total quantity VT	STX	RQ	VT		l	ETX	01	72
Flow in %	STX	RQ	Q%		%	ETX	01	3E
Current temperature	STX	RQ	TA		C	ETX	01	5D
Date and time	STX	RQ	DT			ETX	01	60
Metering error	STX	RQ	ERR			ETX	01	91
Length	1	2	3	14	4	1	1	1

Table 5: Read response from the **IZMSA-T0**

Value to be written	Start	Order	Type	End	Check	Check
Zero positions V1	STX	WQ	V10	ETX	01	5F
Zero positions V2	STX	WQ	V20	ETX	01	60
Length	1	2	3	1	1	1

Table 6: Write request from the PC.

Written value	Start	Order	Type	Value	Unit	End	Check	Check
Zero positions V1	STX	WQ	V10	14*Space	4*Space	ETX	03	A6
Zero positions V2	STX	WQ	V20	14*Space	4*Space	ETX	02	A7

Length	1	2	3	14	4	1	1	1

Table 7: Write response from the **IZMSA-T0**

Example 1: Example of a data transmission

Request from the PC (main counter **V1**)

STX	R	Q	V	1		EXT	0x01	0x4f
0x02	0x52	0x51	0x56	0x31	0x20	0x03	0x01	0x4f

Response from the **IZMSA-T0** (**V1** 123456.41 l)

STX	R	S	V	1							1	2	3
0x02	0x52	0x53	0x56	0x31	0x20	0x20	0x20	0x20	0x20	0x20	0x31	0x32	0x33
4	5	6	.	4	1		l			ETX	0x04	0x64	
0x34	0x35	0x36	0x2e	0x34	0x31	0x20	0x6c	0x20	0x20	0x03	0x04	0x65	

Example 2: Example of the checksum calculation

Request from the PC

0x02 + 0x52 + 0x51 + 0x56 + 0x31 + 0x20 + 0x03 = **0x014f**

Response from the IZMSA-C

0x02 + 0x52 + 0x53 + 0x56 + 0x31 + 0x20 + 0x20 + 0x20 + 0x20 + 0x20 + 0x20 + 0x31 + 0x32 + 0x33 + 0x34 + 0x35 + 0x36 + 0x2e + 0x34 + 0x31 + 0x20 + 0x6c + 0x20 + 0x20 + 0x03 = **0x0465**

50. Flow direction

The **IZMSA-T0** temperature input flow meter detects the two flow directions. The main flow direction is indicated on the transmitter by an arrow.

The pulse outputs can be programmed in such a way that, dependent of the flow direction, volume pulses are put out or suppressed or that the flow direction is signalized via the digital output **OUT3.**

Although the transmitter was calibrated in the main flow direction the metering accuracy in both directions is almost the same.

50.1. Flow in "+" direction

a) No sign when showing the flow rate on the display unit.
b) Volume registers "**V**" and "**V2**" are positively summed up (positive volume without sign)
c) Status of the signal output "**OUT3"** → active (only at "**output mode**" 1, 2, 4, 5)
d) Special evaluation factor for the **"+"** direction: "**p spe**" is active
e) "**output mode 5**": only pulses via **OUT1**; no pulses via **OUT2**

50.2. Flow in "-" direction

a) Is displayed when showing the flow rate on the display unit
b) Volume registers "V" and "V2" are negatively summed up (negative volume with **"-"** sign)
c) Status of the signal output "**OUT3**" → inactive (only at "**output mode**" 1, 2, 4, 5)
d) Special evaluation factor for the return flow: "**n spe**" is active
e) "**output mode 5**": no pulses via **OUT1**; only pulses via **OUT2**
f) In the "**output mode**" 8, 9, 10 the pulses for the negative flow are stored and are offset against a subsequent positive flow.

The effect of the flow direction can be reversed by exchanging the electrode inputs of the terminal X1 **#14** and **#16.** Note that in this case the hydraulic adjustment "**ZERO Adjust**" must be repeated.

51. Calibration parameters (menu 05)

Parameter type	Meaning	Remark Standard setting
Span	**calibration value** of the transmitter	is stored in the MEMbox
offset	**calibration value** of the transmitter	is stored in the MEMbox
m spe	**calibration factor:** - factor is used for the adaptation in case of metering value deviations in the whole system	1. the system is delivered with the factor **1.0000** 2. in case of a positive measurement error **m spe** <1 is set in case of a negative measurement error **m spe** >1 is set 3. **m spe** = 0 will not be accepted
p spe	special **evaluation factor** for **positive** flow	a.) standard **p spe** = **1.00000** b.) **p spe** = 0 will not be accepted
n spe	separate **evaluation factor** for **negative** flow	a.) standard **n spe** = **1.00000** b.) **n spe** = 0 suppresses the measurement at reflux
b spe	**calibration constant** - serves for the adaptation in case of measurement errors in the whole system for the lower flow values	standard **b spe** = **0.00000**
m dim	dimensioning factor for the volume unit referred to the unit LITRES	can only be modified if the setting "**free unit**" is parameterized in the parameter type "**unit**"! **m dim** = 0 will not be accepted
Vmin	smallest admissible metering quantity	depends on the system in case of W&M-approved systems

Table 8: Calibration parameters

51.1. Date/time (menu 08)

Parameter Type	Meaning	Remark Standard setting
Day	Input: day	**setting of date/time for display and printout functions**
Month	Input: month	
Year	Input: year	
Hour	Input: hour	
Minute	Input: minute	
Second	Input: second	

Table 9: Date/time

52. Technical data – T0 Version

52.1. Converter

Electric power supply: 100 V 115 V 120 V 230 V 240 V 24 V DC 24 V AC	 50-60 Hz (0,17A) 85 ... 110 V 50-60 Hz (0,15A) 98 ... 126 V 50-60 Hz (0,15A) 102 ... 132 V 50-60 Hz (0,07A) 195 ... 253 V 50-60 Hz (0,07A) 204 ... 264 V --- (0,8 ... 0,3A) 10 ... 30 V DC 50-60 Hz (0,8 … 0,6A) 21 ... 26 V AC
Power consumption: **Electric fuse protection:**	15 VA / 8 watts max. (10 VA / 6 watts without display) AC supply T315 mA DC supply M2.5 A 24 V AC M2 A
Digital outputs:	4 x galvanically isolated transistor output Load: 30 V / 250 mA max. * inc. external auxiliary voltage functionality of outputs (see table 10, page 53)
Analog output:	0/4 ... 20 mA (active), burden 500 Ohm max. Q = 0 % → 0 mA oder 4 mA, adjustable Q = ±100 % → 20 mA
Digital inputs :	2 x optocoupler; activation: 10 ... 30V DC
Input for temperature sensor Pt100:	4-wire input accuracy: ± 0,1 °C in range -30 ... +100 °C
Serial interface on JB3 (X12):	Hardware: **RS232** to control PLC

Serial interface on MB1x (X9):	Hardware: **RS232**
Serial interface on MB1X (X200):	Hardware: **RS485** Anderson-Negele GmbH CS3-BUS protocol
Display (option):	2 x 20 digits illuminated LC display.
Housing:	Cast aluminium (special coating); system of protection: IP65
Ambient temperature:	-25°C … +55°C

53. If the existing flow is not displayed:

a: Does the set flow direction oppose the direction of the arrow and has the factor "**n spe 0**" been set?

b: Is the selected parameterization unfavourable, e.g., is the measurement intended to be carried out at a small nominal width in a large volume unit ("**m3**" or "**bbl**")? Is the set upper range value too high causing the low flow quantity "**lfs**" to be activated?

c: Is the conductivity above 5 µS per cm?

d: Has the internal EMPTY pipe detection be switched off,

- if the conductivity is below 50 µS/cm?
- if the nominal width of the connected transmitter type is smaller than DN10?
- if the flow is heavily pulsating?

53.1. Considerable fluctuations of the measured value

a: Check the measuring signals by means of "**ZERO TEST**" while the liquid is at rest!

- If this measurement is triggered several times, absolute values between -300 and +300 units will have to be obtained.
- The displayed value may not change by more than 10 units between the measuring processes.
- If there is no stability, check the earthing/grounding of the transmitter! The cabling between the transmitter and the converter must be shielded via the screwed metal Pg cable gland.

b: Carry out the same check when the transmitter is removed, and the meter tube is filled!

c: Check the arrangement of the pipelines for by-pass pipes or possible air occlusions (defective seals)!

d: Check the reference or the procedure (reference metering instrument, balance without temperature compensation, different products compared to the balance value, use of different W&M-approved calibrating vessels with absolute volume differences, start and stop of the measurement while the meter tube is empty, etc.)!

e: Low conductivities or pulsating flow when using the internal EMPTY pipe detection.

f: Moisture or another fault in the transmitter or converter

54. Hardware-Test

The "**hardware test program**" can be used for testing both the inputs and outputs of the **IZMSA-T0** and the connected peripherals. The function is called by key sequence F 8 3 9. The program is ended by pressing the „CLEAR" key.

	2nd line of the display	Function	D11	D14	D5	D6	D7	D8
	all output off	all digital outputs are switched off			o	o	o	o
▲	**OUT1 on**	output **OUT1** is switched on			x	o	o	o
	OUT2 on	output **OUT2** is switched on			o	x	o	o
	OUT3 on	output **OUT3** is switched on			o	o	x	o
	OUT4 on	output **OUT4** is switched on			o	o	o	x
▲	**Anaout 4 mA**	4 mA at terminal **X7** #7/#8						
▲	**Anaout 20 mA**	20 mA at terminal **X7** #7/#8						
	IN1=0 IN2=0	both inputs are not activated						
▲	**IN1=1 IN2=0**	tension at terminal #53 / #65	x	o	o	o	o	o
	IN1=0 IN2=1	tension at terminal #54 / #66	o	x	o	o	o	o
	IN1=1 IN2=1	tension at terminal #53 / #65 tension at terminal #54 / #66	x	x	o	o	o	o
▲	**Curr1 on**	The coil current is constantly kept at approx. +100 ... 110 mA, metered at terminal #11/#12						
	Curr2 on	The value of the metered coil current must be almost equal to "**Curr1 on**" (±0.3 mA), but with the reversed polarity.						
▲	**all output off**	The function is ended by pressing the ENTER key.						

Table 10: Hardware Test

The hardware test is ended by pressing the "CLEAR" key

55. How to correct the temperature display

Via an external Pt100 temperature sensor the **IZMSA-T0** additionally displays the temperature.

Depending on the accuracy required, the temperature value can be adapted by an OFFSET correction. The basic accuracy depends on the Pt100 class.

The standard temperature sensors Pt100 delivered by Anderson-Negele have a tolerance of ±1°C (tolerance class B).

For an adaptation of the displayed temperature, please proceed as follows:

1. Connect the temperature sensor Pt100 as required to the **IZMSA-T0** and install it field-proven into the pipe.
2. "**menu 03**" and press ▼ 3 times:

V		**45.7 l**
To	**0.0**	**8.4°C**

The current temperature OFFSET "**To**" and the temperature resulting from it will be displayed.

3. A comparison temperature is measured by means of a precise reference thermometer.
4. If the temperature displayed by the **IZMSA-T0** is too high, the difference must be calculated and input negatively as "**To**" value.
   If the temperature displayed by the **IZMSA-T0** is too low, the difference must be calculated and input positively as "**To**" value.

Example 9: The reference temperature is 7.9°C

56. Structure and denomination of the device - Transmitter

This instruction manual is an extension of manual **B12.70/B12.71** and concerns the Flow Tube transmitter in separated design only. For mechanical reasons it is only possible to connect the separated version of the Flow Tube transmitter to the **IZMSA-C**

The transmitter is integrated into the pipeline. The converter, type **IZMSA-C**, must be installed according to instruction manual B12.70/B12.71.
Both assembly groups are connected by a coil cable and an electrode cable.

56.1. Transmitter in separated design

Transmitter	Separated version
Protection class:	IP 65
Inductive resistance:	100 Ω, calibrating data included in the appropriate converter
Electrode cable:	C0457A-33 x 1.31 mm², shielded
Coil cable:	1032-2 x 0.82 mm², shielded
Product conductivity:	~~1~~5 µS/cm min., see item conductivity conditions

* The pressure rating depends on the process connection and the seals and gaskets used.

56.2. Measuring ranges and error limits

Refer to instruction manual B12.70/B12.7

11. At any rate the directives of the respective country for opening and repairing the devices must be considered.
12. Before starting any cleaning, conversion, service or maintenance work, the measuring device must be switched off and separated from the mains supply. This requires a device for separating all live wires, e.g., a 2-pole main switch in the control cabinet. The
13. The flow meter fulfils the general safety requirements according to EN 61010.

14. Never remove or put out of action any safety devices by modifications to the flow meter!

57. Intended use

The measuring instrument may only be used for the application that it has been designed, dimensioned, and built for:
- for the connection to an earthed monophase network or a direct current network (see type plate).
- in industrial areas according to EN 61000-6-2/4 for reasons of EMC.

The intended purpose of the electromagnetic flow meter is the measurement of conductive liquids in the food processing industry and in the cosmetic, pharmaceutical, and chemical industries.

This flow meter is *not* suitable for the measurement of hazardous, explosive, and combustible liquids of PED group 1.

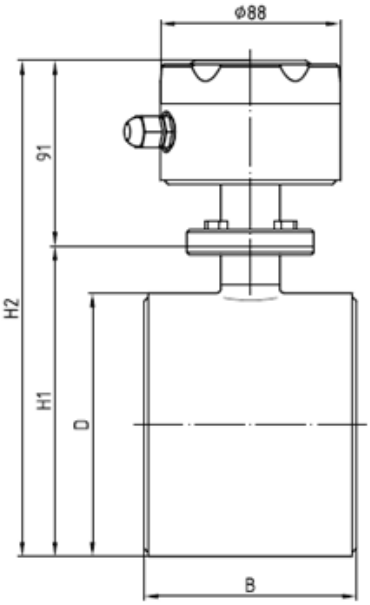
Any modifications to the measuring device that might have an influence on the function and the safety devices of the flow meter are only allowed to be carried out by the engineering specialists or authorized persons of Anderson-Negele.

58. Dimensions and weight

58.1. Transmitter in separated design

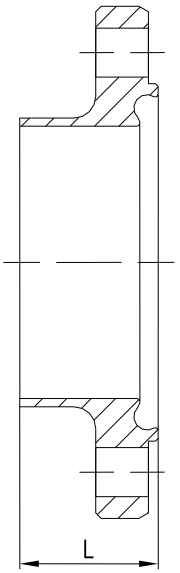
58.1.1. Dimensions of the process connections

The welding socket belongs to the standard delivery.



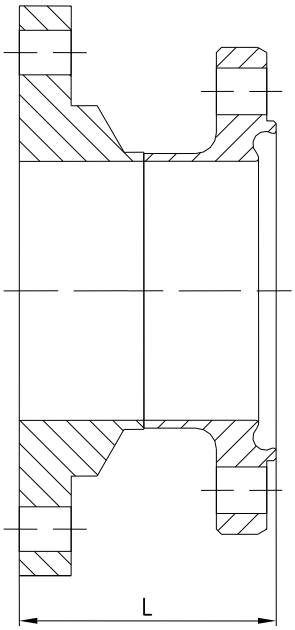
DN	W [mm]	D [mm]	H [mm]	H1 [mm]	H2 [mm]	Weight [kg]
10	104	90	200	110	201	4
15	104	90	200	110	201	4
25	104	90	200	110	201	4
32	104	105	220	125	216	5
40	104	105	220	125	216	5
50	104	130	240	150	241	6
65	104	130	240	150	241	6
80	105	155	270	175	266	10
100	110	170	280	190	281	15

Welding socket (standard)



Nominal width	L
DN 10	25.5
DN 15	25.5
DN 25	25.5
DN 32	25.5
DN 40	25.5
DN 50	25.5
DN 65	25.5
DN 80	27.5
DN 100	27.5

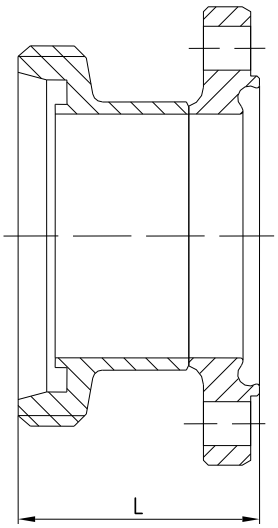
FG hygiene flange



Nominal width	L
DN 10	49.5
DN 15	49.5
DN 25	49.5
DN 32	49.5
DN 40	49.5
DN 50	49.5
DN 65	49.5
DN 80	49
DN 100	71.5

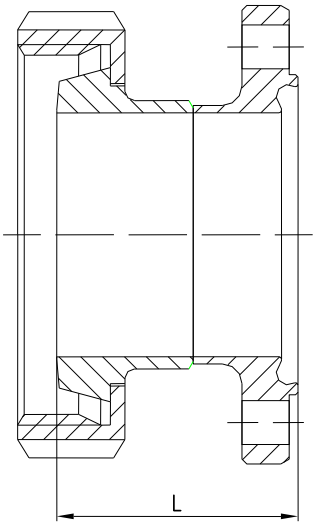
Arrangement

Threaded socket as per DIN 11851



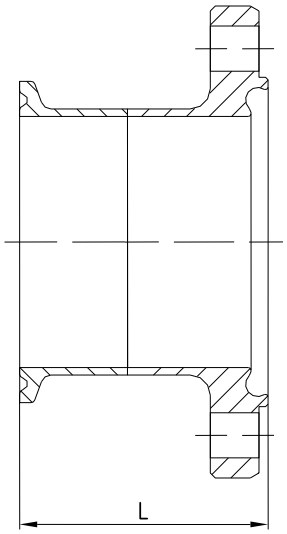
Nominal width	L
DN 10	49.5
DN 15	49.5
DN 25	49.5
DN 32	49.5
DN 40	49.5
DN 50	49.5
DN 65	49.5
DN 80	49
DN 100	71.5

Conical socket / groove nut as per DIN 11851



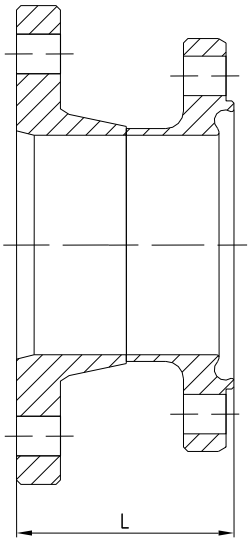
Nominal width	L
DN 10	49.5
DN 15	49.5
DN 25	49.5
DN 32	49.5
DN 40	49.5
DN 50	49.5
DN 65	49.5
DN 80	49
DN 100	71.5

TriClamp DIN 32676



Nominal width	L
DN 10	49.5
DN 15	49.5
DN 25	49.5
DN 32	49.5
DN 40	49.5
DN 50	49.5
DN 65	49.5
DN 80	49
DN 100	71.5

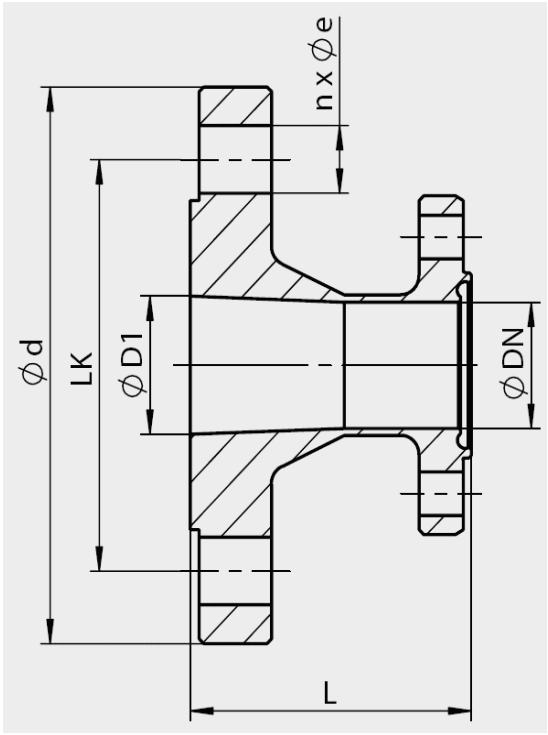
Varivent flange



Nominal width	L
DN 10	49.5
DN 15	49.5
DN 25	49.5
DN 32	49.5
DN 40	49.5
DN 50	49.5
DN 65	49.5
DN 80	49
DN 100	71.5

Arrangement

DIN flange EN ISO 1092-1



All non-

Ø DN	L	Ø D1	Ø d	LK	n x Ø e
DN 10	49,5	10,4	90,0	60,0	4 x Ø14
DN 15	49,5	16,0	95,0	65,0	4 x Ø14
DN 25	62,0	24,8	115,0	85,0	4 x Ø14
DN 32	62,0	32,8	140,0	100,0	4 x Ø18
DN 40	62,0	39,3	150,0	110,0	4 x Ø18
DN 50	62,0	51,2	165,0	125,0	4 x Ø18
DN 65	74,5	70,3	185,0	145,0	8 x Ø18
DN 80	74,0	82,5	200,0	160,0	8 x Ø18
DN 100	71,5	100,8	220,0	180,0	8 x Ø18

dimensioned sizes as per
DIN EN 1092-1
PN 16, type 11, form B (DN 10-100)
PN 10, type 11, form B (DN125-150)

59. Conditions required for the transmitter

When selecting the place for the installation of the measuring instrument you should in any rate ensure that the housing can be opened for service work whenever desired and that the flow meter can be simply removed, if necessary.

59.1. Parts of air and gas

Air locks or deaeration in a liquid will lead to faulty measurements.
Thus, make sure that air locks or other possible parts of gas are safely separated before the measuring device e.g., by gas separators or that deaeration can be excluded by a sufficient working pressure.

The measuring device is not damaged e.g., by air locks.

59.2. Solid parts

Normally, solid parts do not have any negative influence on the volume measurement.
The pipe diameter should always be chosen sufficiently large to prevent the meter tube from being clogged in case of products including solid particles.

Since the flow velocity of solid matters is relatively lower than that of the liquid part of the product, a higher flow fluctuation could be caused while the flow rate is determined.
The measurement of abrasive materials can cause a drifting of the measuring accuracies and, in the end, a deterioration of the transmitter.

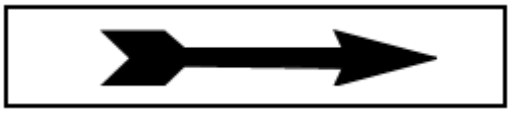
59.3. Conductivity conditions

Transmitter in separated design:
The liquid to be measured must show a minimum conductivity of ≥ 5 µS/cm.
Demineralised water requires a conductivity of ≥ 30 µS/cm.

59.4. Meter tube lining

A damaged PFA lining can cause faulty measurements or even a failure of the flow meter.

59.5. Flow direction



In the standard setting the digital outputs emit the volume pulses independently of the flow direction.
Negative flow rates and quantities are displayed with a MINUS sign.

60. Cable lengths for the separated transmitter version

The transmitter is integrated straight into the pipeline.
For reasons of EMC, the transmitter must be installed at a possibly small distance from the converter, i.e., the connection cable should be kept as short as possible.
The standard coil and electrode cables delivered are destined to cover 5 m each.

The following conditions must be considered for larger distances:

f. The cables must be laid into a separate cable duct.

g. Laying the cables near to frequency converters or motors must be absolutely avoided.

h. The maximum distance between transmitter and converter depends on the conductivity of the product. The following approximate values are recommended:

Conductivity	Maximum cable length
15 - 50 µS/cm	5 m
50 - 200 µS/cm	20 m
> 200 µS/cm	50 m

i. The shielded cables prescribed by the manufacturer must be used.

j. The shielding must be connected to the transmitter and the converter.

61. Welding work

Caution

Welding work involves the risk of destruction for the electronic measuring equipment!

Pay attention to the fact that the earthing/grounding of the welding set is not carried out through the transmitter or the converter!
The welding seams at pipelines must be executed by means of suitable work equipment and filler materials and after a careful preparation of the pipe ends in such a way that a perfect welding effect is guaranteed and that internal stresses (e.g., welding distortion) is kept limited to the absolute minimum.

Before welding work is started, the Flow Tube will have to be removed from the pipeline:

1. Fasten the Flow Tube transmitter by some welding point inside the pipeline!
2. Unscrew the screws at the process connection flange! Remove the transmitter including the seal from the pipeline!
3. Weld the process connection into the pipeline!
4. Reinstall the transmitter into the pipeline! Pay attention to cleanliness and the correct position of the seal!

61.1. Wire end ferrule

Caution

Wire end ferrules can damage the spring clips!

Spring clips can be damaged or become useless by using too large or inexpertly wire end ferrules.

Therefore, wire the Flow Tube without using wire end ferrules!

62. Installation

Only persons disposing of the necessary expert knowledge and authorization of the user are allowed to carry out the installation work. The qualified personnel must have read and fully understood this instruction manual and follow all instructions given therein.
The state of the art is always a decisive criterion for the execution of the installation.

The following points should be considered after completion of the installation work:

- It must be checked whether all external supply connections really meet the requirements specified in the technical data of the flow meter (e.g., pressure, temperature, etc.).
- The pipelines must be flushed before the production is started.
- All external supply joints must be checked for their safe, leakproof, and nearly stress-free connection to the transmitter.
- The media supplied must be cautiously adjusted to their required working pressure.
- Occurring leaks must be removed immediately.
- All electrical lines must be separated from the flow meter before welding work is started at the pipeline.

The electric wiring of the voltage supply and the inputs and outputs of the control circuits must be carried out according to the wiring diagram.

In this respect the state of the art is relevant, too.

62.1. Installation instructions for the transmitter

Caution

Pay attention to the fact that the threaded fittings, clamps, or flanges are perfectly tightened! Otherwise, hot, or caustic solutions or gasses could come out of the gaps and clearances.

- Outcoming liquids can lead to slip hazard.
- Outcoming liquids must be mopped up immediately and disposed of safely.
- If combustible liquids come out, they could cause an explosion hazardous area around that place which has to be marked accordingly.

If the transmitter is connected to existing process lines, those lines must be unpressurized and free from product.

Do not omit to insert the seals into the screwed counter fittings!
In case of leaking pipe connections, you should in any rate check the seals. Never squeeze the seal when tightening the threaded pipe connections!

The shielding braid must be correctly connected to the cable gland to guarantee an optimum operation of the device according to the EMC directives.

62.2. Connection of the transmitter in separated design

Caution

The coil cable and the electrode cable for the separated version must be installed after the transmitter has been built into the pipeline and after the converter housing has been fixed.
The electrical connection of transmitter and converter must be completed before the measuring device is switched on!

You should in any rate see to it that:

- The supply voltage in the converter is switched off while the transmitter is installed.
- No moisture can drip onto the electronic unit.
- No metal particles, e.g., of the shielding braid, can fall into the electronic unit.

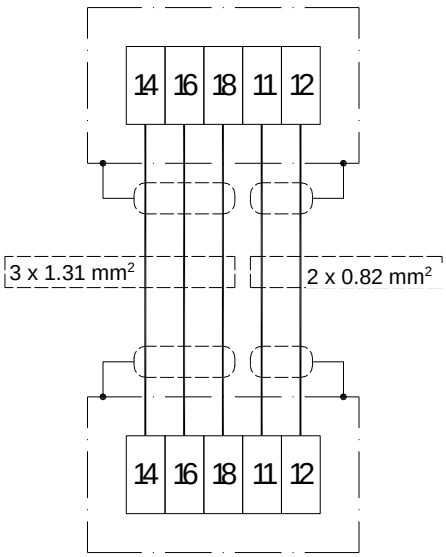
62.2.1. Function:

The magnet coils of the transmitter are supplied straight from the converter.
The ground/earth signal and the two electrode signals E1 and E2 of the converter are led to the converter.

The following cable types must be used:

Coil cable:	2 x 0.82 mm^2 1032A (simply shielded)
Electrode cable:	3 x 1.31 mm^2 C0457A (simply shielded)

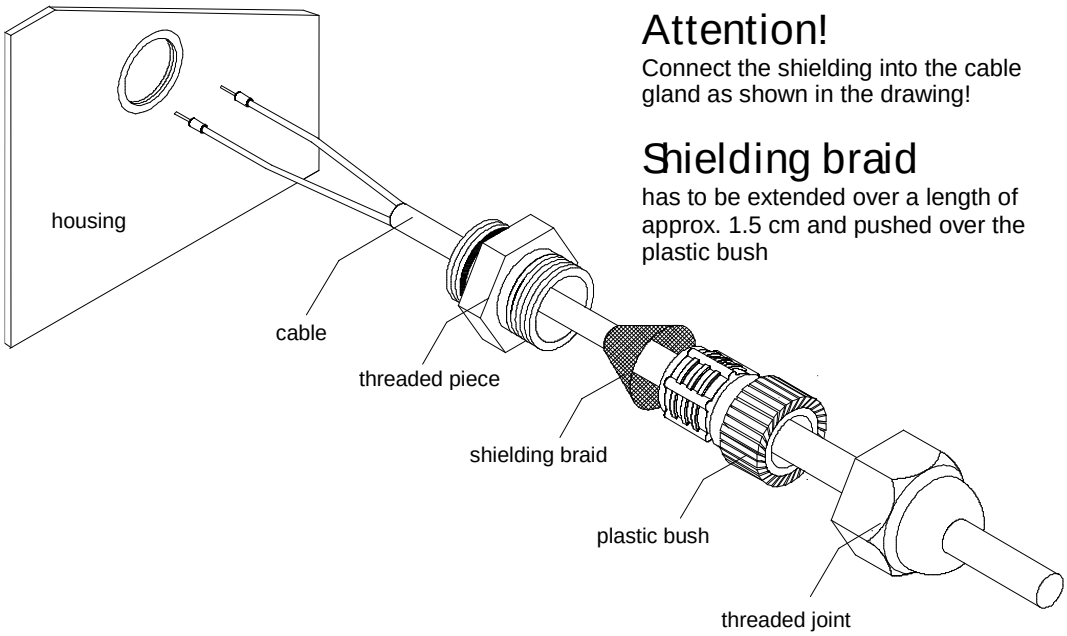
62.2.2. Connection scheme for the separated design



IZMSA converter

Flow Tube transmitter

Pin assignment	
Terminal X1 / No. 11	Coil
Terminal X1 / No. 12	Coil
Terminal X1 / No. 14	Electrode 1
Terminal X1 / No. 16	Electrode 2
Terminal X1 / No. 18	GND



Screwed EMC cable gland

Figure 1: **Assembly of the screwed EMC cable gland, connection of the shielding**

The shielding braid of the coil and electrode cables has in any rate to be connected to the screwed EMC cable glands:

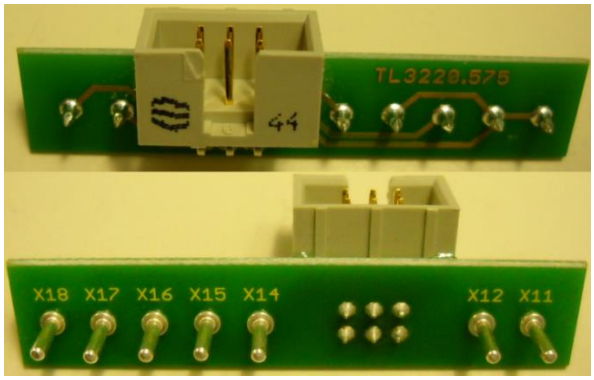
Hinweis

Important information

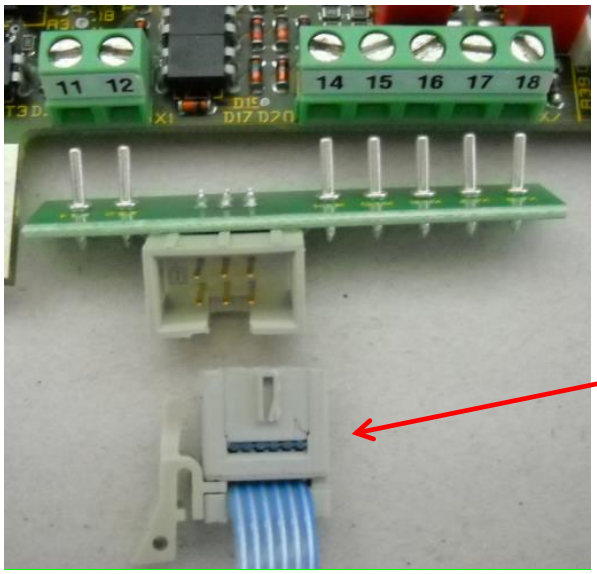
The original cable glands are neither allowed to be removed nor modified. Otherwise, the warranty and the CE approval will extinguish.

63. Connection transmitter

To connect a Flow Tube transmitter at the old motherboard MB1X, an adapter board is used.



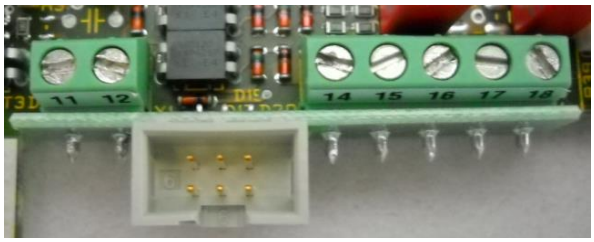
Adapter board



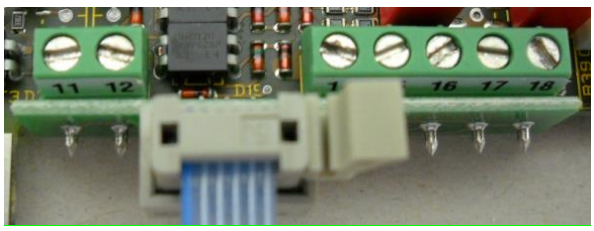
Mainboard MB1A

Adapter board

Connection plug IZMAG transmitter



Insert the adapter board into the connector.
Screw terminals tighten.



Insert connection plug IZMAG transmitter in connector.

finished.

64. Advice for starting-up the Flow Tube

First, the measuring device must be installed into the pipeline!

- The auxiliary energy must be switched off.
- The auxiliary energy must correspond to the specification on the nameplate.
- The pin assignment must correspond to the wiring diagram.
- The temperature limits must be kept.
- Both the transmitter and the converter must be correctly earthed/grounded.
- The converter must be installed at a place which is free from vibration to a large extent.
- The housing covers must be closed before the auxiliary energy is switched on.
- The flow range adjusts itself automatically.
- After the electrical start-up a "**ZERO adjust**" should be carried out by means of the typical liquid to be measured (full meter tube and **no** flow!).

Which other conditions should be taken into consideration?

- Too low product conductivity?
  At less than 50 µS/cm, the internal empty-pipe detection must be switched off by the respective parameter setting.

65. MEMBOX

The MEMBOX which is added to the consignment goes with the transmitter. It must be plugged into the IZMSA converter.

See instruction manual B12.70/B12.71!

66. Adjustments

Normally, an adjustment is not necessary.

For further information please refer to instruction manual B12.70/B12.71.

67. Measuring accuracy

± 0.25 % ± 1 mm/s under reference conditions

Reference conditions for the determination of the measuring accuracy:

According to DIN EN 29104 and VDI/VDE 2641:

- Temperature of the liquid to be measured: +28°C ± 2 K.
- Ambient temperature: +22°C ± 2 K
- Warm-up time: 30 Minuten

Installation:

- Inlet pipe section: > 10 x DN
- Outlet pipe section: > 5 x DN
- Transmitter and converter are grounded.
- The transmitter is installed in the centre into the pipeline.

68. Visual check

The transmitter can be optically checked while it is disassembled:

Reason	Action
Humidity in the connection housing	Dry the housing and perform an insulation test subsequently!
Damaged PFA liner	Replace the transmitter; check the seal!

69. Maintenance

69.1. Safety instructions for maintenance work

The persons concerned must be familiar with the process sequence and be able to recognize possible dangers and to take all necessary steps to remove imminent risks of accidents

70. Process connections – Tube Flow

SS
Welding socket DIN 11853-2

TC
Tri-Clamp DIN 32676 bzw. ASME BPE

GG
Dairy tube thread DIN 11851

HH
Aseptic fitting DIN 11864-1 Thread side

VN
Varivent Plainflange

FG
Hygienic flange, plain flange

DF
DIN-Flange according to DIN EN 1092-1 type 11 form B

SM
SMS threaded socket 1146

71. Quantity Preselection Functions

These operating instructions are intended to be used as addition to the operating instructions B12.70en for the **IZMSA-SV.**

71.1. General Description

The converter **IZMSA-SV** can directly be used together with the appropriate program as a control for filling purposes.

For this purpose, it is equipped with a 2 x 20-digits display.

ATTENTION!

You can use the quantity preselection to realize this:

1. single-stage cut-off
2. two-stage cut-off with throttling phase adjustable according to quantities
3. additional warning contact just before the end of the filling process can be set.
4. automatically learning after-running correction possible
5. quantity preselection control externally or via keypad possible
6. 4 fixed preselection amounts can be selected externally via input signals.
7. direct control of the valves externally possible via input signals
8. error limits can be parametrized.
9. filling statistics of up to 8 drum sizes available

72. Electrical Connection

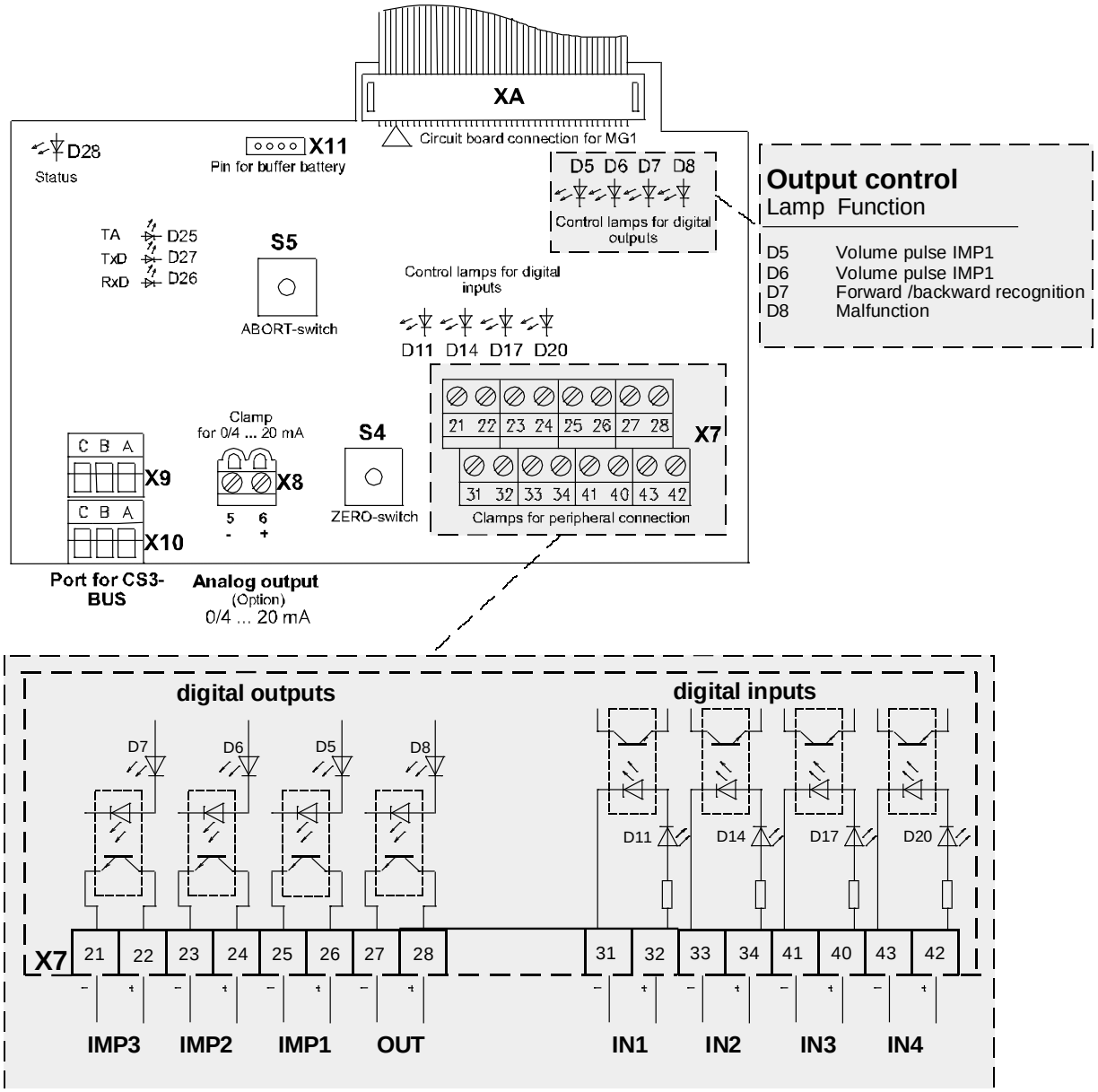


Figure 10: electric connections

72.1.1. The following Input and Output Functions are possible:

Clamp X7	Description of the function	Input/Output	Name
#21/#22	Final signal for cut-off	Output	**IMP3**
#23/#24	Presignal at 2-stage quantity preselection	Output	**IMP2**
#25/#26	Volume pulses or error filling signal	Output	**IMP1**
#27/#28	Malfunction of the device, filling status or warning precontact (horn/lamp)	Output	**OUT**
#31/#32	Count interruption ZÄUB	Input	**IN1**
#33/#34	START of the quantity preselection	Input	**IN2**
#41/#40	STOP of the quantity preselection (not valid at external selection of kegs)	Input	**IN3**
#43/#42	CIP-function (valves open) (not valid at external selection of kegs)	Input	**IN4**

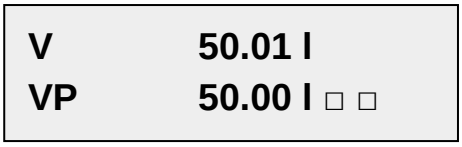
The electric wiring must be performed via an auxiliary direct voltage of 24 V.

The maximum charge of the outputs is 20mA (JB2) or 80 mA (JB2a) depending on the hardware. The charge of the inputs may be 20 mA at maximum.

72.2. Operation

The display of the converter **IZMSA-SV** with quantity preselection function shows simultaneously the current quantity **V** and the preselection quantity **VP**.

Standard condition



The small symbol behind the preselection quantity informs about the status of the quantity preselection function:

- only 1 character means that the quantity preselection is controlled via one stage

- symbol "□" → control signal (final or presignal) in standard condition, i. e. valves are shut, at START the meter is set back and the outputs are active (valve open)

  character "**p**" → control signal (end or presignal) in **PAUSE FUNCTION**, i.e. when STARTing again, the meter is not set back but it continues counting, starting with the current quantity

  character "**x**" → control signal (end or presignal) active, i.e. valves are open; valves will be shut automatically as soon as the target quantity is reached

Depending on the parametrization, basically 3 modes of operation are possible:

The adequate mode of operation is set via the parameter "**preset mode**":

1. "preset mode 0":

simple quantity preselection of different preselection quantities (e.g., for pump-over processes and similar things)

2. "preset mode 1":
   keg operation mode (external control); drum selection via external signals

3. "preset mode 2":
   fixed drum selection via keypad (e. g. manual filling of bowls)

4. "preset mode 3":
   Remote operation (the signals CIP, ZAEUB, START, STOP and the preset quantities are controlled by communicator.

Simple Quantity Preselection of different Preset Quantity ("preset mode 0")

a) START of the quantity preselection

By pressing the green key START Taste or by activating the digital input **IN2**:

The display shows:

V	**0.0 l**
VP	**500.0 l x**

b) Automatic STOP of the quantity preselection

Usually the quantity preselection runs automatically, i. e. before the preselection quantities are reached the valve shuts thus allowing exactly the target quantity to flow.

c) Interruption of the filling process (PAUSE FUNCTION)

You interrupt the running filling process by actuating the red key STOP or via the external input **IN3**. In this case the valve shuts immediately.
The system is now in the "**PAUSE FUNCTION**", i. e. the display shows.

V	**237.9 l**
VP	**500.0 l p**

Furthermore, the message "**Pause**" blinks in the second line.
Before STARTing the quantity preselection again, the following must be observed:

- the filling process is to continue → press directly START the current quantity is counted until the target value is reached

- the filling process is to be started again → press STOP again, the **PAUSE FUNCTION** is deleted, i. e. the display shows this:

V	**237.9 l**
VP	**500.0 l p**

By pressing START or via the external START input, the normal sequence of the following filling is performed.

d) Change-over of the preselection quantity

The change-over of the target quantity **VP** can only be carried out if the quantity preselection has ended (no flow!):

Sequence of keys	2. Line on the display	Meaning
1. [→]	**V 499.9 l** **VP _____ l □**	enter preselection quantity again
2. 1000 [ENTER]	**V 499.9 l** **VP 1000.0 l □**	new preselection quantity

e) Special functions

Different control conditions can be set via the external inputs and/or the keypad:

Special functions	Reaction	Activation	Delete
CIP	control outputs for "Valves open"; normal count at flow	[F] (0) (1) or IN4 “on”	[STOP] or IN4 “out”
CIP measure stopped	control outputs for "Valves open"; no count at flow	[F] (0) (2)	[STOP]
function measure	control outputs for "Valves open"; normal metering without quantity preselection function. **- manual operation -**	[F] (0) (3)	[STOP]

73. Keg mode of Operation (external Control) ("preset mode 1")

In this mode of operation the run of the quantity preselection is controlled **exclusively** via external signals. The keypad has no access on the control.

Manual special functions are not possible.

You change to this mode of operation via the "**menu 01**" (see point 1.5.).

a) START of the quantity preselection

You start the run by activating the digital input **IN2** (24V direct voltage).

If the filling is carried out in 2 stages, the display will show the following:

V 0.00 l
VP 500.00 l □x

b) automatic STOP of the quantity preselection

As standard the 2-stage quantity preselection runs automatically:

Condition	Contact "PRESIGNAL"	Contact "FINAL SIGNAL"	Valve display	Flow on the display
Standard condition	OPEN	OPEN	□ □	Q = 0

Throttle phase after START	OPEN	CLOSED	□ X	Q = Qmin
main phase	CLOSED	CLOSED	X X	Q = Qmax
Throttle phase before STOP	OPEN	CLOSED	□ X	Q = Qmin
Basic condition	OPEN	OPEN	□ □	Q = 0

ATTENTION!
In this mode of operation an external STOP is not possible, i.e. if a STOP has to be performed, you can stop the flow by means of the external valve logic. If this flow stop exceeds the preset "timeout"-time (see "menu 01"), the filling process for the device is finished automatically.

c) Interruption the filling

The **IZMSA** itself can not interrupt the filling process at the time the process is running. In case of a stop of the flow the **IZMSA** finishes its internal quantity preselection run as soon as the preset "timeout"-time (see "**menu 01**") is reached and waits for the following START.

In case the running filling process must be interrupted, please note that:

1. the filling process will continue, if the "**timeout**"-time has not yet run out

2. the filling process will start again, if the **timeout**"-time already ran out

d) Change-over the preselection quantity

The preselection quantity **VP** can even be changed during the run of the filling process is running. You can set up to 4 preselection quantities by activating the digital inputs **IN3** and **IN4** at clamp X7 of the **IZMSA**:

IN3	IN4	Preselection quantity	Control lamp on
0 V	0 V	**vp1**	**----**
24 V	0 V	**vp2**	**D17**
0 V	24 V	**vp3**	**D20**
24 V	24 V	**vp4**	**D17 + D20**

You enter the different preselection quantities **vp1 .... vp4** when parametrizing via the "menu 01".

e. Special functions

You can interrupt the count, e. g. during the cleaning process (CIP) by activating the digital input **IN1** at clamp X7 of the **IZMSA**.
The display shows in the second line the following blinking information.

V 50,0 l
measure stopped

If the signal is removed (0 Volt at input **IN1**), the function is cancelled.

74. Manual drum selection ("preset mode 2")

The manual drum selection allows the setting of the the preselection quantities only via the keypad. You use the key to change to the following preselection quantity.

A maximum of 8 different preselection quantities vp1 .... vp8 are to be set before in the "menu 01". The preselection quantites stored in “menu 01" with the value will not be regarded if you press the key .

a. START of the quantity preselection

You start the quantity preselection by pressing the green key START or by activating the digital input **IN2**.

The display shows during a 1-stage filling process:

V	**0.0 l**
VP	**500.0 l x**

b. Automatic STOP of the quantity preselection

As a standard the quantity preselection runs automatically, i. e. before the preselection quantities are reached, the valve shuts thus allowing the flow of exactly the target quantity to flow through the transmitter.

c) Interruption of the filling process

You interrupt the running quantity preselection function by pressing the red key STOP or via the external input IN3.

d) Change-over of the target quantity

You can change the target quantity **VP** only if the filling process ran out.
You set the following fixed preselection quantity pre-parametrized in "**menu 01**" by **vp1....vp8** by actuating the key .

e) Special functions

You can set different control conditions by means of the external inputs and/or the keypad:

Special function	Reaction	Activation	Delete
CIP	Control outputs for "Valves open" no count at flow	F 0 1 or IN4 “on”	STOP or IN4 “off”
CIP measure stopped	Control outputs for "Valves open" no count at flow	F 0 2	STOP
function measure	Control outputs for "Valves open" normal measuring without quantity preselection. - manual operation -	F 0 3	STOP

75. Quantity preselection via the Profibus (“preset mode 4”)

Different preselection quantities can be entered using the Profibus. Only the Profibus may be used to control the system.

a) START of the quantity preselection
You start quantity preselection by pressing the green START key, via a Profibus command or by activating the digital input **IN2**.

b. Automatic STOP of the quantity preselection
The quantity preselection normally runs automatically, i.e., the valve closes before the preselection quantities are reached, thus allowing the flow of exactly the target quantity through the transmitter.

c) Interruption of the filling process (without pause function)
You can interrupt the running quantity preselection function by pressing the red STOP key, via a Profibus command or via external input IN3.

d) Change-over of the preselection quantity

The target quantity **VP** can only be changed at the end of the quantity preselection (no flow). It can be entered using the Profibus.

e) Special functions

You can set different control conditions by means of the external inputs.

Special function	Reaction	Activation	Reset
CIP	Control outputs for “Valves open”; normal count at flow	Profibus IN4 “on”	STOP via Profibus, IN4 “off” IN3 “on”
CIP measure stopped	Control outputs for “Valves open”; no count at flow	Profibus	STOP via Profibus or IN3 “on”
function measure	Control outputs for “Valves open”, normal measurement without quantity preselection function. - manual operation -	Profibus	STOP via Profibus or IN3 “on”
measure stopped	No count at flow	Profibus or IN1 “on”	STOP via Profibus, IN1 “off”, IN3 “on”

75.1. Keg mode of operation via the Profibus (“preset mode 5”)

In this mode of operation, the quantity preselection process is controlled **exclusively** via Profibus. The keyboard does not provide any way to control the process. The Profibus function is described in more detail in the operating instructions B5752-04en_ZD-flash-FE. Only the Profibus may be used to control the system.

Manual special functions are not available.

This mode of operation is accessed via “**menu 01**” (see point 1.5.).

a) START of the quantity preselection
The process is started by activating digital input **IN2** (24V direct voltage), via the Profibus.

c) Interruption of the filling process (PAUSE FUNCTION)
You interrupt the running filling process by pressing the red STOP key or via external input IN3. In this case, the valve closes immediately. The system is now in the "**PAUSE FUNCTION**". In addition, the message "**Pause**" is shown in data acquisition, and "P" is displayed on the counter.
Note the following before STARTING quantity preselection again:

- filling is to continue → press START ; the current quantity is incremented up to the target quantity
- filling is to be stopped and restarted → press STOP again; the **PAUSE FUNCTION** is deleted.

By pressing START, via digital input **IN2** or via a Profibus command, the normal sequence of the next filling is executed.

d) Change-over of the preselection quantity
The preselection quantity VP must be changed prior to the start of filling. The preselection quantity VP itself must also be defined prior to filling. Both can be carried out via Profibus. Up to 15 preselection quantities can be set.

e) Special functions
You can set different control conditions by means of the external inputs.

Special function	Reaction	Activation	Reset
CIP	Control outputs for "Valves open"; normal count at flow	Profibus IN4 "on"	STOP via Profibus, IN4 "off" IN3 "on"
CIP measure stopped	Control outputs for "Valves open"; no count at flow	Profibus	STOP via Profibus or IN3 "on"
function measure	Control outputs for "Valves open"; normal measurement without quantity preselection function. - manual operation -	Profibus	STOP via Profibus or IN3 "on"
measure stopped	No count at flow	Profibus or IN1 "on"	STOP via Profibus, IN1 "off", IN3 "on"

76. Drum Statistics

In the filling operation mode “**preset mode 1**" and “**preset mode 2**" statistics concerning the filled drums are created. Each filled drum which was within (“**ok**”) and not within (“**±**”) the tolerances is registered.

The tolerance can be set via the parameter “**vlim**” which determines the percentage the ACTUAL quantity may deviate from the TARGET quantity.

Example:

“vlim 0,50%” means that if the preselection quantity comes to 50 litres, the filling quantity between 49,75 ... 50,25 litres is still within the tolerances.

Reset of the Drum Statistics Data

At the beginning of the filling batch the statistics data should be reset. To perform this, you actuate the key ▼ twice to display the batch volume V2 and you reset all the counters by means of the key ZERO.

ZERO

V	**0.0 l**
V2	**0.0 l**

ZERO

Standard condition

V	**0.0 l**
VP	**50.0 l □ □**

Indication of the packing drums statistics

You use the key sequence ▭ 0 7 to call the drum statistics. You use the key ▲ to transfer the drum information.

V	**50.0 l**
Kegs	**195 ok 2±**

→ total of 197 fillings,
2 fillings not within the tolerance

V	**50.0 l**
30.0	**108 ok 0±**

→ total of 108 litres drums,
no freak value.

V	**50.0 l**
50.0 l	**87 ok 2±**

→ total of 87 50 litres drums,
2 x freak values

You reset the display to its standard condition by pressing the key CLEAR.

77. Quantity Preselection Parameters

The parameters relevant for the run of the quantity preselection are in "**menu 01**" which is called by pressing the keys [⊟] [0] .

In the following the different types of parameters and the standard settings adjusted in the factory are shown:

Survey of the Quantity Preselection Parameters

Description	Type of parameters	Standard setting
Operating mode of the quantity preselection	**"preset mode"**	0
Function of the digital output IMP1	**"imp1 mode"**	0
Time for automatic ending of the run	**"timeout"**	0 sec
Fixed time for closing the valves	**"tv"**	0 ms
Volume after START for throttling phase	**"vo"**	0.00 l
Volume before STOP for throttling phase	**"vc"**	0.00 l
Volume range for automatic correction	**"vn"**	8.00 l
Volume that is metered but not filled	**"va"**	0.00 l
Limit value for "good/bad"-evaluation	**"vlim"**	0.00000 %
Fixed preselection quantities (target quantities)	**"vp1".... "vp15"**	x.xx l
Duration for reset of the "horn signal"	**"tep"**	6000 ms

Type of Parameter	Meaning	Possible data and remarks
preset mode	determines the functioning of the quantity preselection	**"0"** free input of the preselection quantity via the keypad **"1"** preselection quantities and run are controlled externally via the digital inputs (keg filling); STOP not possible! **"2"** fixed preselection quantities are set via the keypad; further functions such as "preset mode 1". **"4"** Control of the quantity preselection via the keyboard, Profibus. The preset quantity is freely adjustable. **"5"** Control of the quantity preselection via the keyboard, Profibus. quantity can be selected from the fixed packing drum volumes.
imp1 mode	determines the functioning of the digital output IMP1.	**"0"** output of volume pulses with the value "pv1" (Menu 02) depending on the limiting value "Vlim" one of the following signals is set: **"1"** only signal when overfilling. **"2"** only signal when underfilling **"3"** signal when overfilling or underfilling
timeout	time accepted at stop of the (Q = 0) until the control signals are set back	**"0"** "timeout" not active - in "preset mode 0" the "timeout" leads to the **PAUSEFUNCTION** **"15"** a time has to be entered for the mode of operation: keg control "preset mode 1"
tv	valve closing time:	**"0"** valve closing time is optimized for each filling process (automatic after-running correction)

	for calculating the time, the final signal is turned off	**"Xxx ms"** the system calculates the turn off time depending on the flow and the preset time
vo	2-stage quantity preselection function: throttled start phase until "vo"	as soon as the volume "vo" is reached, the presignal switches additionally to allow the full amount to flow. **vo = 0,0** l: for the 1-stage quantity preselection "vo" is set to 0
vc	2-stage quantity preselection function: throttled final phase from the amount (VP - vc) on	as soon as the volume "VP - vc" is reached, the presignal is set back to make a throttled amount of flow possible before the final signal is turned off. **vc = 0,0 l** for the 1-stage quantity preselection "vc" is set to 0. special function: **horn precontact** when reaching the volume "VP - vc" the output can be set to "OUT"
vn	admissible after-running quantity the after-running correction is to work within; if the filled volume is not within the tolerance (VP + vn), the calculation is not carried out again	should be set in dependence of the flow and the used valve
va	"Wash down quantity" this volume passes the metering instrument in dependance of the filler system, but it does not reach the receptacle	correction volume subtracted from the metered volume during the quantity preselection run; va = 0,0 l: must be 0 during single filling
vlim	setting of limiting values for "good/bad"-recognition	percentage limit of the admissible filling quantity tolerance (for drum statistics and error output) can be set. "**vlim 0,0 %**": function is switched off
vp1....vp15	8 preselection quantities at maximum to be set in the "menu 01"	the first 4 preselection quantities are controlled externally in the "preset mode 1" via the digital inputs IN3 and IN4
tep	duration of pulses at the digital output OUT to signalize the end of the filling process	depending on the setting of the parameter "**out4 mode**" "**tep 6000**" ms: setting in milliseconds can be used

78. Functions of the Quantity Preselection Parameters

78.1. Setting and Optimization of the Preselection Parameter

To carry out the quantity preselection you must set and, if required, to optimize the parameters. When doing this, the following notes shall be observed:

Parameter	Setting range
not throttled flow Q_H	30% ... 100% of Q_{max}
throttled flow Q_L	10% ... 25 % of Q_{max}
throttle phase before the end of the filling process VC (tv → approximate valve closing)	$Vc > 30 \times \frac{Q_H\ (l/h)}{3600} \times tv\ (s)$
control range for the after-running correction during the commissioning	Vn *approximately* $3 \times \frac{Q_H\ (l/h)}{3600}$

ATTENTION!

The "throttle parameter" VC for the single-stage quantity preselection must be set to 0 because otherwise the automatic after-running correction is not active! The flow can be between 10 - 100 %.

Example:

a) 2-stage filling:
maximum flow not throttled $Q_{max.}$ = 9,000 l/h

vc > 7.5 l
vn = 7.5 l

b) 1-stage filling:
maximum flow $Q_{max.}$ = 50,000 l/h

vc = 0 l
vn = 42 l

79. Error messages

The transmitter **IZMSA** ndicates disturbances and warnings by blinking and in the first line of the display.

For the normal error messages for the metering instrument refer to the operating instructions B12.70en.

79.1. For the quantity preselection function additional disturbances are possible

Detected effect	Reason	Measure
permanent overfilling or underfilling	a. automatic after-running correction does not work	vn-value is too small change in "**menu 01**"
	b. valve closing time "**tv**" is set as a standard	set tv-value to 0
overfilling	automatic after-running correction cannot work because the drum is too small	reduce the preselection quantity for 3 fillings to make sure that the after-running fits in the drum and the closing time for the valve can be calculated
underfilling	presignals and final signals are interchanged by mistake	correct wiring or pneumatics
valves do not open	a. no quantity preselection function set	set "output mode 3"
	b. presignal and final signal are interchanged by mistake	correct wiring
	c. valve status display remains in the character "□"	keypad or digital input defect (if necessary perform a check of the lamps on the PC-board) or flow is not 0 when STARTing (perform "**Zero Adjust**" at Q=0)
	d. supply of the valves is not okay	check and correct pneumatics or electricity
	e. mechanical problem	check valve
valves do not close	a. valve status display remains in character "**x**"	preselection quantity is not yet reached: - make conveyance until VP possible

80. Declaration of Product Safety

For the device(s)/component(s) to be repaired:

Type:	
Serial no.:	

This is to confirm that:

- the above-mentioned device(s) is/are not contaminated by any hazardous material.
- any health hazard for the person in charge with the repairs is excluded.

Name

Company

Date / Signature

81. Fault Location Report

Customer:	Date:
	Device / board / component:
Contact:	**Serial no.:**
Phone no. (For queries):	Name:
The following members of the Anderson-Negele staff have already been informed:	

Complaint:	☐ Yes	☐ No
Do not omit to indicate the following details in case of complaint. (otherwise, it will not be possible to check, if the complaint and/or the warranty claim can be recognized):		
Invoice/Order Confirmation no.:		
Date of invoice:		
Cost estimate:	☐ Yes	☐ No

Cause of trouble:

82. Additional Information

Do you have any further questions or wishes left?
We are readily prepared to assist you.

You can find our contact on the front page of this manual.

Our service department will help you to quickly find the best suitable specialist for your question.
This instruction manual is subject to an updating service by **Anderson-Negele.**