

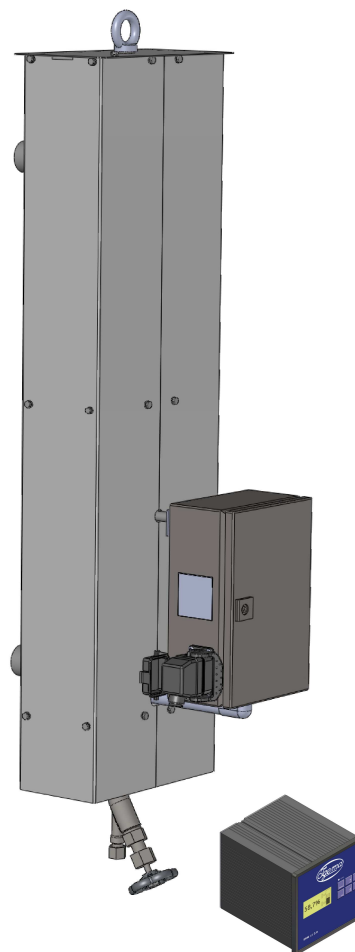
IGEMA GmbH
Measuring and control systems

Mounting and operating instructions

Electronic remote water level indicator

- Type PE2-xx

with control unit ERW *Icd* 2.0
and indicating instrument



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Safety instructions



General health and safety instructions

1. Avoidance of danger for persons and property

- Only use unit for intended purpose.
- No additional mountings and modifications on the unit without our approval.
- Adhere to the standards for prevention of accidents and to the plant specific safety regulations.
- Read and observe installation and operating instructions.

2. Application limits

Only use this unit according to these operating instructions and to the parameters agreed upon in the delivery contract (see identification plate) including the agreed operating conditions.

3. Avoidance of danger and damages

- Distribute these mounting and operating instructions to appropriate department "arrival of goods, works transport, mounting, commissioning and maintenance".
- When passing the unit to a third party, these mounting and operating instructions must be enclosed in the national language of this third party.
- Only skilled and qualified personnel with special work order may work on the unit, which must be free of pipeline stress!
- Carefully read, observe and preserve these mounting and operating instructions.
- **Observe and adhere to the precautions marked in bold characters in the sections of these mounting and operating instructions!**
- Avoid shocks and impacts during transport, which could damage the unit.
- In case of intermediate storage take care for a dry and appropriate place where the unit cannot be damaged.

4. Marking

In these mounting and operating instructions, the safety instructions are specially marked with the following symbols:



Danger

means danger to life and/or serious property damage in case of non-observance. Never ignore!



Attention

means that you must pay special attention to the technical relationships.

Unit-specific safety instructions

- ⇒ The fitting is under pressure during operation!
If flange connections, screw plugs or stuffing boxes are unfixed, hot water and steam will escape.
- ⇒ Carry out assembly and maintenance works only if plant is completely pressureless!
- ⇒ The fitting is hot during operation!
Severe burns on hands and arms are possible.
Wait until the unit has cooled before carrying out assembly and maintenance works!
- ⇒ Severe burns and scaldings on the whole body are possible!
- ⇒ Wait until the unit has cooled. In case of opening and disassembling the unit, residual medium can escape. Further evaporation is also possible on pressureless plant.
- ⇒ Sharp-edged interior parts can cause cutting damages on the hands!
Always wear work gloves when exchanging packing, valve seat and valve cone!

Exclusion of liability

The IGEMA GmbH Mess- und Regelsysteme does not accept liability when a/m regulations, instructions and warning indications are not observed and adhered to. The operator is responsible for modifications on a unit of IGEMA (if they are not explicitly specified in the mounting and operating instructions).

2. Important information

2.1 Intended use

Remote level gauge:

The primary element PE2-XX in connection with the ERW *lcd* 2.0 (= control unit) is used as a remote water level indicator for steam boilers or vessels, containing conductive liquids.

The product corresponding to the PED Directive 97/23/EEC has the CE-mark no. 0035 of the notified body.

Applied rules as per TRD/AD2000 or ASME-Boiler.

3. Explanations

3.1 Scope of supply

Remote level gauge:

- Primary element PE2-xx
- Control unit ERW *lcd* 2.0
- Indicating instrument LB16/Bargraph (optional)

3.2 System description

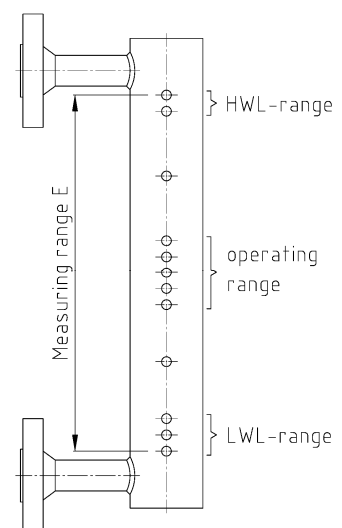
The utmost important feature of the primary element is a big advantage for the customers which is resulted in the applied technology. Reducing the number of used probes without losing the quality of information, saves costs at acquisition state and costs on spare parts during lifetime.

The default primary element is equipped with 12 probes. Customers can order each desired number of probes within a range of 4 up to 28.

The distances between every two probes can be chosen by the customer, individually. The only limit is the minimum distance between two probes which shall not be dropped below 36 mm, due to physical issues.

The customer can build partitions of indication areas { f. e. a low water level area (LWL area), an operating area and a high water level area (HWL area) }.

"ERW *lcd*" stands for electronic remote water level indicator with liquid crystal display.
It is the control unit for the primary element PE2-XX.



3.3 Function

A low-frequency alternating current, with a special none sine waveform, feeds all four probes of a module. The input circuit samples the values of these currents and compares them against preset limits. The results of the comparisons are interpreted as water or steam and saved in the data storage for further required processing. After a complete sampling phase on all four probes has been completed, a validation check is performed to detect incorrect conditions like "steam under water". When all work out on the samples is done, the μ -controller idles, listening the bus for the next poll from the control unit. The answer on such a poll hit contains the status quo of the probes and the module.

The electronic-unit at the PE2-xx is based on a modular concept. One module can support up to four probes. A total of seven modules can be installed to support up to 28 probes. All modules contain an especially designed μ -controller. This μ -controller is capable of monitoring four related probes at one time. The water level is detected by the principle of conductive measurements. This principle requires a minimum conductivity of the liquid, (here $> 0.5\mu\text{S/cm}$). The communication bus is physically based on RS-485. The system got one master (control unit) and multiple slaves (the modules in the primary element). The primary element does **not** need a separate power supply because the required power is fed via the four wire bus cable.

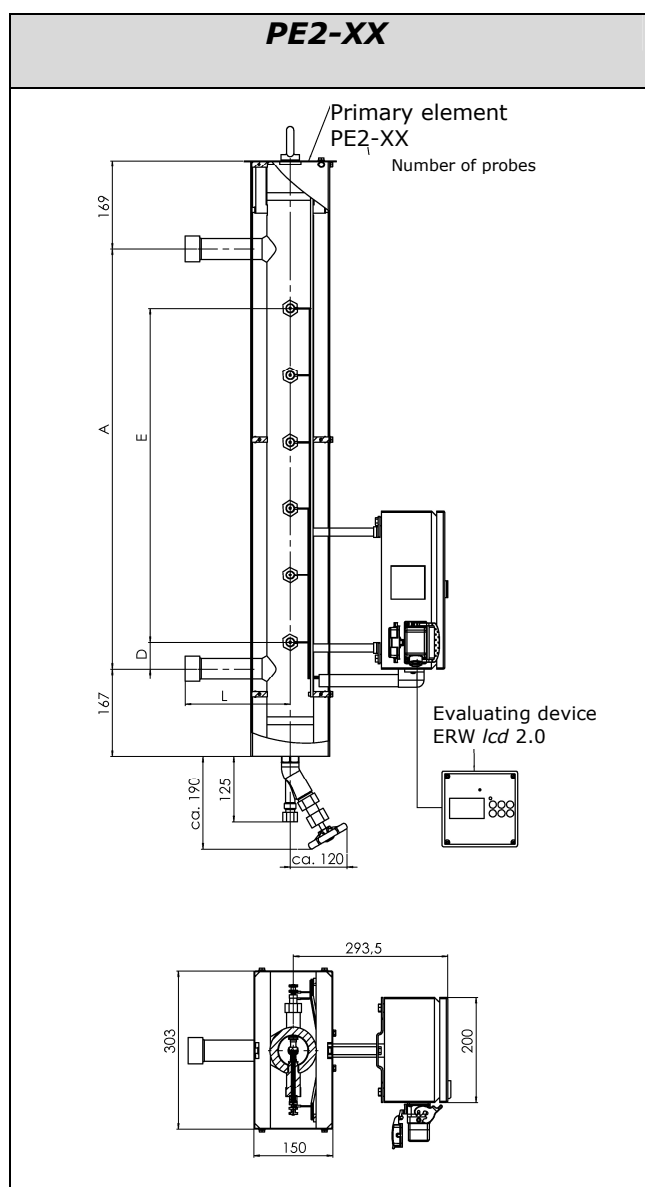
The control unit performs an inter-modular validity check. The level information is compared against the freely defined limit values. In case of congruence, the corresponding limit switch is activated. The ERW *lcd* 2.0 controls a total of five limit switches. One of them is a SMC contact (self-monitoring control) and can be used as a limiter for low-level. The four remaining contacts are intended for regulation and/or indication. Two additional separate 4-20 mA interfaces are supposed to enable further use of the water-level information. (f.e. an external indicating instrument).

4. Technical data

4.1 Versions ERW *lcd* 2.0

- Aluminium case for switch panel mounting according to DIN 43700/IEC 61554
- Backlighted liquid crystal display
- Digital display
- Current water level can be indicated percent, absolute or relative
- Modular design supports 4 - 28 probes
- Two separate 4-20 mA interfaces for loads up to 500 Ohm
- Four adjustable switch points and one additional SMC-contact
- Serial interface RS232C (D-Sub 9) (for maintenance only)

4.2 Versions PE2-XX



Maximum cable length
between PE2-XX and
ERW lcd 2.0 **250m !**

4.3 Type of connection

Flanges according to DIN or ASME.
Welding ends according to DIN or ASME.

4.4 Materials

Parts in contact with the medium: C steel according to DIN or ASTM.
Pressure holding components: C steel according to DIN or ASTM.

4.5 Application limits


Max. all. pressure PS	[bar]	32	50	80	100	160	200
Max. all. temperature TS	[°C]	239	265	296	312	348	367

4.6 Corrosion resistance

The safety of the unit is not influenced by corrosion if it is used as intended.

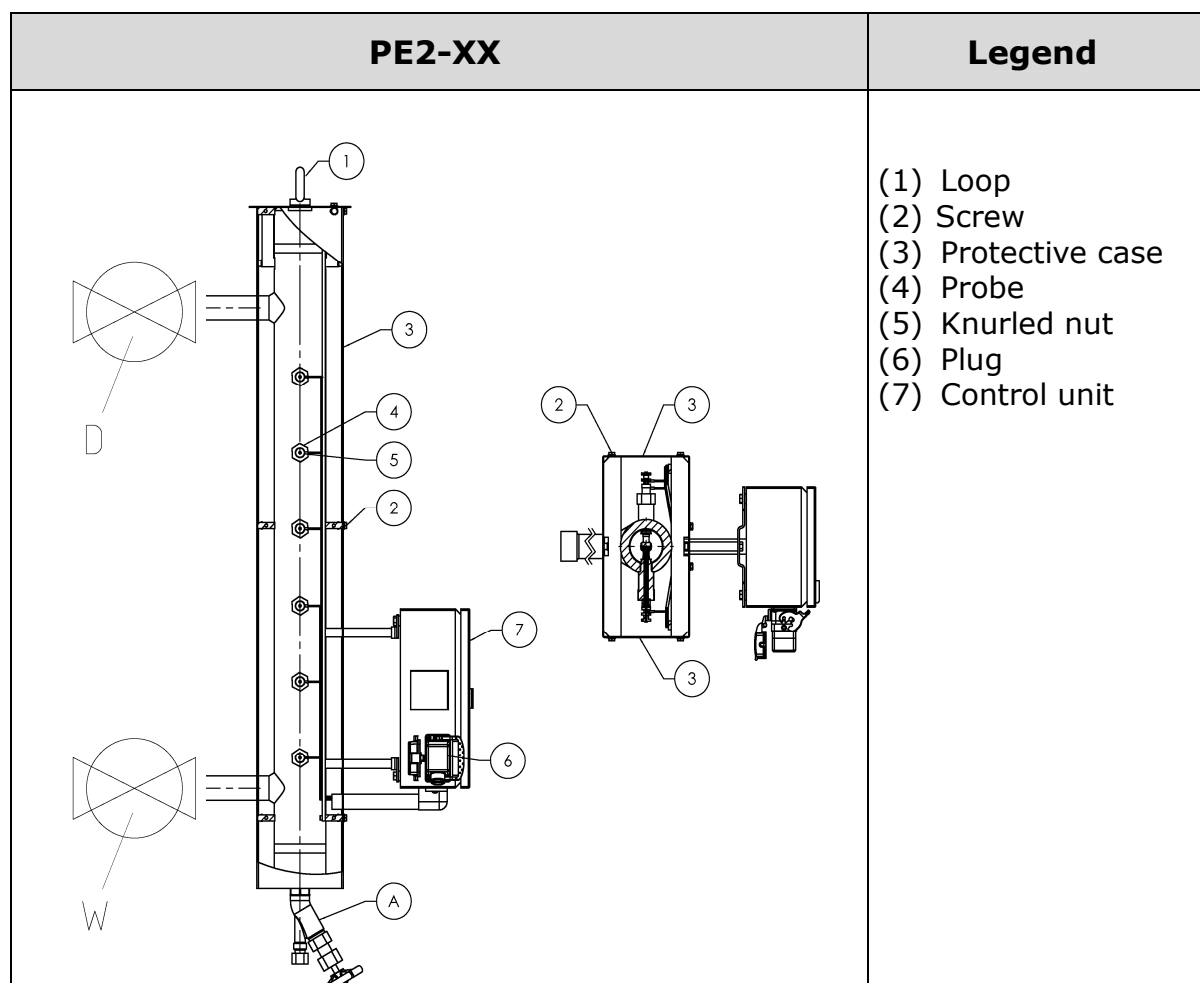
4.7 Identification plate / Marking

The following data are indicated on the identification plate according to EN 19:

 IGEMA GmbH Mess- und Regelsysteme Zieglerstraße 10-16 Germany - 52078 Aachen CE0035 made by LECOS GmbH a company of the IGEMA group See installation instructions	Built A		Type B	
	PS C	bar	TS D	°C
	{	DN F		

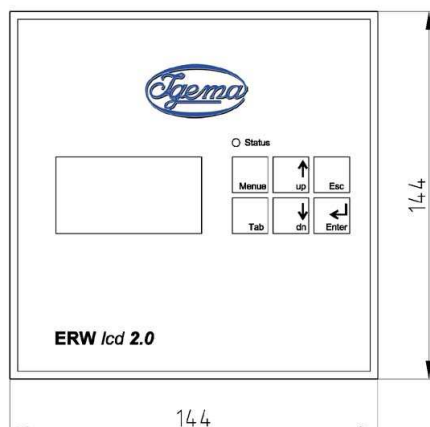
- A** Date of manufacture
- B** Type of unit
- C** Max. all. pressure
- D** Max. all. temperature
- F** Nominal diameter

5. Construction

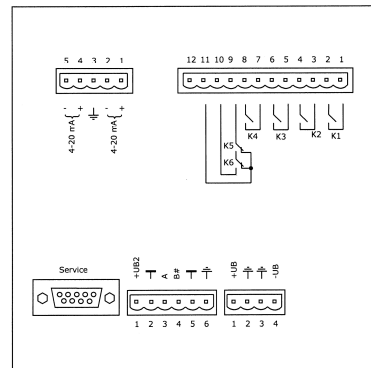


ERW lcd 2.0

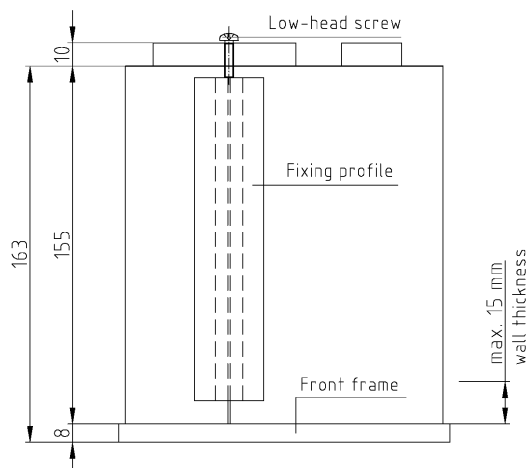
Front view



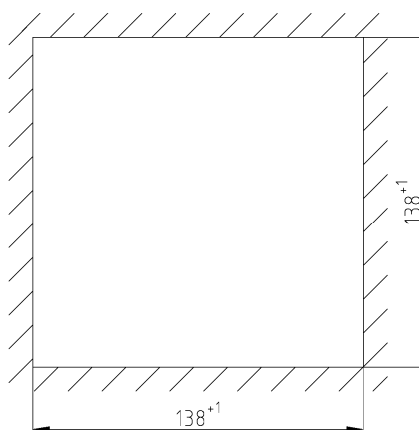
Back view



Top view



Switch panel detail



6. Assembly PE2-XX



Ensure that valid protection has been maintained!
Protective case (3) must be closed during the assembly!



Check conformity of connection dimensions between boiler connection and connection studs of the primary element PE2-XX.

A spring suspension can be mounted on the loop (1) to release the boiler studs.

6.1 Version with flange

- Respect installation position!
- Remove protection caps from connection flanges. Caps only serve as transport protection.
- Ensure that sealing surfaces are clean and undamaged.

- Use sealing material as per EN1514 and screws as per DIN2510 or DIN974 (material 1.7709).
- Mount remote level gauge.

6.2 Version with welding end

- Respect installation position!
- Remove protection caps from connection flanges. Caps only serve as transport protection.
- Assembly only by using welding process 111 (manual arc welding) and 141 (tungsten inert gas welding).

6.3 Drain piping

- Mount drain piping on drain valve (A) (to be provided by the customer).



Ensure that drain piping has free outlet to atmosphere and is protected from pressure peaks!

- Close drain valve.

7. Installation ERW lcd 2.0



Ensure that valid protection has been maintained!

- Make recess on control panel according to illustration (Switch panel detail).
- Insert control unit, slide in fixing profiles into provided notches and tighten.

8. Electrical connection

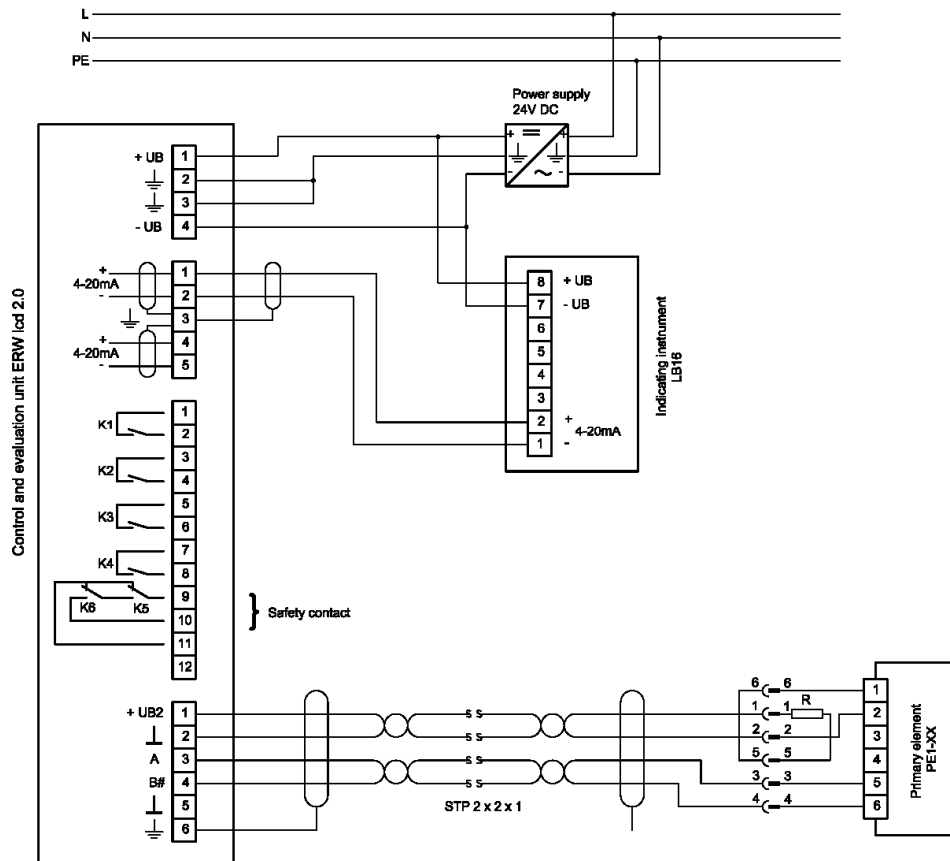


Never lay connection line in close proximity to hot tubes and power lines!

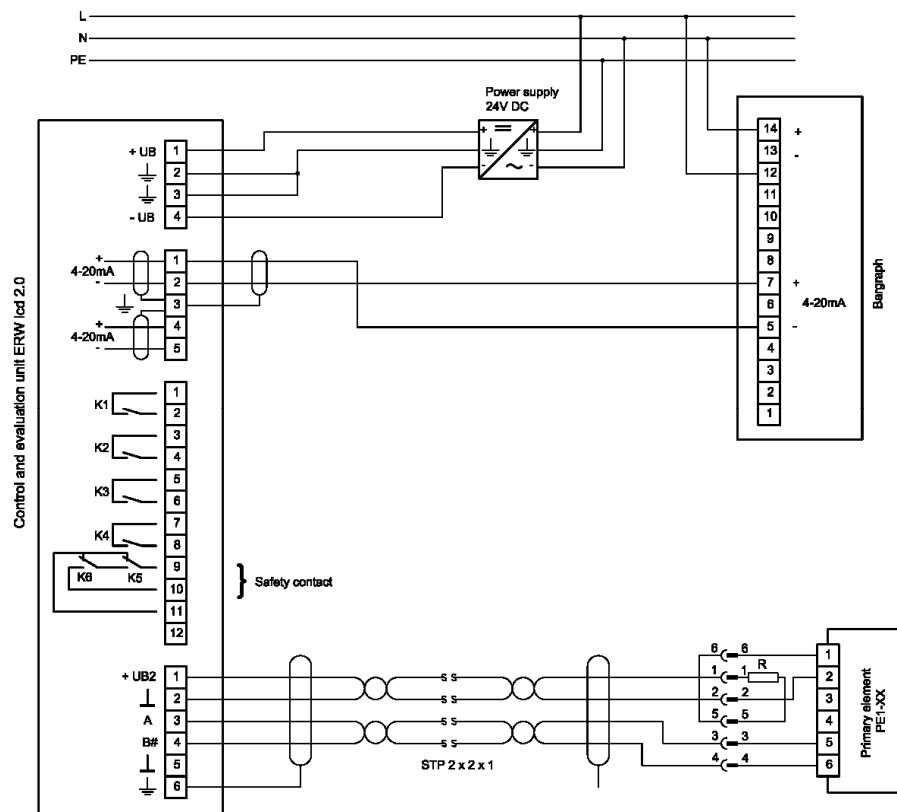
Probes have already been connected in our factory!

- Carry out connection according to wiring diagram.
- Primary element and control unit must be connected via a screened communication line e.g. 2x2x1 STP.
- The control unit is connected via screw terminals and the primary element via a plug (6) pre-cabled in our factory.
- Use a screened line to connect indicating instrument and control unit for reasons of electromagnetic tolerance.

8.1 Wiring diagram PE2-XX / ERW lcd 2.0 / LB16



8.2 Wiring diagram PE2-XX / ERW lcd 2.0 / Bargraph



9. Commissioning

9.1 Commissioning PE2-XX during boiler heating

- Close drain valve (A) (design sketch chapter 5).
- Open shutoff devices (D) and (W) as far as it will go.
- PE2-XX is heated simultaneously with the boiler.

9.2 Commissioning PE2-XX during boiler operation

- Fully open drain valve (A).
- Slightly open upper shutoff device (D) and heat PE2-XX carefully with steam until operating temperature is reached.
- Close drain valve (A).
- Slowly open upper and lower shutoff devices (D) and (W) as far as it will go.

10. Maintenance PE2-XX

Clean the PE2-XX regularly considering water quality and current regulations.



For maintenance works, the PE2-XX must be completely empty and pressureless! Only then, the protective case may be removed!



Probes are wearing parts. They have to be changed after long working time.

10.1 Setting PE2-XX pressureless

- Close valves W and D (design sketch chapter 5).
- Slowly open drain valve (A) and drain water.
- Fully open drain valve (A).
- Wait until unit has cooled.

10.2 Cleaning of probe

- Set PE2-XX pressureless (10.1).
- Loosen screws (2) and remove protective case (3).
- Carefully remove contamination.
- Place protective case (3) and fix with screws (2).
- Re-commissioning of PE2-XX (see 9.1 or 9.2).

10.3 Re-tightening of probe (in case of leakages)

- Set PE2-XX pressureless (10.1).
- Loosen screws (2) and remove protective case (3).

- Loosen electrical connection (5) of leaky probe.
- Re-tighten probe (tightening torque $M_d = 140 \text{ Nm}$).
- Replace probe in case of further leakage (see 10.4).
- Connect probe (4) electrically with knurled nut (5).
- Place protective case (3) and fix with screws (2).
- Re-commissioning of PE2-XX (see 9.1 or 9.2).

10.4 Probe exchange

- Set PE2-XX pressureless (10.1).
- Loosen screws (2) and remove protective case (3).
- Loosen electrical connection (5) of the probe to be exchanged.
- Carefully screw out probe.
- Ensure that sealing surface is clean and undamaged.
- Screw in new probe. Tightening torque **$M_d = 140 \text{ Nm}$** . Only use probes of the same type and do not damage probe insulator!
- Connect probe (4) electrically with knurled nut (5).
- Place protective case (3) and fix with screws (2).
- Re-commissioning of PE2-XX (see 9.1 or 9.2).

11. Configuration ERW Icd 2.0

Basic settings of ERW Icd 2.0 are made user-specifically in our factory!

11.1 To operate and programme

The menu structure is explained in chapter 12.2.

The settings can be changed by the six keys on the control unit.

Therefore the programming mode must be selected:

- Press "Menu" key for more than 2 seconds until the main menu appears.
- The indicated menu items can be selected by use of the arrow keys "up" and "dn".
- By pressing the "Enter" key, the subordinated menu level is chosen. Inputs can be made with the arrow keys.
- By pressing the "Tab" key, the different input items or the next line can be chosen.
- The inputs are confirmed by pressing "Enter".
- A current process can be cancelled by pressing "Esc". This will force the software to reenter the main menu.
- To leave the programming mode press the "Esc" key several times. All modifications can be confirmed and stored by pressing the "Enter" key.

Key	Function
Menu	start programming mode
Arrow "up" ↑	upwards, to the right
ESC	quit menu, cancel
TAB	next input, next line
Arrow "dn" ↓	downwards, to the left
Enter	select

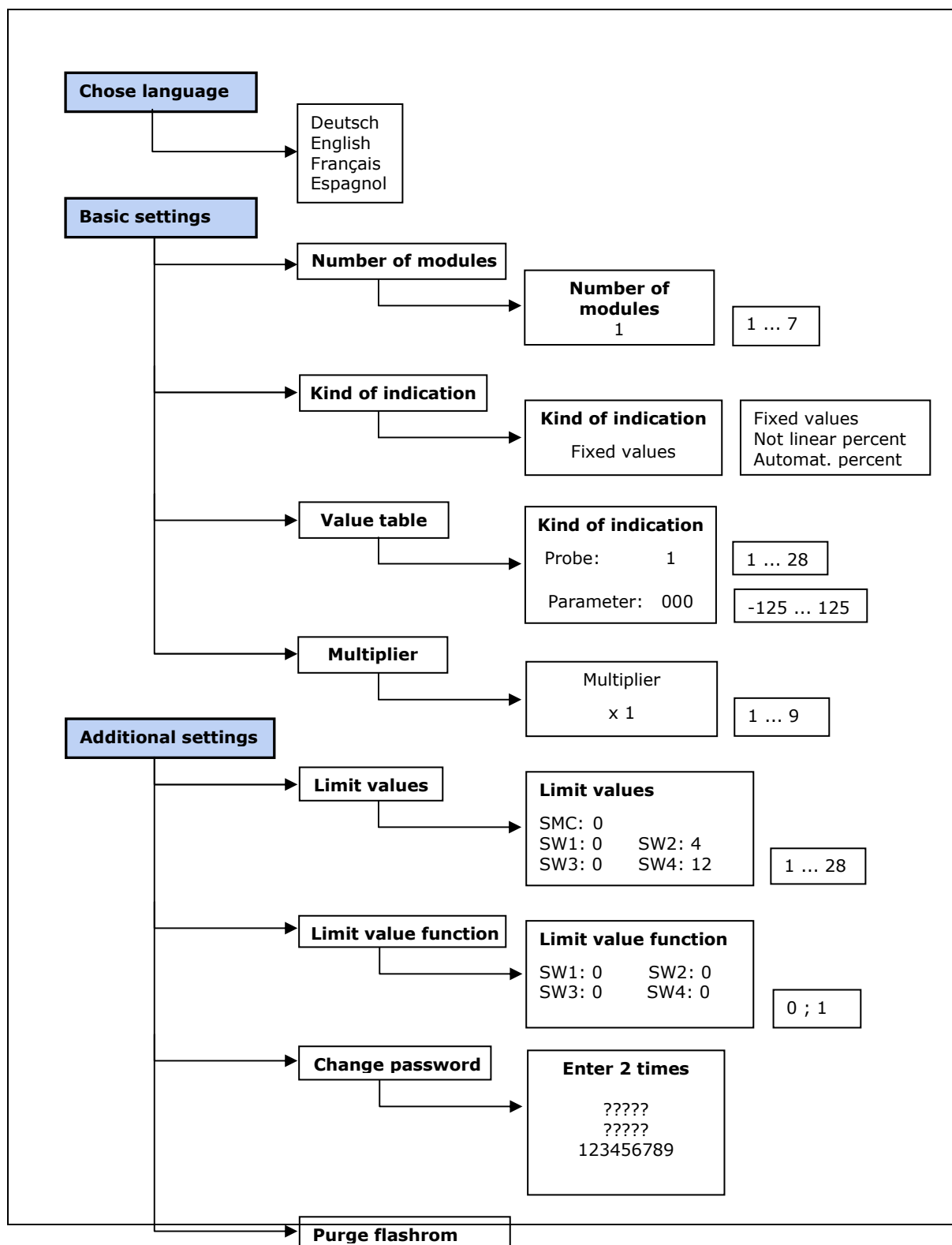
The user can set up a **password** to prevent third person manipulations of the settings. The password consists of five digits.

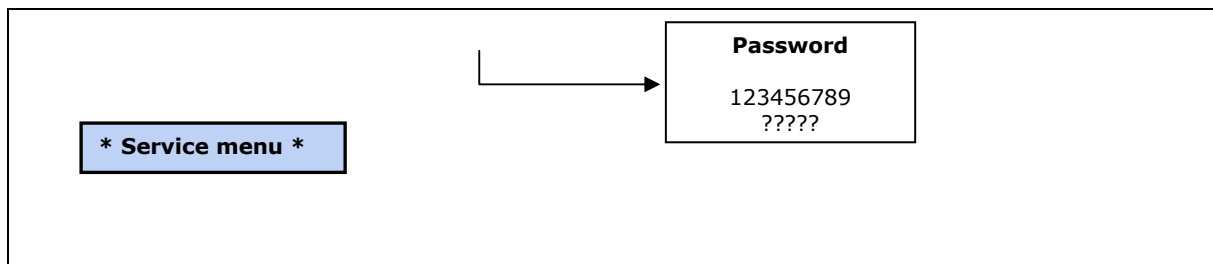
- A new password can be selected or changed under the menu item "additional setting".
- With the "up" and "dn" keys, the desired digit can be selected in the bottom number line and taken over with the "Tab" key.
- The five-digit password is entered continuously (without "Enter" key) also in the second line (confirmation). A final confirmation is made by pressing the "Enter" key. If the password confirmation was not correct, the password must be completely re-entered.
- After that, the main menu appears and after approximately 15 seconds, the password can be confirmed with "Enter" or cancelled with "Esc" in reply to the question "Save?".
- Thereafter, a start of the programming mode is only possible after entering the correct password. This is made as usual by pressing the arrow and the "Tab" key and is confirmed with "Enter".



The option "Purge flashrom" under point "Additional settings" erases all earlier settings. This option is password protected to prevent a purging of the flashrom. The current password is "56870". After purging the flashrom, all settings must be re-entered!

11.2 Menu structure



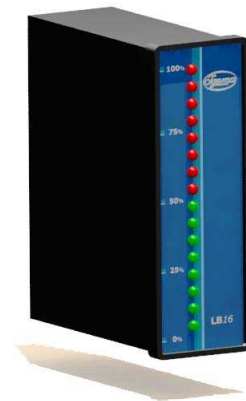


12. Indicating instrument (optional)

12.1 Indicating instrument LB16

This additional indicating instrument permits an easier visual detection of the water level. The representation is made in form of 16 vertical arranged LEDs.

The indicating instrument is delivered in a plastic case for a switch panel installation according to DIN 43700/IEC 61554 and it has a lockable snap attachment through plastic clips for a wall thickness up to 50 mm.



12.2 Installation LB16



Ensure that valid protection has been maintained!

- Make recess on control panel (138 x 45 mm).
- Insert LB16, snap in plastic clip and fix unit.
- Electrical connection see chapter 8.1.

12.3 Indicating instrument Bargraph

This additional indicating instrument permits also an easier visual detection of the water level. The representation is made in form of a vertical bargraph.

The bargraph is delivered in a plastic case for a switch panel installation according to DIN 43700/IEC 61554 and it has a lockable snap attachment through plastic clips for a wall thickness up to 50 mm.

Type Bargraph **BVO3.001.310B**: on the front side IP40,
connection IP00

Type Bargraph **BVO3.001.317B**: IP65



12.4 Installation Bargraph



Ensure that valid protection has been maintained!

- Make recess on control panel (92 x 22 mm).
- Insert bargraph, snap in plastic clip and fix unit.
- Electrical connection see chapter 8.2.

13. Specification

13.1 Specification PE2-XX

Production according to EC directive 97/23/EG, Module D1, Category II, Standards TRD, AD2000, ASME-Boilers s							
Max. all. pressure	PS [bar]	32	50	80	100	160	200
Max. all temperature	TS [°C]	239	265	296	312	348	367
Probe		EL 65	EL 60				
Article no..		15-01877	15-00790				
Connection thread		G 1/2					
Width across flats SW		27					
Bolting		Stainless steel					
Probe tip		Stainless steel					
Insulator		PTFE	Keramik				
Centre distance A		user-specific					
Measuring area E		user-specific					
Standpipe		DIN / ASME					
Process connection		DIN / ASME					
Number of probes		4-28					
Probe distance [mm]		min. 36 in case of staggered mounting					
Interfaces		RS485 (6-port plug)					
German registered design		Nr.20 2004 007 619.5					

13.2 Specification ERW Icd 2.0

Article no.	15-090060
Power supply	24 Vdc / 1,25 A durch separates Netzteil
Interfaces	RS232C (D-Sub 9) RS485 (6-port plug) limit switch 12-port plug 4-20 mA (2x)
Case version	acc. to DIN 43700 / IEC 61554
Material	aluminium, conductive chrome-plating inside
Protection	Front IP 40
Connection	from the back side with terminals up to 2,5 mm ²
Operating temperature	0 up to +55°C

13.3 Max. operating data of dry contacts

Safety chain	unblocking potential	max. 250 V ac
	current on contact	max. 4 A ohmic max. 0,75 A inductive $\cos \varphi 0,5$
Indication	unblocking potential	max. 250 V ac
	current on contact	max. 8 A ohmic max. 1,5 A inductive $\cos \varphi 0,5$

13.4 Specification indicating instrument LB16

Supply voltage		24 V DC
Power input		7,5 VA
Measurement input	Measuring range	4-20 mA
	Input resistance	$\sim 100 \Omega$
Case	Design	Control panel case according to DIN 43700 / IEC 61554
	Material	Glass fibre reinforced Noryl SE1 GFN2
	Dimensions (B x H x T)	48 x 144 x 116,5 mm
	Installation detail	45 x 138 mm
Connection		Terminal connection: max. 2,5 mm ² (on the backside)
Protection	Front	IP 40
	Backside	IP 00
Weight		0,300 kg
Ambient temperature		0...55°C
Indication		Display red/green LED indication (16 points)

13.5 Specification indicating instrument Bargraph

Case BVO3.001.310B	Article-no.	20-00076
	Material	PC/ABS-screen, colour black, self-extinguishing according to UL94V-0
	Protection	front IP40, terminal connection IP00
	Weight	approx. 0,30 kg
	Connection	from the back side with terminals up to 2,5 mm ²
	Operation	behind the front side
Case BVO3.001.317B	Article no.	20-00086
	Material	PC/ABS-screen, colour black, self-extinguishing according to UL94V-0
	Protection	front IP65, terminal connection IP00
	Weight	approx. 0,32 kg
	Connection	from the back side with terminals up to 2,5 mm ²
	Operation	factory-made settings at IP65, operation from the back side

Measurement	Measuring area	4 – 20 mA
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interface	Inlet resistance	100 Ω (input)
Precision	Resolution	20 segments
	Measuring error	+/-1 digit
	Temp. coefficient	100 ppm/K
	Measuring principle	Dual-Slope-Integration
Power supply	Supply voltage	230/115 V +/- 10% (50-60 Hz)
	Input	approx. 2 VA
Indication	Display	bar indication with 30 points
	Overflow	EEE
	Measuring rate	250 ms
Ambient conditions	Operating temperature	0 up to +60 °C
	Storage temperature	-20 up to +80 °C

14. Decommissioning



Severe burns and scaldings on the whole body are possible!

Before detaching flange connections, screws of stuffing box cover screws or screw plugs, all connected lines must be pressureless (0 bar) and cooled off to ambient temperature (20°C)!

14.1 Disposal

Dismount unit and separate waste products.

When disposing the unit, observe legal regulations for waste disposal.

15. Supplement

Warranty

We accord a warranty period of 24 month on our products. A condition for that is the appropriate treatment according to these mounting and operating instructions. The warranty for wear and spare parts is restricted to material defects and construction faults.

The probes installed in the remote level gauge are wear parts and are **not** included in the warranty.

The sealings/gland packing installed in the valves are **not** included in the warranty.

CE- Declaration of Conformity

Declaration of Conformity in accordance with the PED Directive 97/23/EEC, annex VII, EMV directive 89/336/EEC and Low- Voltage Low- Voltage Equipment Directive 72/23/EEC

We, the company:

IGEMA GmbH
LECOS GmbH
J.G. Merckens Mess- und
Regelsysteme GmbH & Co. KG
Zieglerstraße 11a
52078 Aachen
Deutschland

declare as IGEMA group that the products "water level gauges"
as pressure holding parts

type of product:

**Remote water level indicator Typ PE2-XX
with control unit ERW lcd 2.0**

comply with the PED Directive 97/23/EEC
and that the following Conformity Assurance System was used:

Category II, Module D1

Applicable standards:
TRD, AD2000, ASME-Boilers, DIN EN 12952-7

Notified body for the modules:

TÜV Rheinland Industrieservice GmbH
Am Grauen Stein
51105 Köln
Germany

Aachen, 10.05.07



E.H. Kilchert
(Managing director)



A. Scholl
(QM representative)



P. Barth
(Development)



Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

PRODUCER	IGEMA GmbH
PLACE OF PRODUCTION	Zieglerstrasse 10-16 52078 Aachen Germany
DESCRIPTION	Water level indication system
TYPE	ERW lcd 2.0
APPLICATION	Water level indicator for land based water and steam boilers
ADDITIONAL TESTS	Electromagnetic immunity and emission tests according to Lloyd's Register Type Approval System Test Specification No. 1 - 2002: Immunity to conducted low frequency interference (Section 22) Immunity to conducted high frequency interference (Section 23) Immunity to radiated radio frequency fields (Section 24) Immunity to fast low energy transients (Section 25) Immunity to slow high energy transients (Section 26) Immunity to electrostatic discharge (Section 27) Radiated emission (Section 29) Conducted emission (Section 30)
DESIGN CODE	Manufacturer's specification
OTHER CONDITIONS	The system is not to be used for safety critical functions

Certificate No.	03/20089
Issue Date	18 December 2003
Expiry Date	17 December 2008
Sheet	1 of 2



Thorsten Wolff
Hamburg Plan Approval Centre
Lloyd's Register EMEA

BUNDESREPUBLIK DEUTSCHLAND

URKUNDE

über die Eintragung des
Gebrauchsmusters

Nr. 20 2004 007 619.5

IPC

G01F 23/24

Bezeichnung

Vorrichtung zur Bestimmung des Flüssigkeitsniveaus in einem Behälter

Gebrauchsmusterinhaber

IGEMA GmbH, 48155 Münster, DE

Tag der Anmeldung

12.05.2004

Tag der Eintragung

22.07.2004



Der Präsident des Deutschen Patent- und Markenamts

Dr. Hilde



This high quality IGEMA product has been developed, manufactured

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according to DIN EN ISO 9001:2000.

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