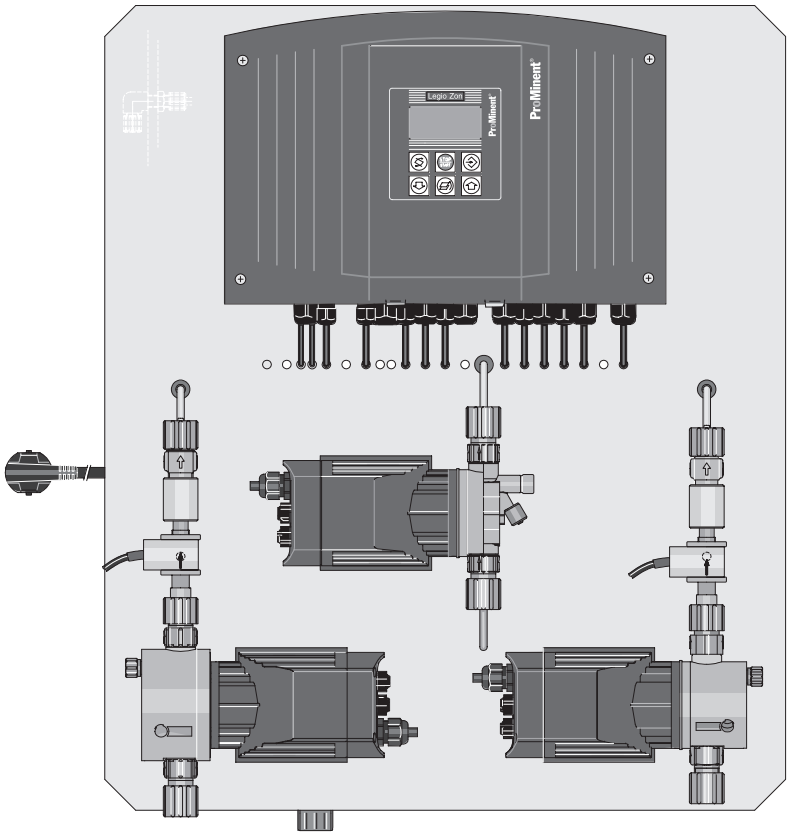
ProMaqua®
a ProMinent Company

Operating Instructions

Chlorine dioxide systems
Legio Zon® Type CDLa



Please read through the whole of these operating instructions to begin with! Do not discard them!
The operator shall be liable for any damage caused by installation or operating errors!

Legal notice:
Operating instructions
Chlorine dioxide systems
Legio Zon® Type CDLa

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We reserve the right to make technical modifications.
Printed in Germany

Identcode

CDLa Legio Zon® systems come with an identcode, indicating the features specified on order placement. The identcode is shown on the system type identification plate.

CDLa	System type
05	CDLa 5 = 5 g/h
10	CDLa 10 = 10 g/h
	Application:
0	With integrated metering pump
1	Without integrated metering pump
	Version:
P	ProMaqua
J	Japan
H	Switzerland (version conforming to SVGW)*
N	Neutral
	Operating voltage:
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
3	100 V, 50/60 Hz (only Japan version)
	Cover:
1	With blue cover hood
	Chlorine dioxide pump:
0	None
1	With pump
	Intake lance:
0	Without intake lance
1	Intake lance for 10/25 l tank
	Language:
D	German
E	English
F	French
I	Italian
S	Spanish
J	Japanese
C	Czech

* SVGW version:
Diluting water connection G 3/4″,
Pressure relief valve, type MFV with wall mounting bracket included in scope of delivery.

DXCa	05	0	P	0	1	0	0	D

General notes for the user

Please read through the following notes for the user! When you are familiar with them, you will get a lot more out of the operating instructions.

In the text, particular emphasis is placed on:

Operating notes:

NOTE

Notes are designed to make your work easier.

Safety notes are marked with pictograms:

WARNING

Indicates a possibly dangerous situation. Failure to comply puts your life at risk and can result in serious injuries.

CAUTION

Indicates a possibly dangerous situation. Failure to comply can result in slight or minor injuries or damage to property and equipment.

ATTENTION

Indicates a possibly harmful situation. Failure to comply can result in damage to property and equipment.

NOTE

Sect. 9 “Control elements”, Sect. 10 “Commissioning” and Sect. 11 “Operation” explain the setting menus of the software according to their sequence.

Note for the Operator

Contains notes and quotations from German directives and guidelines for the area of responsibility of the Operator. They in no way relieve him of his responsibility as the Operator. They are only intended to remind him of certain problems or to make him aware of them. No claim is made with regard to completeness or for validity for every country of use, or that the document is absolutely up to date.

The version number of the hardware and software is displayed on the controller LCD screen (see Sect. 9, fig. 18). Please quote this version number in case of complaint or if you are extending a Legio Zon® system that has already been installed.

1 About this system

The Legio Zon® chlorine dioxide production and dosing system is designed for potable water treatment, particularly to combat Legionella.

The controller feeds the required amount of dilution water to the reactor and mixes it with precisely calculated amounts of hydrochloric acid and sodium chlorite that are dosed via two dosing pumps. A ClO_2 solution with a concentration of 2 g/l is produced. This low concentration – compared with other processes – minimises the potential dangers.

The prepared ClO_2 solution is transferred to a storage tank from which it is dosed with the dosing pump, also integrated in the system.

The combination of dosing monitors, level switches and time monitors ensures reliable operation.

2 Safety section

WARNING

- ***Operating staff must receive instruction from a ProMinent ProMaqua service technician! (This takes place during the commissioning and is documented in the commissioning log)***
- ***A copy of the operating instructions must be kept within easy reach of the system!***
- ***Fix warning notices at the location where the Legio Zon® system is installed and at the storage areas for the chemicals!***
- ***Observe national regulations!***

Note for the Operator

Key words for use when searching for the required regulations:

- Chlorine dioxide systems
- Chlorine dioxide (possibly also chlorination)
- Potable water
- Food
- Hydrochloric acid
- Sodium chlorite
- Storage
- Dangerous materials
- Personal protective equipment

2.1 Basic rules

First and foremost, always follow these two basic rules:

1. **The two components Bello Zon® acid (dilute HCl) and Bello Zon® chlorite (dilute $NaClO_2$) must never be allowed to come together other than in the reactor!**

   Otherwise toxic ClO_2 gas is formed!

2. **Never operate the chlorine dioxide system Legio Zon® CDLa with wrongly diluted acid sodium chlorite!**

   Otherwise this can result in ClO_2 concentrations that the system is not designed for!

   Otherwise this can result in chlorite concentrations in the treated water that are harmful to health!

2.2 Authorised use

- The Legio Zon® system is solely intended to produce and dose a disinfectant solution containing ClO_2 from dilute hydrochloric acid (9%), sodium chlorite solution (7.5 %) and water.
- All other uses or modifications to the system are prohibited!
- The system must not be operated outside the conditions specified in the Technical Data!
- Only allow suitably-instructed personnel to operate the Legio Zon® system! All other activities must only be carried out by personnel who have received training for these activities and have been authorised by ProMinent!
- Observe the appropriate national rules and regulations at all phases in the life of the system!
- You are obliged to observe the particulars in the operating instructions at the various phases in the life of the system!

2.3 Training staff for operation of the system

Activity	Training
Mounting/installation	ProMinent ProMaqua service technician or skilled person(s) authorised by ProMinent ProMaqua
Initial commissioning	ProMinent ProMaqua service technician or skilled person(s) authorised by ProMinent ProMaqua
Commissioning	Skilled person(s)
Operation / changing containers	Instructed person(s)
Maintenance / repair	ProMinent ProMaqua service technician or skilled person(s) authorised by ProMinent ProMaqua
Taking out of service / disposal	ProMinent ProMaqua service technician or skilled person(s) authorised by ProMinent ProMaqua
Simple troubleshooting	Instructed person(s)
Complex troubleshooting	ProMinent ProMaqua service technician or skilled person(s) authorised by ProMinent ProMaqua

WARNING

According to accident statistics, holiday replacements represent a safety risk!
Even holiday replacements must have the qualifications referred to above and must have received instruction!

2.4 Personal protective equipment

- Face protection
- Rubber or plastic boots
- Protective gloves (ClO_2-proof type!)
- Protective apron
- Breathing apparatus as full face mask
- 1 replacement filter per breathing apparatus

2.5 Information for emergencies

- If you have been in contact with the ClO_2 solution or with ClO_2 gas, refer to explanatory leaflet “Chlorine dioxide dangerous substance safety data sheet: properties of chlorine dioxide and notes on handling aqueous solutions” in the Appendix!
- If you have been in contact with the acid: refer to explanatory leaflet “Bello Zon® acid-05, EC Safety Data Sheet in accordance with EC Directive 91/155/EEC” or data sheet in the Appendix!
- If you have been in contact with the chlorite: refer to explanatory leaflet “Bello Zon® chlorite-05, EC Safety Data Sheet in accordance with EC Directive 91/155/EEC” or data sheet in the Appendix!

2.6 Description and test of the safety devices

Chlorine dioxide systems Legio Zon® are designed and built in accordance with the German Gas and Water Authority DVGW technical standards W 224 and W 624. They have the following safety devices:

Dosing monitoring devices

The pumps must always dose the chemical components in the correct ratio. If too much acid is dosed, the treated water will be too acidic, which can lead to corrosion damage. If too much chlorite is dosed, the treated water will contain chlorite (limits!).

Two different devices prevent this:

The suction lances in the component containers are equipped with two-stage level switches. The level switches are designed to prevent only one component being dosed on its own. At the first level, the controller shows a warning message on the LCD display and the “Warning” relay operates. At the second level, the control still allows reaction batch that has been started to be completed. The control shuts down the system before the next batch. A message appears and the "Alarm" relay switches.

Dosing monitors

The dosing monitors are intended to indicate an uncontrolled change in the dosing ratio of the components. For this, a dosing monitor is positioned after each pump. The magnetic float in the dosing monitor bobs up and down in time with the pressure surges of the dosing medium of the pump. The controller records this via the proximity switch of the dosing monitor. If these signals fail, the controller switches the dosing off and gives an alarm: the “Alarm” relay operates and a message appears in the LCD display.

The position of the proximity switch is accurately set in the factory and must not be adjusted!

Safety bunds (accessory)

The safety bunds are intended to prevent uncontrolled escape of the chemical from a faulty component container and to prevent the chemical possibly mixing with the other components.

3 Storage and transport

The chlorine dioxide system Legio Zon® CDLa is supplied in a wooden crate. The chlorine dioxide system must be drained before being stored or transported.

Environmental conditions for storage and transport:
Temperature: 0 °C to +50 °C

Humidity: < 92 % relative humidity non-condensing
Other: Protect from direct sunlight

In addition to the system itself, the delivery package also contains:

- Two suction lances with affixed adhesive labels (only version with intake lances)
- A 3-way valve for wall mounting
- Wall mounting plate
- Mounting bracket
- An angle valve with support inserts and hose
- The supplementary kit (installation material)
- Set of labels (information notices, warning notices, etc.)

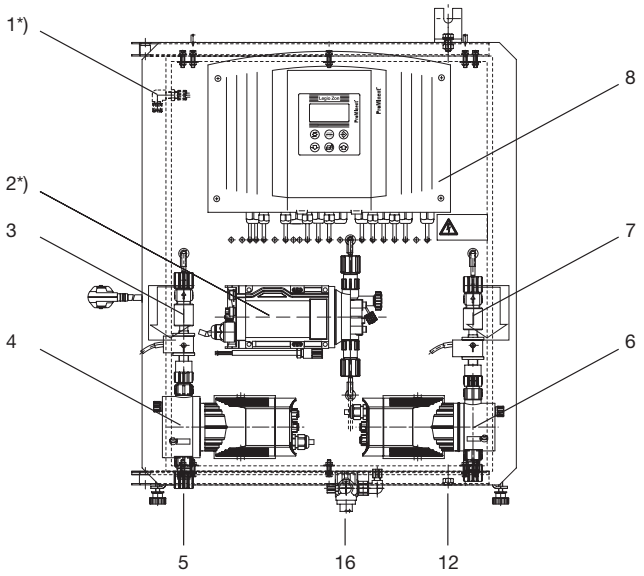
Shipping weight (incl. packaging): approx. 40 kg

CAUTION

Systems that have already been operated with chemicals must not be shipped until they have been thoroughly flushed with water and cleaned.
A completed safety declaration form must accompany the system when it is shipped (see sample form in Appendix).

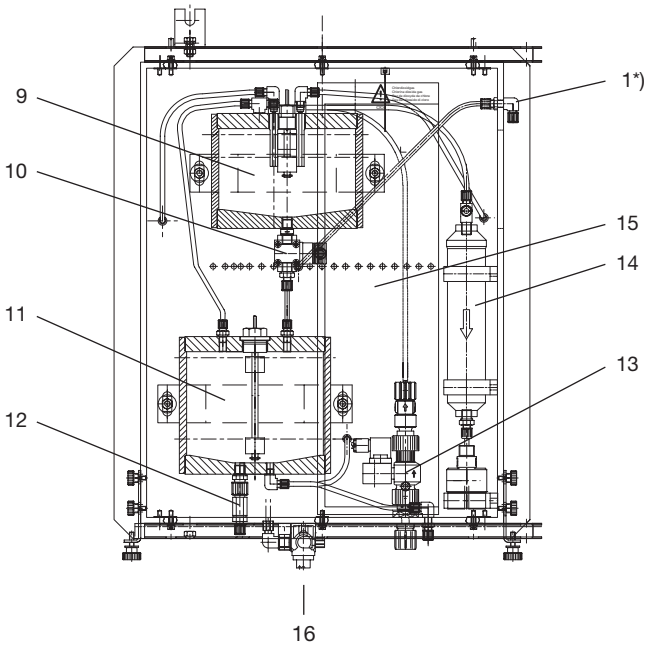
4 System overview

Fig. 1: Front



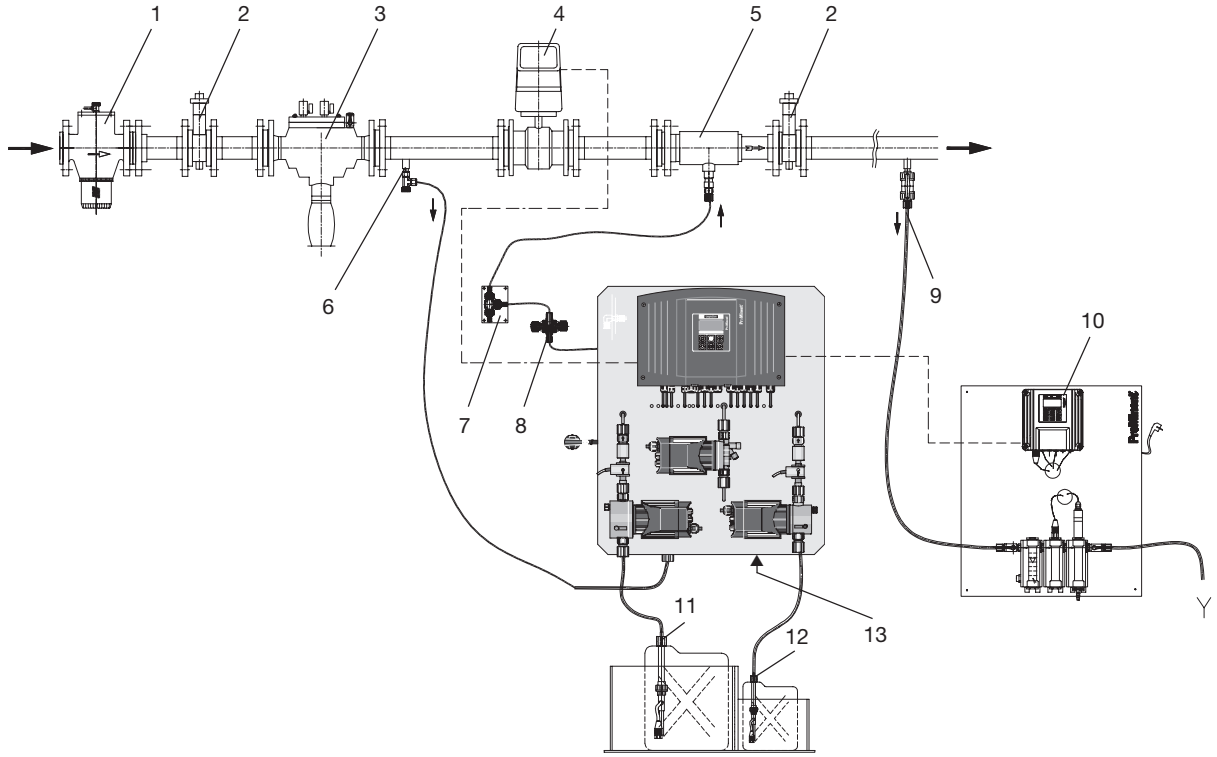
1 ClO_2 solution outlet*)
2 ClO_2 dosing pump*)
3 Acid dosing monitor
4 Acid dosing pump
5 Dilution water connection
6 Chlorite dosing pump
7 Chlorite dosing monitor
8 Controller
12 Storage tank drain valve
16 Three-way cock valve as output ClO2 solution in "without integrated metering pump" version
*) not provided in "without integrated metering pump" version

Fig. 2: Back



9 Reactor
10 ClO_2 solenoid valve
11 Storage tank
12 Storage tank drain valve
13 Dilution water solenoid valve
14 Activated charcoal filter
15 Exhaust gas “lung”
1 ClO_2 solution outlet*)
16 Three-way cock valve as output ClO2 solution in "without integrated metering pump" version
*) not provided in "without integrated metering pump" version

Fig. 3:
Typical Legio Zon® system installation



1 Dirt trap
2 Isolating valve
3 System isolator
4 Water meter
5 Dosing point Legio Zon®
6 Angle valve
7 3-way valve
8 Multi-function valve
9 Sample water line (or sampling cock)
10 Measurement point
11 Suction lance with Bello Zon® acid in safety bund
12 Suction lance with Bello Zon® chlorite in safety bund
13 Drain valve

5 Functional description

Chemical principle of the system

The chlorine dioxide system Legio Zon® CDLa works according to the hydrochloric acid-chlorite process:
hydrochloric acid + sodium chlorite = chlorine dioxide + sodium chloride + water
$4HCl + 5NaClO_2 = 4ClO_2 + 5NaCl + 2H_2O$

By bringing together dilute hydrochloric acid, dilute sodium chlorite solution and water, the Legio Zon® system initially produces a 0.2 % chlorine dioxide solution (2 g/l). This solution is stored in the system in the interim and fed to the water being treated at the required rate.

Operating principle of the system

Two dosing pumps dose the components – Bello Zon® acid and Bello Zon® chlorite – into the reactor, which is pre-filled with a defined quantity of water. After a defined reaction time has elapsed, the controller drains the contents of the reactor into the storage tank. The third dosing pump doses this ClO_2 solution. Dosing is controlled at the required rate by the signal from a water meter.

In the "without metering pump" version, the system is equipped with two separate metering pumps instead of the integrated ClO_2 pump. They are to be configured for activation via external control regulators. The integrated CDLa controller is not used in this case.

Safety devices

The safety devices are described in Sect. 2.6.

6 Installation position requirements

6.1 Installation position requirements

WARNING

Observe the applicable national and local rules and regulations!
The Operator of the system is responsible for compliance with these rules and regulations!

- The chlorine dioxide system must not stand outdoors!
- Provision must be made to protect the chlorine dioxide system against unauthorised access!
- The position for the chlorine dioxide system must be protected from direct sunlight, be frost-free and well ventilated.
- At room temperatures below 10 °C, the dilution water and chemicals may have to be pre-heated.
- Clear access must be provided to bring the component containers to the system.
- An emergency escape route must be available.
- A flat, vertical wall must be available for installation of the Legio Zon® system.
- It must be possible to install the Legio Zon® system so that the component containers fit comfortably underneath it (underside of the Legio Zon® at least 1 m above ground).
- A measurement point must be provided. The sample water line (or a sampling cock) must be more than 2 m downstream of the dosing point, but upstream of the first extraction point.
- A water supply for the dilution water is required (minimum pressure 3 bar).
- A water tap must be provided to allow spilt chemicals to be safely removed.
- A floor drain must be provided to allow spilt chemicals to be safely removed.
- An electrical power supply is required.

Note for the Operator

The following rules and regulations – applicable in Germany – provide more detailed information on this:

- Safety Rules “Chlorination of water” , GUV V-D5 E (GUV = Statutory Accident Insurance)
- “Dosing systems for chlorine dioxide”, DVGW (German Gas and Water Authority) explanatory leaflet W 624, DVGW e.V., Eschborn, 10/1996
- “Chlorine dioxide in water treatment”, DVGW Technical Specification W 224, DVGW e.V., Eschborn, 04/1986, ISSN 0176-3504
- Guidelines for protecting groundwater against contamination (§ 19 Federal Water Act – version issued 23.09.1986)
- Hazardous Materials Order - particularly § 17 (General protection obligations) and § 20 (Operating instructions; see also Safety Rules § 9 on this subject).

6.2 Water requirements

WARNING

Serious system malfunctions can occur and corrosion damage in your pipework system can result if the requirements for the dilution water and the water to be treated are not complied with!

Dilution water

Temperature: 10 - 30 °C
Pressure: 3 - 6 bar
Quality: potable water, free of particles, non-corrosive

Water to be treated

Temperature: 0 - 60 °C
Pressure: Less than 10 bar for CDLa 5 and less than 7 bar for CDLa 10 (depending on the metering station material and the water temperature). Dependent on the external metering pumps in version without metering pump.

The following information on acid capacity refers to a ClO_2 dosing concentration of 0.4 ppm. They are suggested figures that must be checked on site by pH measurements in continuous operation. The information given should prevent pipeline corrosion by maintaining the pH above 6.5.

If the water to be treated has an acid capacity up to pH 4.3 ($K_{A4.3}$) of less than 0.4 mmol/l and a carbonate hardness of less than 1.1 °dH, a pH increaser must be dosed in addition. For this, a Beta or gamma/ L type dosing pump can be controlled in parallel with the ClO_2 dosing pump (refer to terminal connection diagram in the Appendix).

CAUTION

Take account of possible consumption of ClO_2 by the water components and ensure that the required ClO_2 concentration is also actually reached! At the same time, bear in mind the simultaneous formation of chlorine.

7 Mounting

CAUTION

- ***The system must be easily accessible for maintenance work!***
- ***The dosing line must not be exposed to strong light! Otherwise the light decomposes the ClO_2!***
- ***Observe the applicable national and local rules and regulations!***

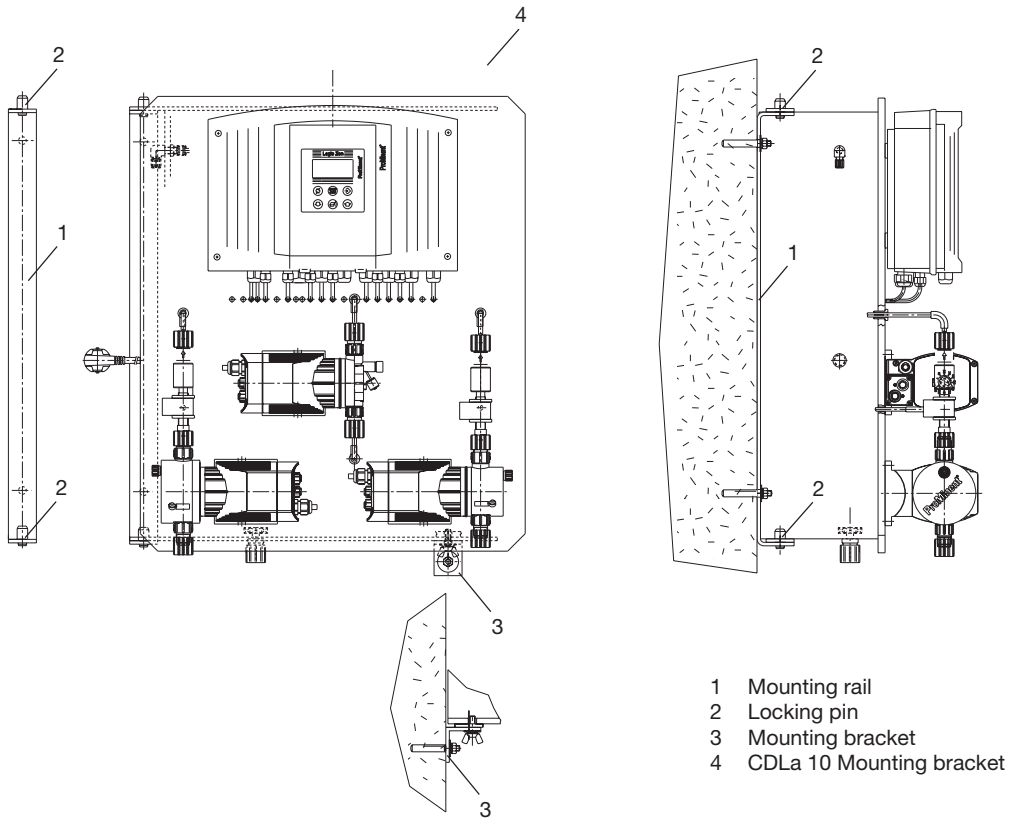
The supplementary kit supplied includes the necessary bolts, wall plugs and shims (supplementary kit = bag of bolts etc.).
Plan to install the Legio Zon® system on a suitable flat, vertical wall, as close as possible to the dosing point (see Appendix for dimension sheet).

Select the mounting height so that:

- The controller LCD screen is easily readable
- The underside of the system is at least 1 m above ground
- The liquid level in the full component containers is below the level of the dosing pumps
- The maximum suction lift of the dosing pumps is not exceeded.

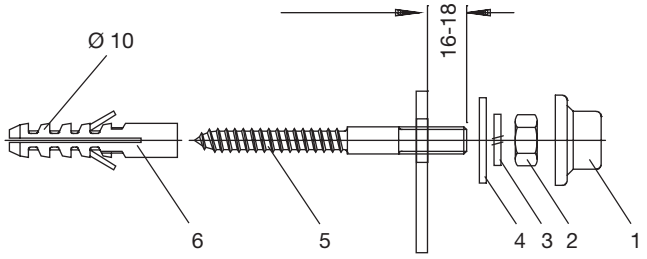
Maximum dosing pump suction lift: 2 m WC
(with clean, wetted valves, with water (20 °C) as dosing medium, at 100 % stroke length (symbol “Pump”), 180 strokes/min, with vent valve opened)

Fig. 4: Mounting



1 Mounting rail
2 Locking pin
3 Mounting bracket
4 CDLa 10 Mounting bracket

Fig. 5: Fitting the dowel bolt



1 Cap
2 Hexagon nut
3 Tooth washer
4 U-shaped washer (metal)
5 Dowel bolt
6 Wall plug

- ▶ Bolt the mounting rail (1) absolutely vertically on the wall, with the locking pins (2) upwards. The rail must also be vertical in the “front to back” direction; use the shims to align it.
- ▶ Draw a horizontal line 500 mm long to the right, from the upper edge of the bottom hinge of the mounting rail; e.g. use a 500 mm spirit level.
- ▶ Make a mark on this line 445 mm to the right of the swivel axis of the mounting rail.
- ▶ Hold the mounting bracket (3) against the wall with the slot upwards, so that the horizontal line can still just be seen from directly in front; the slot must be positioned exactly on the mark.
- ▶ Draw a drilling hole through the hole in the mounting bracket (3).
- ▶ Drill the hole and insert a suitable wall plug (Ø 10 mm).
- ▶ Bolt the mounting bracket (3) to the wall; the dowel bolt must not stick out too far, so that the wing nut can be turned easily later on.
- ▶ Fit the Legio Zon® system on the mounting rail (1) and fold it to back against the wall.
- ▶ Secure the Legio Zon® system with the wing nut.
- ▶ Make a corresponding hole for the upper mounting bracket for the CDLa 10 and secure with wall plug, hanger bolt and knurled nut.
- ▶ After mounting, coat the metal fixing parts with Vaseline to prevent corrosion.
- ▶ Fit warning notices in accordance with the national regulations at the entrance to the chlorine dioxide system and the chemical store or other locations (warning notices in accordance with German regulations are included in delivery package):

Fit these two notices together at the entrances to rooms in which Legio Zon® chlorine dioxide systems are installed:

Fig. 6: Chlorine dioxide warning notice

Chlorine dioxide systems
Access for trained personnel only

Fit these two notices together **at the entrances** to rooms in which the Bello Zon® chlorite component is stored or used:

Fig. 7: Sodium chlorite accesses warning notice

Sodium chlorite
$NaClO_2$

Fit this notice **in rooms** in which sodium chlorite (Bello Zon® chlorite) is stored:

Fig. 8: Sodium chlorite rooms warning notice

Do not use containers and equipment alternately
sodium chlorite + acid =
highly toxic chlorine dioxide gas
DANGER TO LIFE

8 Installation

ATTENTION

Observe the applicable national and local rules and regulations!

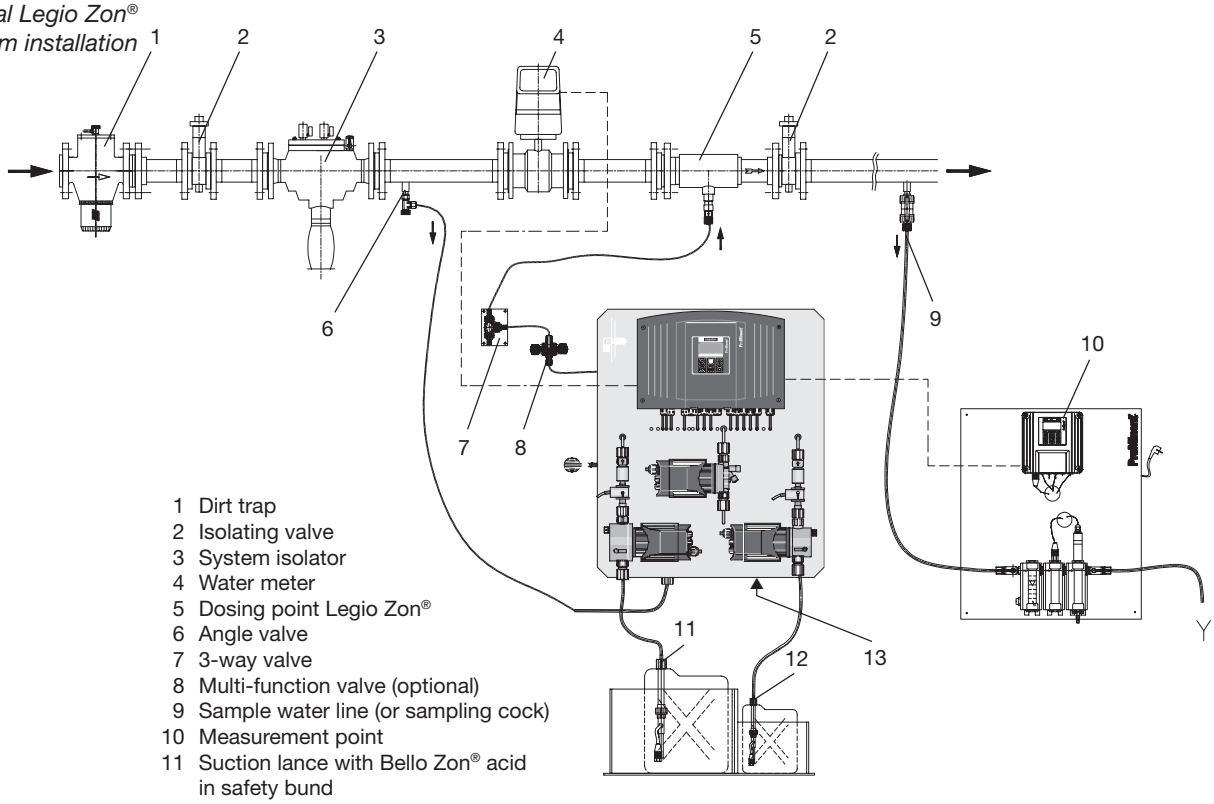
8.1 Installation, hydraulic

WARNING

The pipeline carrying the water to be treated must never come under vacuum!
Otherwise uncontrolled siphoning of the ClO_2 solution can occur!
So provide a system isolator!

The following sub-section contains information on the hydraulic installation.

Fig. 9: Typical Legio Zon® system installation



1 Dirt trap
2 Isolating valve
3 System isolator
4 Water meter
5 Dosing point Legio Zon®
6 Angle valve
7 3-way valve
8 Multi-function valve (optional)
9 Sample water line (or sampling cock)
10 Measurement point
11 Suction lance with Bello Zon® acid in safety bund
12 Suction lance with Bello Zon® chlorite in safety bund
13 Drain valve

8.1.1 Dirt trap

Install a dirt trap first to protect the system and valves.

8.1.2 System isolator

WARNING

The pipeline carrying the water to be treated must never come under vacuum! Otherwise uncontrolled siphoning of the ClO_2 solution can occur, so provide a system isolator!

8.1.3 Water meter

WARNING

- ***There must be no possibility of water extraction between the water meter and the dosing point!***
  Otherwise the ClO_2 concentration at the dosing point can increase sharply leading to health problems! What's more, the pipes can corrode!
- ***Maintain the inlet and outlet distances upstream and downstream of the water meter in accordance with its operating instructions!***
  Otherwise the ClO_2 concentration in the treated water could turn out to be wrong because of incorrect readings!

The controller of the Legio Zon® system can process signals from the following types of water meter:

a) Magnetic inductive water meter (IDM) with frequency output
b) Contact water meter with Hall-effect sensor
c) Contact water meter with reed switch contacts
d) Contact water meter with inductive pulse transmitter (Namur)

ATTENTION

Avoid problems with the water meter.
Use an IDM type if at all possible (magnetic inductive water meter).

The water meter should be installed after the system isolator and before the dosing point (see Fig. 8). It must measure the total volume of water that is to be treated!

To ensure continuous dosing of the ClO_2 solution, contact water meters must be selected in accordance with the following table:

Pulse interval in l/pulse	> 6	4	3	2.5	2	1.5	1	< 0.5
Maximum setpoint in ppm	0.1	0.2	0.3	0.4	0.5	0.6	1	2
Maximum flow in m^3/h	50	25	17	13	10	8	5	3

Table 1: Maximum adjustable ClO_2 setpoints in relation to the water meter pulse interval

To avoid corrosion due to occasional overdosing of acidic chlorine dioxide solution, the controller only accepts target ClO_2 concentrations up to a certain maximum setpoint. This depends on the pulse interval set on the water meter. As a result, the controller only permits a maximum of 2 dosing strokes of the chlorine dioxide pump per incoming pulse from the water meter.
For suitable applications, you can cancel this limitation in the setting menu under “Cancel corrosion protection”.

8.1.4 Dosing point

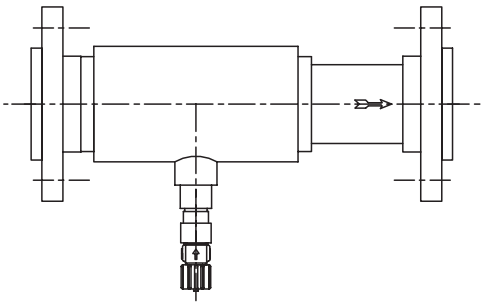
WARNING

- ***Install the ClO_2 connection of the dosing point vertically downwards! Otherwise the integral non-return valve can't close!***
- ***PTFE hose (e.g. 6x4 mm, Order No. 37426 or equivalent) must be used for the feed line. Other materials such as polyethylene (PE) are not sufficiently resistant to ClO2 and would therefore result in leaks***
- ***The pipeline from the Legio Zon® system to the dosing point must not be exposed to bright light! The light can decompose the ClO_2 which means that the water can't be adequately treated!***
- ***If an electrically conducting pipe is broken into as part of the installation, suitable equipotential bonding must be provided (e.g. link the two ends of the pipe with a metal bridge)! Otherwise there can be grave danger to personnel and to equipment during a lightning strike, for example!***
- ***The dosing point must always be leak-free! So it must be corrosion-proof too! Otherwise uncontrolled siphoning of the ClO_2 solution can result!***
- ***Bear in mind the temperature-dependence of the maximum permissible pressure of the dosing point used!***

Install the dosing point at a suitable point in the main water pipe (for minimum corrosion and optimal mixing) e.g. dosing point Legio Zon® CDL:

	Material	Flow rate max. in m^3/h	Installation length	Order No.
Flange connection DN 50	PVC-U	15	450 mm	1027611
Flange connection DN 65	PVC-U	25	400 mm	1026490
Flange connection DN 80	PVC-U	35	400 mm	1027612
Flange connection DN 65	PVC-C	25	400 mm	1029326
Flange connection DN 80	PVC-C	35	400 mm	1029327

Fig. 10: Dosing point Legio Zon® CDL



Water temperature in °C	Maximum permissible pressure in bar PVC-U	PVC-C
40	12	12
50	7	9,5
60	4,5	7,5
70	–	5
80	–	3

Table 2: Dependence of the maximum permissible pressure on the water temperature for the dosing point Legio Zon®

8.1.5 3-way valve

WARNING

A blanking plug is fitted In the vent port (port 3). This plug must only be removed during venting or draining of the system!
Otherwise ClO_2 solution could escape due to carelessness!

ATTENTION

The 3-way valve supplied must be mounted on the wall as close as possible to the Legio Zon® system.

Connect port (1) to the ClO_2 outlet of the Legio Zon® system (if required, via a multi-function valve with bracket, Order No. 1027652), and port (2) to the dosing point. Use 6 x 4 mm PTFE hose (Order No. 37426)!
The system can be vented and drained via port (3).

Fig. 11: 3-way valve

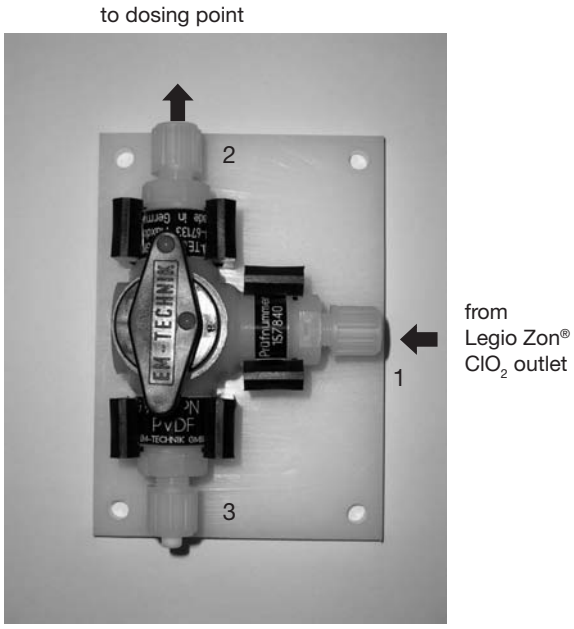
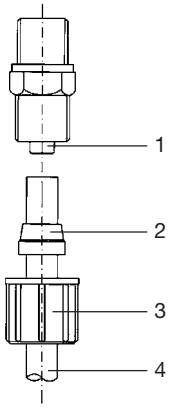


Fig. 12: Fitting the hose on the 3-way valve



1 Adaptor spigot
2 Olive
3 Union nut
4 Hose

- ▶ Cut the hoses to length so that they are not in tension later on.
- ▶ Push the union nut and olive over the hose (see Fig. 12).
- ▶ Push the end of the hose over the spigot up to the stop.
- ▶ Tighten the union nut hand-tight.

8.1.6 Multi-function valve with wall bracket

WARNING

- ***A blanking plug is fitted in the bypass connection. It must not be removed! Otherwise ClO_2 solution could escape due to carelessness!***
- ***The multi-function valve with wall bracket must be used as a back pressure valve if the back pressure in the dosing line is too low (e.g. when the dosing point is positioned below the Legio Zon® system or the dosing is into an open discharge)! Otherwise ClO_2 solution can be sucked through the Legio Zon® uncontrolled due to siphonic action!***

▶ Mount the multi-function valve on the wall between the ClO_2 outlet of the Legio Zon® system and the 3-way valve.

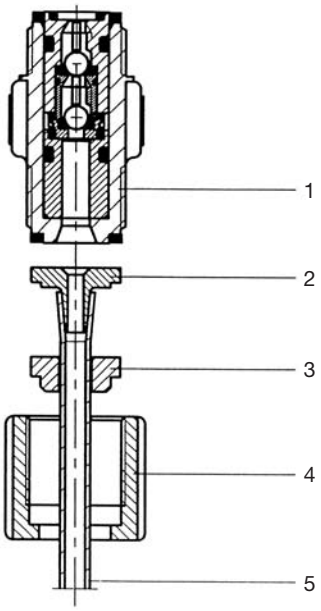
The multi-function valve with wall bracket is an accessory part (Order No. 1027652).

8.1.7 Suction lances

CAUTION

- ***Only use suction lances that are approved for the Legio Zon® system!***
- ***Only use matching hose and connection kits!***
- ***Assign the parts for the acid and chlorite sides correctly! On the suction lance for the acid, the cap can't be screwed onto the "chlorite" component container.***

Fig. 13: Installing the suction lance



1 Pump suction valve
2 Hose spigot
3 Compression ring
4 Union nut
5 Suction hose

▶ Do not insert the suction lances into the component containers yet!
▶ Adjust the length of each suction lance (later on, the foot valve must be suspended just above the bottom of the container.)
▶ Cut the suction hoses to length so that they will rise steadily and not be in tension later on
▶ Push the union nut and compression ring over the suction hose (see Fig. 13).
▶ Push the hose end over the spigot up to the stop (open up the hose end slightly if necessary).
▶ Fix the spigot on the pump suction valve.
▶ Press the suction hose onto the spigot and tighten the union nut.
▶ Give the suction hose a quick pull and retighten the union nut.

8.1.8 Water supply – dilution water

The dilution water is supplied to the system via an 8 x 5 mm hose connection.

8.1.9 Drain connection

WARNING

A blanking plug is fitted In the drain connection. This plug must only be removed during venting or draining of the system!
Otherwise ClO_2 solution could escape due to carelessness!

NOTE

Turn the black ring counterclockwise to open the drain connection (approx 1 turn).

The drain connection for the storage tank – fitted with a 6 x 4 mm hose connection – is located at the bottom right of the system.

8.1.10 Notes on supply of chemicals

WARNING

- ***The fill level of the chemical containers must never be above the underside of the Legio Zon® system or the dosing point!***
  Otherwise chemicals can escape if there is a leak on the suction side of a dosing pump!

Chemicals are supplied to the system via a 25 l Bello Zon® “acid” component container and a 10 l Bello Zon® “chlorite” component container.

8.1.11 Sample water connection

The sample water line (or a sampling cock) must be positioned more than 2 m downstream of the dosing point but upstream of the first extraction point.

8.2 Installation, electrical

WARNING

- ***It is essential to install overcurrent and short- circuit protection for the Legio Zon® system!***
- ***Use only flexible cables for any additional cable connections (contact water meter, ...)!***
- ***Once the transparent interface cover under the keypad has been opened, it must be screwed back on correctly to ensure a moisture-proof seal! Otherwise IP65 protection is not achieved!***

Wiring up the controller

WARNING

- ***The controller must only be opened by qualified technical staff!***
- ***Before opening the equipment, make sure that the controller is dead and that the electrical supply can’t be switched back on!***

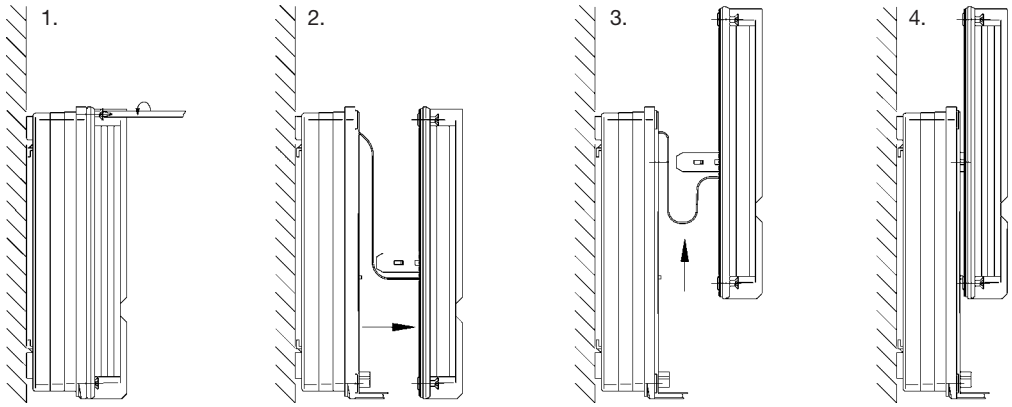
NOTE

If too many knock-outs have been broken out, blank off any spare holes with blanking plugs from the supplementary kit supplied.

Open the case:

- ▶ Unscrew the four countersunk screws
- ▶ Take the front off and move it to the “Park position” (see 4. in Fig. 14)

Fig. 14: “Park position”



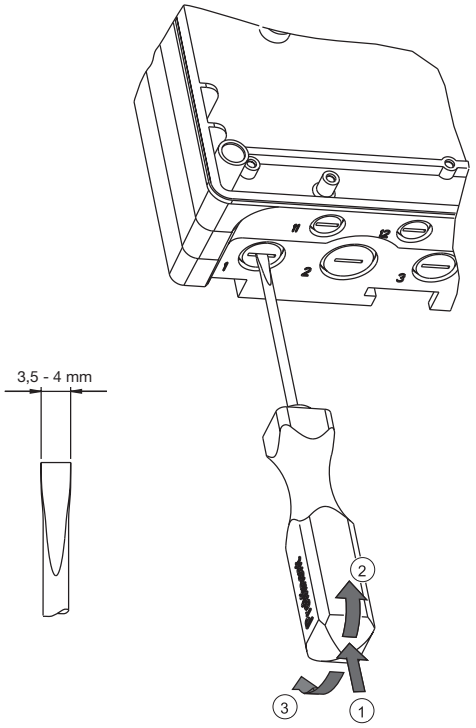
- ▶ Decide which knock-outs are to be broken out (colour the desired knock-outs)

ATTENTION

When breaking out the knock-outs, don’t let the screwdriver penetrate too far into the case!
Internal components of the equipment could be damaged!

- ▶ To break out the knock-outs, use a medium size screwdriver (3.5 – 4 mm blade width) to break through the slot in the middle of the threaded knock-out and remove the material (Fig. 15).
- ▶ Smooth the edges.

Fig. 15: Breaking out the knock-outs



- ▶ Secure the appropriate glands (Fig. 16, 2) with the matching locknuts (Fig. 16, 1) and tighten them securely.
- ▶ Insert the multiple sealing inserts (Fig. 16, 3) in the glands, according to the cable cross section used.
- ▶ Route the cables into the glands.
- ▶ The other steps are covered in the “Connecting flexible cables” and “Connecting cables” sections.

Afterwards, please proceed with the following steps:

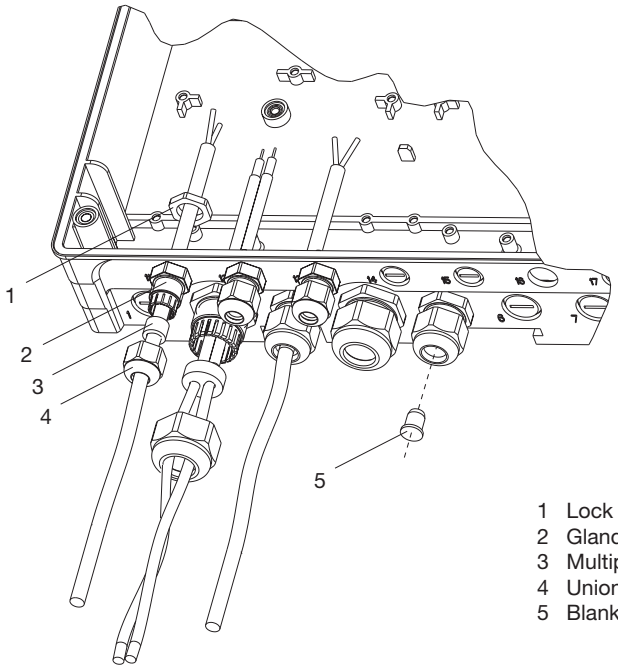
- ▶ Check all wiring with the help of the terminal connection diagram.
- ▶ Tighten the union nuts (Fig. 16, 4) of the glands so that they are leakprooof.
- ▶ Refit the front onto the back section of the case.

ATTENTION

Recheck that the gasket is correctly seated. IP65 protection is only achieved when these are correctly fitted!

- ▶ Tighten the case screws hand-tight.

Fig. 16:
Fitting the glands



1 Lock nut
2 Gland
3 Multiple sealing insert
4 Union nut
5 Blanking plug

Connecting flexible cables

NOTE

To install the conductors for terminals XK1 to X2, just push them into the terminals. To release the conductors from terminals XK1 to X2 again, simply push on the white button of the desired terminal with a screwdriver and pull out the conductor.

- ▶ Remove the cable insulation as shown in Fig. 17.
- ▶ Crimp suitable terminations on the ends of the conductors.
- ▶ Connect the conductors in accordance with the terminal connection diagram (see Appendix).

Connecting cables

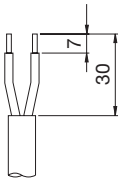
- ▶ Remove the cable insulation as shown in Fig. 17.
- ▶ Crimp suitable terminations on the ends of the conductors.

- ▶ Pull off the orange terminal blocks for the installation.
- ▶ Connect the cables in line with the terminal connection diagram (see Appendix).
- ▶ After the cables have been connected, plug each of the terminal blocks that were removed back into its place on the PCB.

NOTE

The terminal connection diagram is included in the Appendix.

Fig. 17:
Removing cable insulation

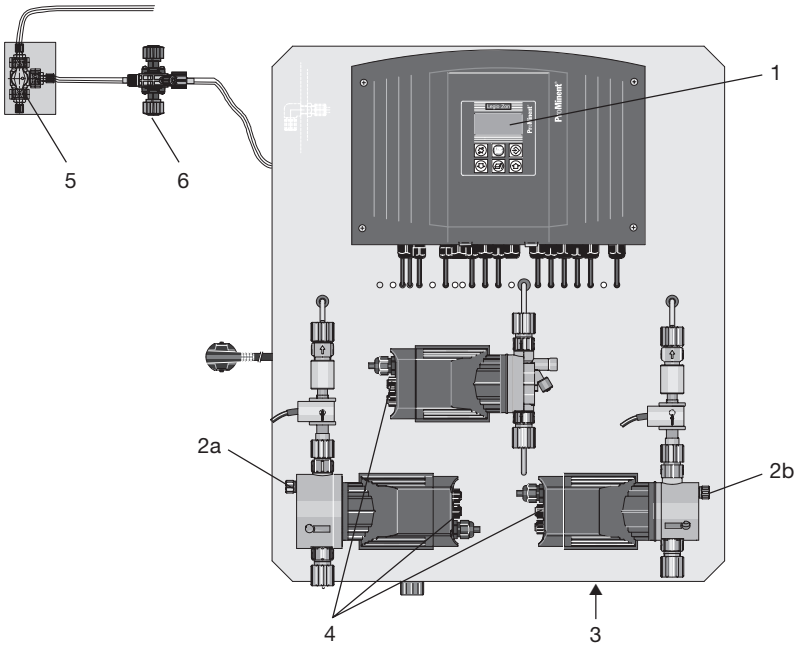


Preparatory work on the Legio Zon® system has now reached a stage where it is ready for commissioning by a ProMinent ProMaqua service technician!

9 Control elements

Control elements

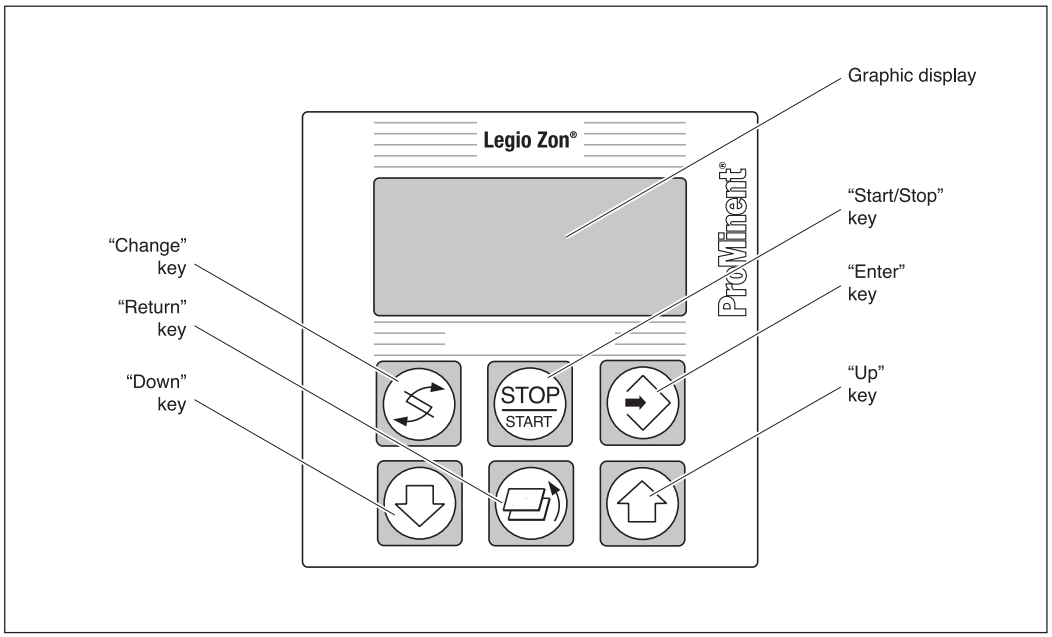
Fig. 18:
Control elements



1 Controller
2a Acid pump vent valve
2b Chlorite pump vent valve
3 Drain valve
4 Stroke adjustment knobs
5 3–way valve
6 Multi-function valve (optional)

Key functions

Fig. 19: Keypad

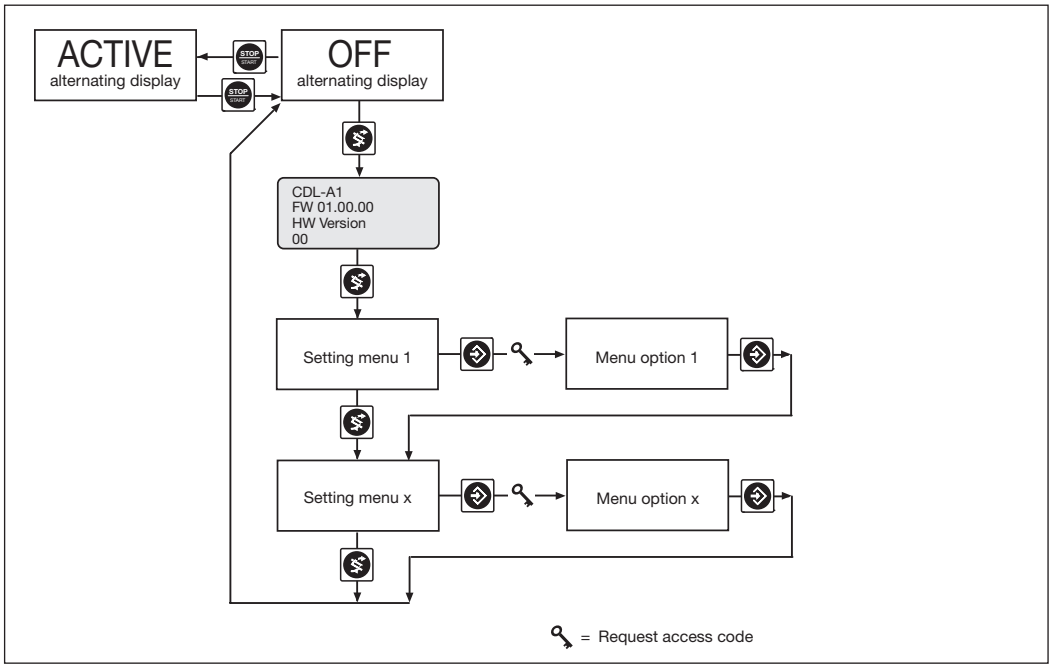


	CHANGE key To change within a menu level and to change from one variable quantity to others within a menu item.
STOP START	START/STOP key Star/Stop of the control and dosing function (keep pressed for 3 sec).
	ENTER key To accept, confirm or save a displayed value or state. To acknowledge alarms.

	UP key To increase a displayed numerical value and to alter the variables (flashing display)
	RETURN key Back to the display or to the start of the current setting menu.
	DOWN key To decrease a displayed numerical value and to alter the variables (flashing display).

Operating menu, shown schematically

Fig. 20: Operating menu, shown schematically,



The alternating displays show the time of the last maintenance and the quantity of ClO_2 produced since then, or how old the available ClO_2 solution is.

In the 4 weeks before the end of the annual operating time, the alternating displays show the remaining run time instead of the operating hours and the quantity of ClO_2 produced.

NOTE

1 year = 8760 hours

The “OFF” alternating display appears when the dosing is off.
The “ACTIVE” alternating display appears when the dosing is on (and no signal is present at the digital input).
In addition, the bottom line of the display shows whether “Shock dosing”, “Boost dosing” or “Manual dosing” has been set in the “Assign digital input” setting menu. If “Pause” has been set, the word “ACTIVE” appears in upper case instead of “Pause”, if a signal at the digital input sets the dosing to pause when the system is in service.

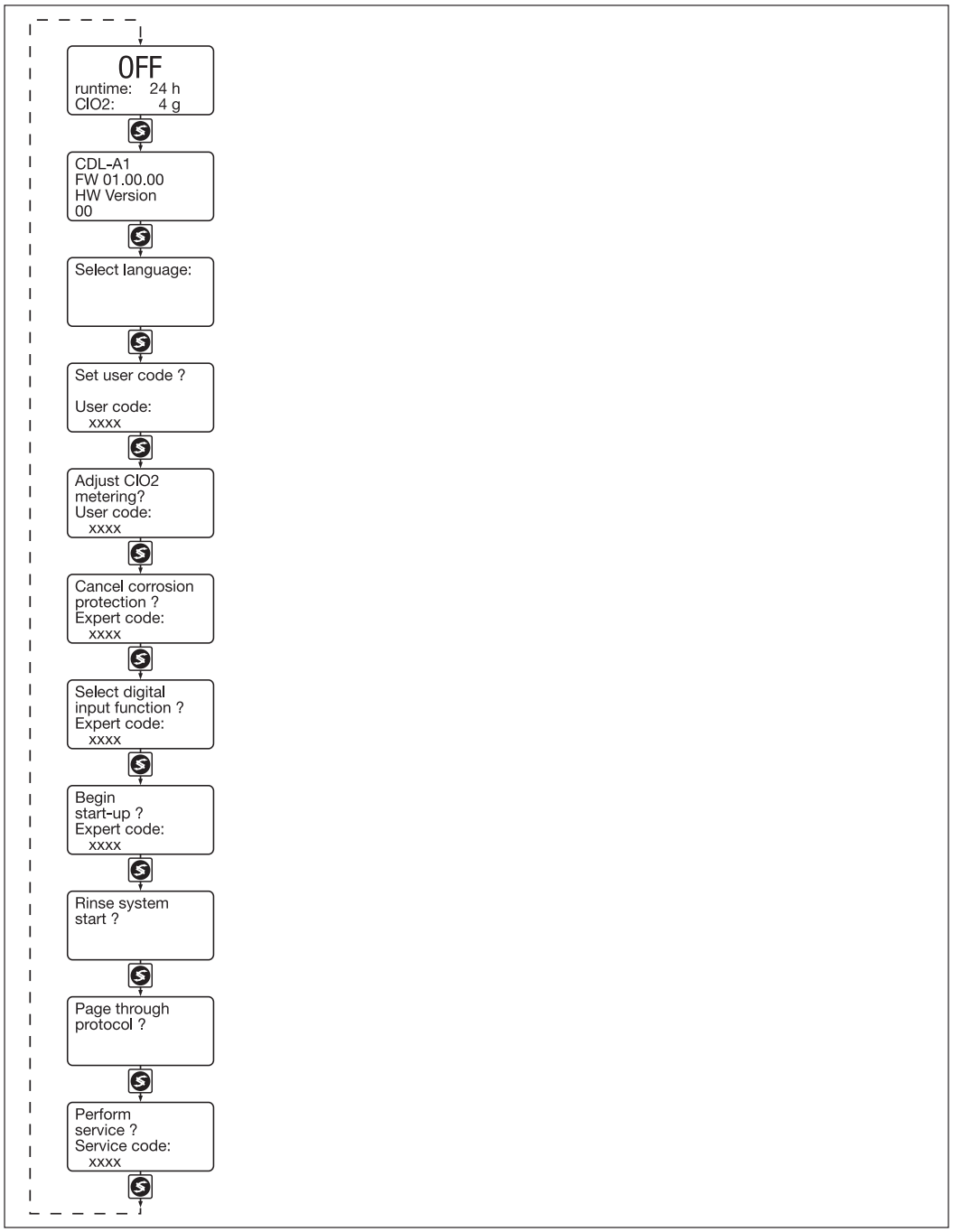
Fig. 21
“ACTIVE” alternating display (standard setting)

Symbol	Meaning	Comment
↓	Low level warning HCl or $NACIO_2$ container	Provide full component container
■	HCl or $NACIO_2$ pump stopped	Feedback from dosing monitor
□	HCl or $NACIO_2$ pump performing a stroke	Feedback from dosing monitor

Table 3: Explanation of the alternating display symbols

To read the hardware or software version or to set something on the controller, the dosing must be off (Start/Stop key) – the LCD shows “OFF” (the controller then no longer activates the pumps and ignores all input signals).
When the “Change” key is pressed., the controller display changes to show the versions or the setting menu.

Operating menu, overview



10 Commissioning

WARNING

- ***Only a ProMinent ProMaqua service technician or a skilled person authorised by ProMinent ProMaqua is allowed to commission the Legio Zon® system!***
- ***The person carrying out the commissioning must check whether the system is correctly mounted and installed!***
- ***The person carrying out the commissioning must instruct the Operator and the operating staff!***
- ***Any acid and chlorite that accumulated during venting must be washed down a drain separately with plenty of water! Otherwise toxic ClO_2 can be produced!***

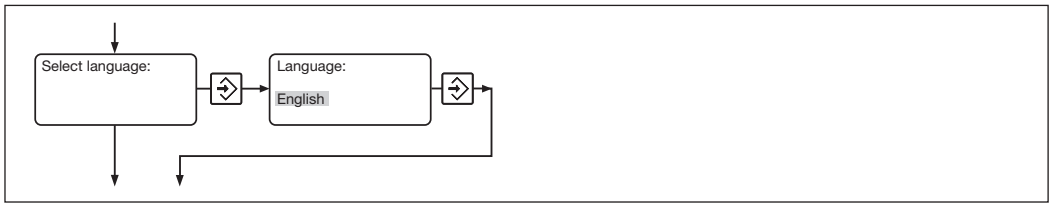
CAUTION

- ***During commissioning, the dosing pumps must not be allowed to pump against closed isolation valves! This can cause burst pipes!***
- ***The chlorine dioxide system Legio Zon® CDLa has no ON/OFF switch. It starts working as soon as the incoming mains cord is powered up!***

Preconditions:

- Everything is correctly mounted and the hydraulic and electrical installations correctly completed.
- The Legio Zon® system plug is plugged into the mains socket outlet.
- No closed isolation valves are restricting the operation of the dosing pumps.
- The component containers are available but are not connected yet.

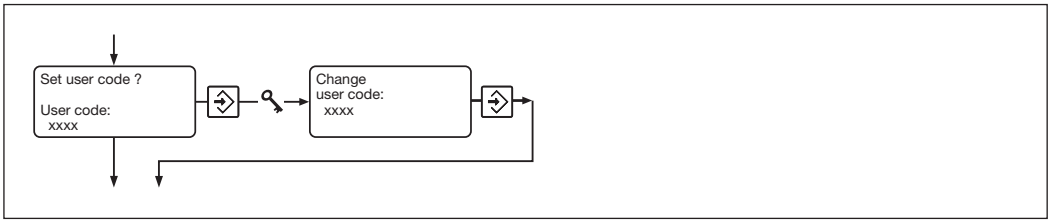
10.1 Set language



▶ Change to the “Select language?” setting menu with the “CHANGE” key and press ENTER.

▶ Select the operating language (arrow keys) and press ENTER.

10.2 Set user code



There are 3 different access codes:

User code:	intended for local operation by instructed persons (setting parameters and target concentration)
Expert code:	intended for more complex local operation by skilled persons (commissioning, flushing, troubleshooting, etc.)
Service code:	intended for service work by service personnel

Most of the setting menus can only be opened with one of these access codes.

NOTE

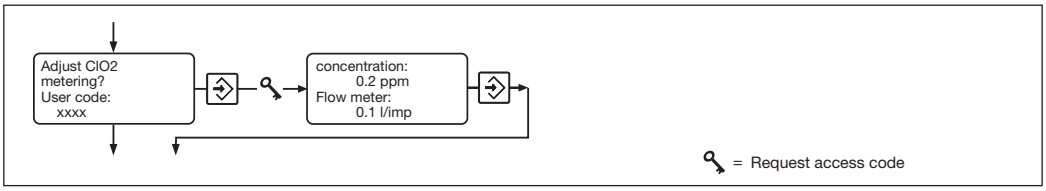
Settings in the “Adjust ClO_2 metering?” and “Select digital input function?” setting menus can be checked without an access code.

The user code can be set as required in the “Set user code?” setting menu. The factory setting (as delivered) of the user code is : 5005.

ATTENTION

Choose a secure user code so that it really does provide some protection!

10.3 Adjust ClO_2 metering



NOTE

Settings can only be made with a user code.

- ▶ Change to the “Adjust ClO2 metering?” setting menu with the CHANGE key and press ENTER.
- ▶ Enter the access code and press ENTER.
- ▶ In the first menu item, enter the required target concentration of ClO_2 in the water to be treated (arrow keys). It is an approximate value that would be accurate with 80 % stroke length on the ClO_2 pump and 5 bar pressure in the pipeline carrying the water to be treated.
- ▶ Press ENTER to save the value.
- ▶ In the next menu item, enter the pulse interval of the water meter (arrow keys) (cf. also Sect. 8.1.3).
- ▶ Press ENTER to save the value.
- ▶ Now the dosing can be started – to do this, change to the alternating display with the ESC key and press the Start/Stop key.

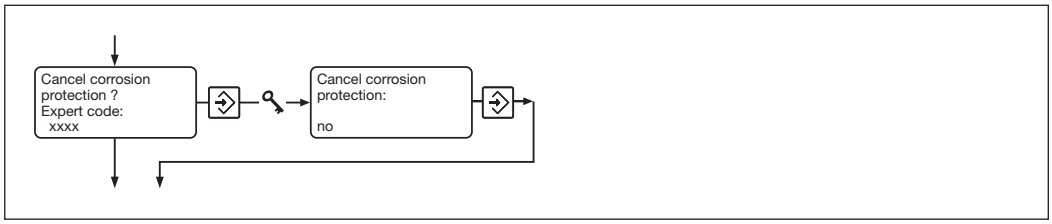
WARNING

Consumption can lower the ClO_2 concentration in the treated water too sharply! So check the ClO_2 value in the treated water, correct as necessary, and enter this in the commissioning log after the Legio Zon® system has been dosing for a certain time!

CAUTION

Too low a pH in the treated water can lead to corrosion damage in the entire installation! So check the pH in the treated water, correct as necessary, and enter this in the commissioning log after the Legio Zon® system has been dosing for a certain time! With pH values below 6.5, provide additional dosing with a pH increaser!

10.4 Cancel corrosion protection

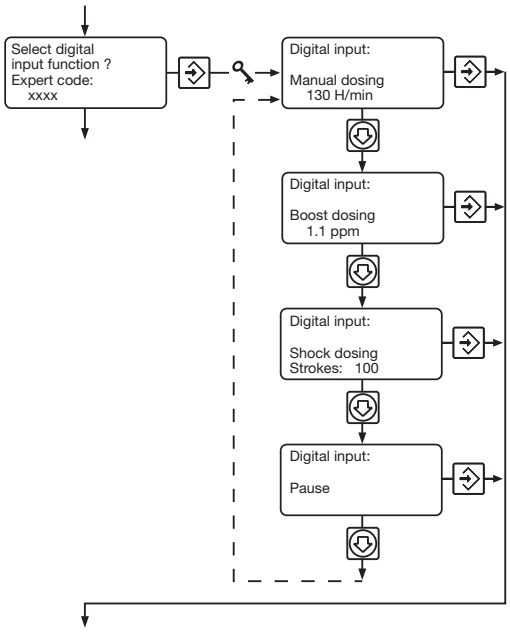


To prevent corrosion due to occasional overdosing of acidic chlorine dioxide solution, the controller only accepts target ClO_2 concentrations up to a certain maximum setpoint. This depends on the pulse interval set on the water meter. As a result, the controller only permits a maximum of 2 dosing strokes of the chlorine dioxide pump per incoming pulse from the water meter.
For suitable applications, you can cancel this limitation in the setting menu under “Cancel corrosion protection”.

CAUTION

If clouding occurs, hydraulic components soon corrode through and toxic chlorine dioxide solution escapes!
If the corrosion protection has been cancelled, make absolutely sure that chlorine dioxide dosing is uniform!

10.5 Select digital input function



CAUTION

- ***If an external switch is connected, remove the link between the two terminals (XK7:3 - XK7:4)!***
  Otherwise the system does not stop when in the "Pause" mode setting. With the other settings, the "Shock dosing", "Boost dosing" and "Manual dosing" modes cannot be activated!
- ***If no external switch is connected to terminals XK7:3 - XK7:4 and they are not linked, the system does not dose in the "Pause" setting. With the other settings, the system is permanently switched to "Shock dosing", "Boost dosing" or "Manual dosing"!***

Depending on the setting, a signal at the digital input can interrupt normal operation with 4 different operating modes:

- Pause
- Shock dosing
- Boost dosing
- Manual dosing

In "Pause, an open contact causes the ClO_2 dosing to be interrupted – otherwise the system carries on working normally.
In "Shock dosing", a separate contact signal (close) causes the ClO_2 pump to run at maximum stroke frequency – for a number of strokes that can be set here.
In "Boost dosing", a closed contact causes the system – controlled by the water meter – to dose a higher target concentration of ClO_2. The higher target concentration is set here.
In "Manual dosing", a closed contact causes the ClO_2 pump to run at a stroke frequency that can be set here.

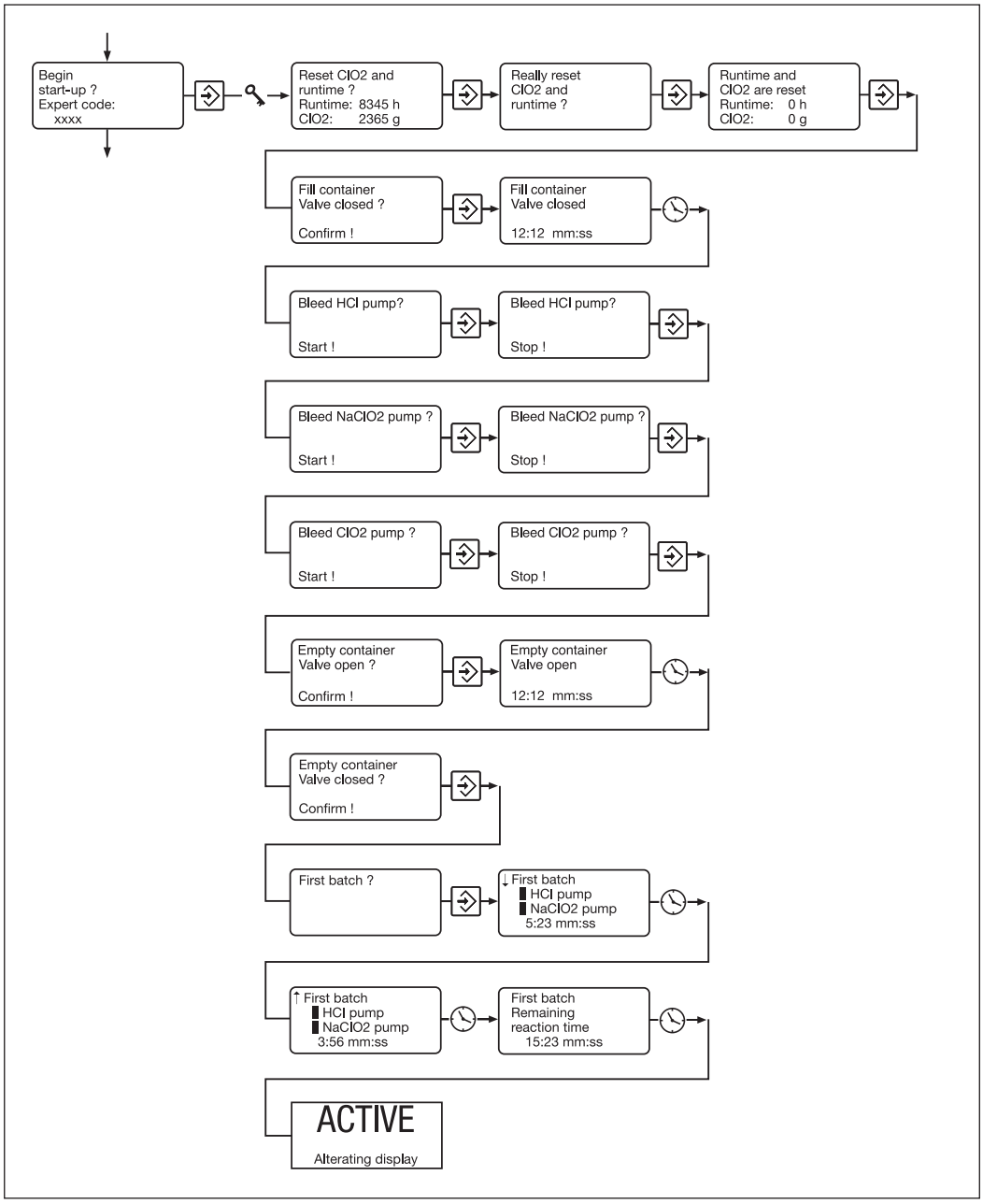
The alternating displays show these operating modes in plain text.

10.6 Install component containers

- ▶ The LCD screen must be showing OFF – press the "Start/Stop" key if necessary
- ▶ Position the new component containers under the system
  (acid = large, red, on the left; chlorite = small, blue, on the right!)
- ▶ Screw the cap with the correct suction lance on to the component container (Observe colour code! The cap on the suction lance for acid cannot be pushed down or screwed onto the component container for chlorite!)

The reactor and storage tank must be filled first and the three dosing pumps vented.
This part of the commissioning is menu-led:

10.7 Begin start-up



Symbol	Meaning		Comment
↑	first line:	Intermediate tank full	
↓	first line:	Intermediate tank empty	
	second/third lines	Low level warning HCl or $NaClO_2$ containers	Provide full containers for both components
■	HCl or $NaClO_2$ pump stopped		Feedback from dosing monitor
□	HCl or $NaClO_2$ pump performing a stroke		Feedback from dosing monitor

Table 4: Explanation of the symbols of the “First batch” menu item

- ▶ Change to the “Begin start-up” menu item in the setting menu with the CHANGE key and press ENTER.
- ▶ Enter the access code and press ENTER.

NOTE

To move between the displays in the first column, you can use the CHANGE key to skip from one display to the one below it.
So, for example, you can avoid resetting the operating time.

- ▶ Reset the operating time and the ClO_2 meter by pressing ENTER.
- ▶ Check that the drain valve – bottom right of the system – is closed (black ring turned fully clockwise?).
- ▶ Press ENTER to confirm the check – the controller fills the storage tank with dilution water.
- ▶ Set up a collecting vessel at the vent connection of the HCl pump (acid), on the left-hand side of the system.
- ▶ Open the vent valve of the HCl pump and press ENTER to start the HCl pump.
- ▶ When the HCl pump is vented, press ENTER to stop the pump.
- ▶ Close the vent valve of the HCl pump.
- ▶ Flush the contents of the collecting vessel down a drain with liberal amounts of water.
- ▶ Set up a collecting vessel at the vent connection of the $NaClO_2$ pump (chlorite), on the right-hand side of the system.
- ▶ Open the vent valve of the $NaClO_2$ pump and press ENTER to start the $NaClO_2$ pump.
- ▶ When the $NaClO_2$ pump is vented, press ENTER to stop the pump.
- ▶ Close the vent valve of the $NaClO_2$ pump.
- ▶ Flush the contents of the collecting vessel down a drain with liberal amounts of water.

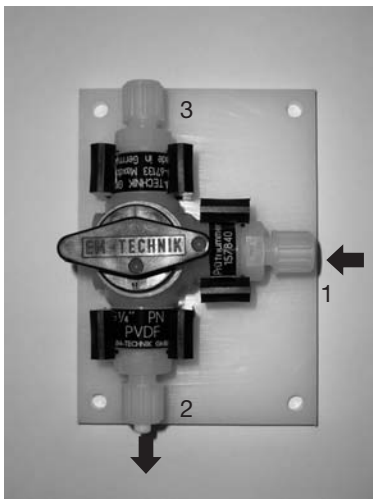
CAUTION

Use the separate 3-way valve in the dosing line to vent the ClO_2 pump (chlorine dioxide)!
Do not remove the plug in the vent connection of the ClO_2 pump!

- ▶ Remove the plug in the vent port of the 3-way valve.
- ▶ Connect a 6 x 4 mm PVC hose to the vent port.
- ▶ Lead the PVC hose into a 10 l bucket into which has been stirred some ClO_2 eliminator (see Sect. 18, “Accessories”).
- ▶ Turn the 3-way valve to the “Vent” position (see Fig. 22 a).
- ▶ Press ENTER to start the ClO_2 pump.

Fig. 22: 3-way valve

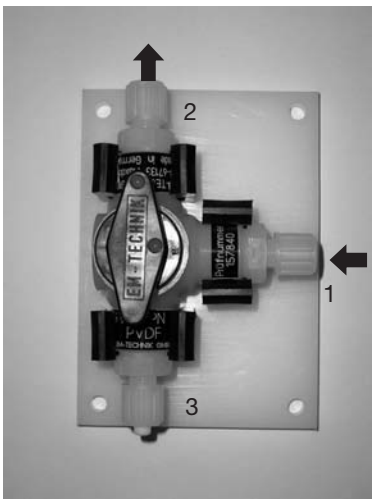
a) in the “Vent” position



Collecting vessel

b) in the “Operation” position

Dosing point



- ▶ When the pump and the dosing line are vented, press ENTER to stop the ClO_2 Pump.

CAUTION

It's imperative that you refit the plug from the vent port of the 3-way valve!

- ▶ To empty the storage tank, remove the plug in the drain valve first.
- ▶ Connect a 6 x 4 mm PVC hose to the drain valve at bottom right of the system (a length of approx. 1 m is required).
- ▶ Lead the PVC hose into the 10 l bucket with the ClO_2 eliminator. The bucket should stand on the floor directly below the system.
- ▶ Open the drain valve at bottom right of the system (turn the black ring counterclockwise (approx. 1 turn)).
- ▶ Confirm the action with ENTER and wait until the next menu item appears.
- ▶ When no more liquid is flowing, close the drain valve at bottom right of the system (turn the black ring clockwise (approx. 1 turn)).

CAUTION

It's imperative that you refit the drain valve plug!

- ▶ Confirm the action with ENTER and wait until the next menu item appears.
- ▶ Take the PVC hose off the 3-way valve and fit the plug
- ▶ Set the 3-way valve to "Operation"
- ▶ Empty the 10 l bucket down the drain and flush again with liberal amounts of water.

All the pumps are now vented.

- ▶ Press ENTER to start the commissioning – the controller fills the reactor with dilution water and the pumps then pump acid and chlorite into it.
  The controller then allows the prepared mixture to flow through the solenoid valve into the storage tank.
  It then refills the reactor with dilution water and the pumps pump acid and chlorite into it.
  In the next menu item, the controller displays the "Remaining reaction time" of the mixture in the storage tank. Once this time has elapsed (standard: 20 min), the ClO_2 solution is ready.
  The "ACTIVE" message appears in the alternating display and the system starts dosing.

WARNING

- ***The ClO_2 concentration in the treated water can be reduced too sharply due to consumption!***
- ***So check the ClO_2 value in the treated water, correct as necessary, and enter this in the commissioning log after the Legio Zon® system has been dosing for a certain time!***

CAUTION

- ***Too low a pH in the treated water can lead to corrosion damage in the entire installation!***
- ***So check the pH in the treated water, correct as necessary, and enter this in the commissioning log after the Legio Zon® system has been dosing for a certain time! With pH values below 6.5, provide additional dosing with a pH increaser!***

11 Operation

WARNING

- ***The maximum permissible operating pressure must not be exceeded under any operating condition.***
- ***The entire installation must be leak-free when operating at maximum operating pressure.***

11.1 Replace component container

WARNING

- ***Only instructed personnel must replace the component containers!***
  Large quantities of toxic ClO_2 gas can be produced as a result of improper handling!
- ***Observe the colour code!***
  Red stands for acid (HCl, large component container, on the left),
  blue stands for chlorite ($NaClO_2$, small component container, on the right)!
- ***Never pour chemicals from the component containers back or pour them together!***
  Large quantities of toxic ClO_2 gas can be produced!
- ***Never put both suction lances in the same container!***
  Toxic ClO_2 gas can be produced!
- ***The two components – hydrochloric acid (HCl) and sodium chlorite ($NaClO_2$) must never come together, other than in the reactor!***
  Otherwise toxic ClO_2 gas can suddenly be formed, which can decompose explosively!
- ***Ensure that the "acid" suction lance is fitted in the container for the "acid" component (observe coloured labels!) and that the "chlorite" suction lance is fitted in the container for the "chlorite" component.***
- ***Never operate the Legio Zon® CDLa chlorine dioxide system with undiluted sodium chlorite! Otherwise it can result in ClO_2 concentrations that the system is not designed for! Only use Bello Zon® chlorite!***
- ***Never operate the Legio Zon® CDLa chlorine dioxide system with undiluted sodium chlorite! Otherwise it can lead to chlorite concentrations in the treated water that are harmful to health! Only use Bello Zon® chlorite!***
- ***Never confuse sodium chlorite ($NaClO_2$) with sodium hypochlorite (NaOCl)! Only use Bello Zon® chlorite!***
- ***Only use Bello Zon® acid!***
- ***Do not use any technically contaminated hydrochloric acid.***
  It can contain chloroorganic compounds that will attack the seals aggressively and cause embrittlement of the PVC components!

▶ The LCD screen must be showing OFF – press the "Start/Stop" key if necessary

▶ Carefully take each suction lance out of its component container (lift it slowly and keep it vertical)

▶ Put each of the suction lances into a bucket filled with clean water (this prevents the suction lances from emptying)

▶ Close the empty component containers and have them disposed of professionally.

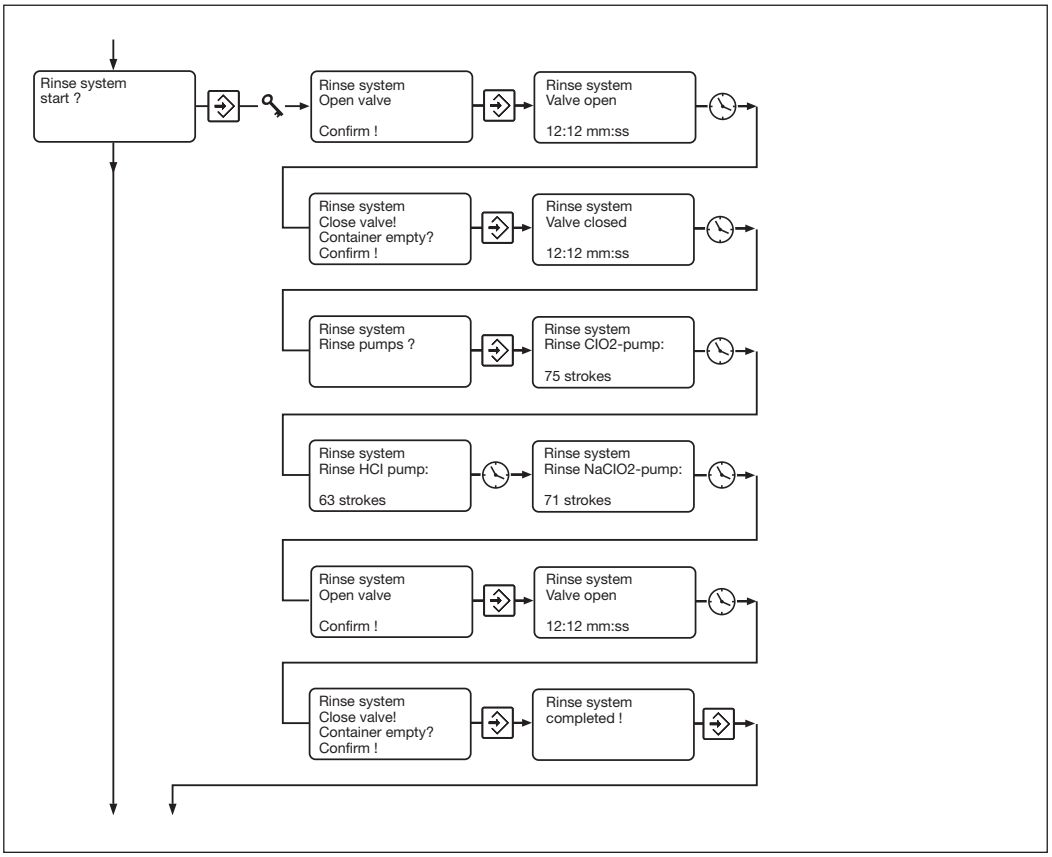
▶ Position the new component containers under the system (acid = large, red, on the left; chlorite = small, blue, on the right!)

▶ Screw the cap with the correct suction lance on to the component container (Observe colour code! The cap on the suction lance for acid cannot be pushed down or screwed onto the component container for chlorite!)

▶ Check the suction lances for air bubbles; if there are any, flush the system (se below)

▶ Press the "Start/Stop" key to start the dosing.

11.2 Rinse system



The system must be flushed through:

- If there are air bubbles in the suction line
- After a malfunction
- If the ClO_2 solution has become too old
- Before maintenance is carried out
- Before it is taken out of service.

To flush the system:

▶ Put each of the suction lances into a bucket full of water.

▶ Remove the plug in the vent port of the 3-way valve.

▶ Connect a 6 x 4 mm PVC hose to the vent valve.

▶ Lead the PVC hose into a 10 l bucket into which has been stirred some ClO_2 eliminator (see Sect. 18, “Accessories”).

▶ Turn the 3-way valve to the “Vent” position (see Fig. 22 a).

▶ Connect a 6 x 4 mm PVC hose to the drain valve at bottom right of the system (a length of approx. 1 m is required).

▶ Lead the PVC hose into the 10 l bucket with the ClO_2 eliminator. The bucket should stand on the floor directly below the system.

▶ Open the drain valve by turning the black ring counterclockwise (approx. 1 turn).

▶ Change to the “Rinse system start?” menu item in the setting menu with the CHANGE key and press ENTER.

▶ Enter the access code, press ENTER and wait until the controller changes to the next menu item (ClO_2 solenoid valve operates).

▶ When no more liquid is flowing out, close the drain valve by turning the black ring clockwise (approx. 1 turn).

▶ Press ENTER and wait until the controller has filled the storage tank with dilution water and changes to the next menu item.

- ▶ To flush the pumps, press ENTER – in the display, the controller first counts down the specified number of strokes for the for the ClO_2 pump. The controller then counts down the specified number of strokes for the for the HCl pump and finally for the $NaClO_2$ pump.

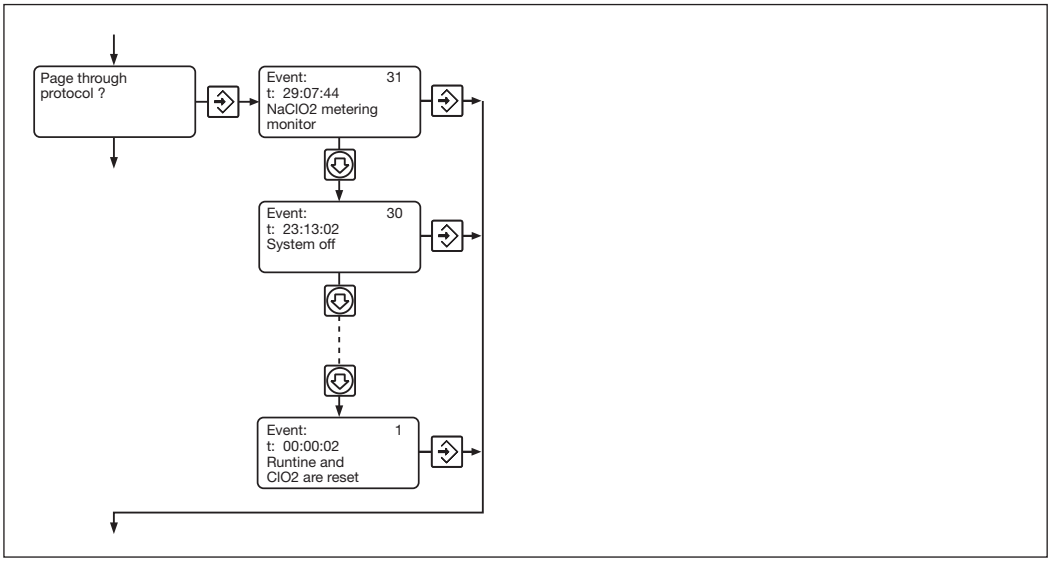
Now the ClO_2 solution that has formed in the storage tank during flushing must be drained off:

- ▶ Lead the PVC hose into the 10 l bucket with the ClO_2 eliminator. The bucket should stand on the floor directly below the system.
- ▶ Open the drain valve by turning the black ring counterclockwise (approx. 1 turn).
- ▶ Press ENTER and wait until the controller changes to the next menu item
- ▶ When no more liquid is flowing out, close the drain valve by turning the black ring clockwise (approx. 1 turn).
- ▶ Take the PVC hose off the drain valve and fit the plug.
- ▶ Take the PVC hose off the 3-way valve and fit the plug.
- ▶ Turn the 3-way valve to the “Operation” position.
- ▶ Carefully put the suction lance for the acid into the “acid” container and tighten it.
- ▶ Carefully put the suction lance for the acid into the “chlorite” container and tighten it.
- ▶ Empty each of the water buckets down a drain one after the other, flushing down thoroughly after emptying the first one.
- ▶ Press ENTER – the controller indicates “Rinse system completed”.
- ▶ Press ENTER to quit the “Rinse system start?” setting menu and change to the OFF display with the SHIFT key.

WARNING

- ***Check that the plugs have been fitted on the drain valve and the 3-way valve! The system must not operate without these plugs as toxic ClO_2 solution can escape!***
- ***Check that the 3-way valve is in the “Operation” position! Otherwise the pump can cause the pipe to burst and toxic chemicals can escape!***

11.3 Scroll through log



The protocol function records all important events on the controller of the Legio Zon® system (see Table 5) and retains the information even after a mains failure. It numbers the events consecutively and retains the time of the event (the internal clock keeps running during a mains failure).

The protocol function starts with the initial commissioning in the factory.

The controller counts the time “t” of new events starting from the last reset of the operating time (this is normally the date of the last maintenance).

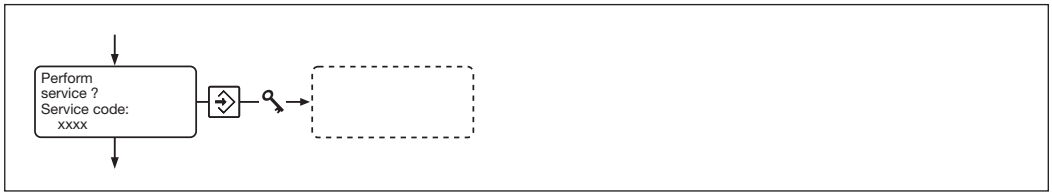
The controller continues to store old events when the operating time is reset.
They retain their old time “t”.

You can scroll through the protocol with the arrow keys.

Event	Remarks
System On	via “Start/Stop” key
System Off	via “Start/Stop” key
Voltage supply On	—
Run time and ClO_2 are reset	see Sect. “Begin start-up”
Rinse system	see Sect. “Rinse system” or “Taking out of service”
Start-up	First fill of the two containers
Calibration $NaClO_2$ pump	in Service mode
Calibration HCl pump	in Service mode
All error messages	see Sect. 14 “Troubleshooting”

Table 5: Events that are recorded in the protocol

11.4 Carry out service



This setting menu is only for customer service authorised by ProMinent® ProMaqua® (see “Operating instructions – chlorine dioxide system Legio Zon® Type CDLa, service instructions”).

12 Maintenance

A correspondingly instructed person must inspect the Legio Zon® system at least once a week. All metering pumps and hose connections must be checked for leaks. If leaks are found, please contact ProMinent ProMaqua authorised Service. Complete servicing in accordance with the service menu (see Section 11.4) must be carried out once a year.

WARNING

Only ProMinent ProMaqua authorised Service is permitted to service and maintain the Legio Zon® system!

13 Repair

WARNING

- ***Repair work by the Operator’s staff is restricted to replacing the fuses in the controller! All other repairs on the Legio Zon® system must only be carried out by ProMinent ProMaqua customer service!***
- ***The controller must only be opened by qualified technical staff!***
- ***Before opening the equipment, make sure that the controller is dead and that the electrical supply can’t be switched back on!***
- ***The chlorine dioxide system Legio Zon® CDLa has no ON/OFF switch. It starts working as soon as the incoming mains cord is powered up!***

Fuses: miniature fuse 5 x 20 mm:

		Order No.
Fuse F1 (controller):	for 100...230 V: 0.4 A extra slow-blow,	712060
Fuse F2 (pumps, solenoid valves):	for 100...230 V: 3.15 A extra slow-blow,	712069

NOTE

The fuses are fitted in bayonet-type fuse holders on the right in the terminal space of the controller.

14 Troubleshooting

Operating indicator The “operating indicator” relay has dropped off.
The system is not ready – it is in an error state, is just being flushed or put in service, is switched off or has interrupted the dosing temporarily due to excessive ClO_2 extraction.

Warning messages The “warning message” relay has picked up.

Error message	Cause	Remedy
↓ HCl or ↓ $NaClO_2$	Shortage of chemicals	Get ready to change the component container.
Residual runtime = xxx h	Before long, a year will have passed since the last maintenance (I year = 8760 h). The controller gives a warning 4 weeks beforehand (4 weeks = 672 h).	Place order with ProMinent ProMaqua customer service for maintenance as soon as possible

WARNING

The system switches itself off after 8760 h!
Then no more ClO_2 is dosed!

Fault messages The “alarm” relay has operated, “Error” appears in the operator display along with an error message, the system switches itself off.

All error messages must be acknowledged.

Error message	Cause	Acknowledge-ment code	Remedy
HCl container empty	Hydrochloric acid container is empty	without	Replace both component containers (see Sect. 11.1)
$NaClO_2$ container empty	The chlorite container is empty	without	Replace both component containers (see Sect. 11.1)
External fault	A device connected to the “External fault” input is reporting a fault (e.g. flowmeter bypass or ClO_2 measurement point)	without	Rectify fault
Runtime expired	The system has run for 1 year and requires maintenance	experts	Maintain the system immediately
Extraction too high * ERROR	The chlorine dioxide extraction is higher than can be supplied at present	users	Check the system for leaks. Reset flow in the water meter (IDM). Check process control
Dilution water flow too high	The reactor vessel was filled with water too early	without	Reduce dilution water pressure
Dilution water flow too low	The reactor vessel was filled with water too late	without	Check dilution water pressure (line blocked?)
HCl metering monitor	The actual number of pump strokes does not agree with that reported back.	without	Inspect HCl suction line for air bubbles. Check HCl dosing pump for leakage. Is the stroke adjustment button at the middle symbol (pump)?
$NaClO_2$ metering monitor	The actual number of pump strokes does not agree with that reported back.	without	Inspect $NaClO_2$ suction line for air bubbles. Check $NaClO_2$ dosing pump for leakage. Is the stroke adjustment button at the middle symbol (pump)?

Overfill container	Intermediate tank has been overfilled	experts	Request Pro Minent ProMaqua customer service
Overfill reactor	Reactor has been overfilled	experts	Request ProMinent ProMaqua customer service
Transfer ClO_2 - level container	The intermediate tank is not full after time T4 (standard: 80 sec)	experts	Request ProMinent ProMaqua customer service
Transfer ClO_2 - reactor level	The reactor is not empty after time T3 (standard: 100 sec)	experts	Request ProMinent ProMaqua customer service
Level control reactor **	Intermediate tank is full. No transfer possible	without	Request ProMinent ProMaqua customer service
Level control container **	Reactor is full. No transfer possible	without	Request ProMinent ProMaqua customer service

* see also “operating indicator”
** only during initial commissioning

All other errors Please contact your responsible ProMinent ProMaqua branch or agency!

ATTENTION

If a mains failure occurs, the controller saves the parameters and status of the Legio Zon® system.

Following a mains failure in normal operation, the Legio Zon® system carries on working as if this interruption had not occurred.

15 Taking out of service

WARNING

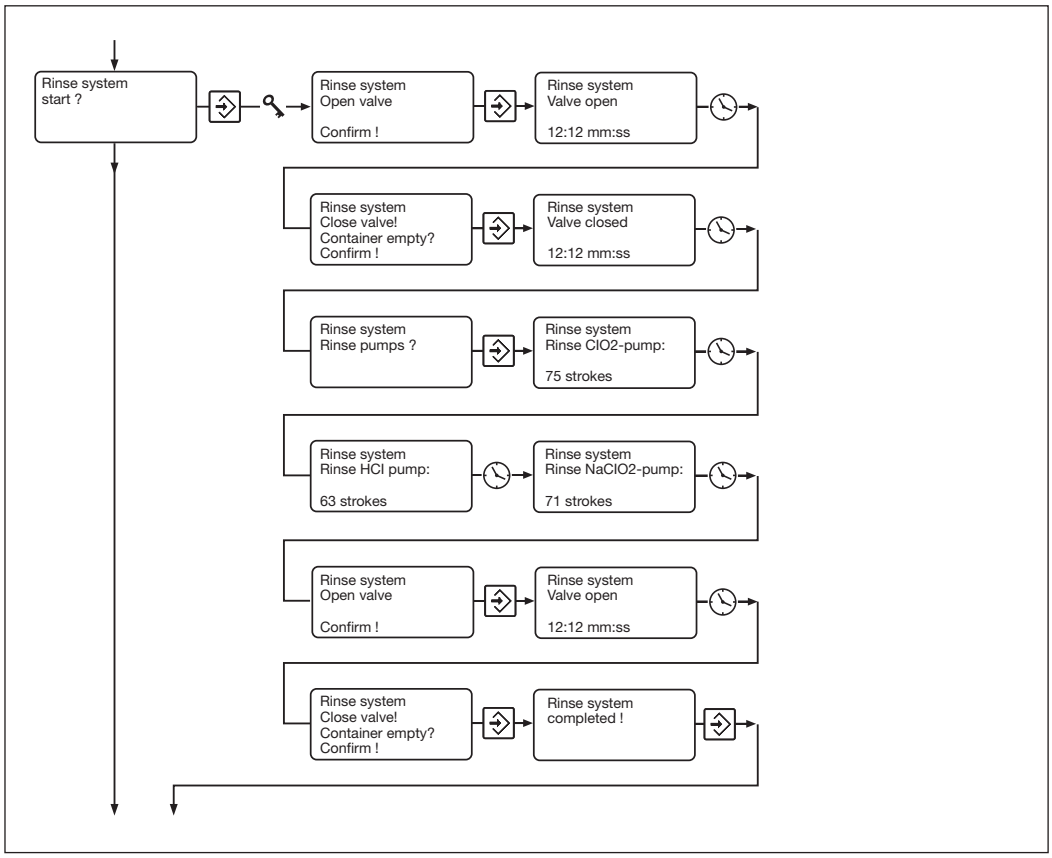
- ***Never combine the contents of the component contents! A large quantity of toxic, explosive ClO_2 gas is then produced!***
- ***Never put both suction lances into the same bucket either together or one after the other! A large quantity of toxic, explosive ClO_2 gas is then produced!***
- ***Do not adjust the different valves! Corrosive chemicals can escape!***

15.1 For a short period

To take the Legio Zon® system out of service for a short period only, simply press the “Start/Stop” key (“OFF” appears). The power supply to the controller of the system must not be switched off. The power supply to any chlorine dioxide or chlorite measurement point installed must not be interrupted for longer than 2 hours!

15.2 For a longer period

Chlorine dioxide is an unstable compound that decomposes over time. If the Legio Zon® system is to be taken out of service for a longer period, the system must be flushed through with water.



To flush the system:

- ▶ Put each of the suction lances into a bucket full of water.
- ▶ Remove the plug in the vent port of the 3-way valve.
- ▶ Connect a 6 x 4 mm PVC hose to the vent port.
- ▶ Lead the PVC hose into a 10 l bucket into which has been stirred some ClO_2 eliminator (see Sect. 18, “Accessories”).
- ▶ Turn the 3-way valve to the “Vent” position (see Fig. 22 a).
- ▶ Connect a 6 x 4 mm PVC hose to the drain valve at bottom right of the system (a length of approx. 1 m is required).
- ▶ Lead the PVC hose into the 10 l bucket with the ClO_2 eliminator. The bucket should stand on the floor directly below the system.
- ▶ Open the drain valve by turning the black ring counterclockwise (approx. 1 turn).
- ▶ Change to the “Rinse system start?” menu item in the setting menu with the CHANGE key and press ENTER.
- ▶ Enter the access code, press ENTER and wait until the controller changes to the next menu item (ClO_2 solenoid valve operates).
- ▶ When no more liquid is flowing out, close the drain valve by turning the black ring clockwise (approx. 1 turn).
- ▶ Press ENTER and wait until the controller has filled the storage tank with dilution water and changes to the next menu item.
- ▶ To flush the pumps, press ENTER – in the display, the controller first counts down the specified number of strokes for the for the ClO_2 pump. The controller then counts down the specified number of strokes for the HCl pump and finally for the $NaClO_2$ pump.

Now the ClO_2 solution that has formed in the storage tank during flushing must be drained off:

- ▶ Lead the PVC hose into the 10 l bucket with the ClO_2 eliminator. The bucket should stand on the floor directly below the system.
- ▶ Open the drain valve by turning the black ring counterclockwise (approx. 1 turn).
- ▶ Press ENTER and wait until the controller changes to the next menu item

- ▶ When no more liquid is flowing out, close the drain valve by turning the black ring clockwise (approx. 1 turn).
- ▶ Take the PVC hose off the drain valve and fit the plug.
- ▶ Take the PVC hose off the 3-way valve and fit the plug.
- ▶ Turn the 3-way valve to the “Operation” position.
- ▶ Carefully put the suction lance for the acid into the “acid” container and tighten it.
- ▶ Carefully put the suction lance for the acid into the “chlorite” container and tighten it.
- ▶ Empty each of the water buckets down a drain one after the other, flushing down thoroughly after emptying the first one.
- ▶ Press ENTER – the controller indicates “Rinse system completed!”
- ▶ Press ENTER to quit the “Rinse system start?” setting menu and change to the OFF display with the SHIFT key.

WARNING

- ***Check that the plugs have been fitted on the drain valve and the 3-way valve! The system must not operate without these plugs as toxic ClO_2 solution can escape!***
- ***Check that the 3-way valve is in the “Operation” position! Otherwise the pump can cause the pipe to burst and toxic chemicals can escape!***

16 Disposal

WARNING

The entire Legio Zon® system must be thoroughly flushed through with water (see Sect. 15 “Taking out of service”)! If necessary, flush out the empty component containers as well! Otherwise the Legio Zon® system could still contain hydrochloric acid (HCl), sodium chlorite ($NaClO_2$) and chlorine dioxide (ClO_2)!

CAUTION

Lithium batteries can give off substances that are harmful to health, heat up or explode if improperly or roughly handled (heating, short circuiting, crushing, ...)!

ATTENTION

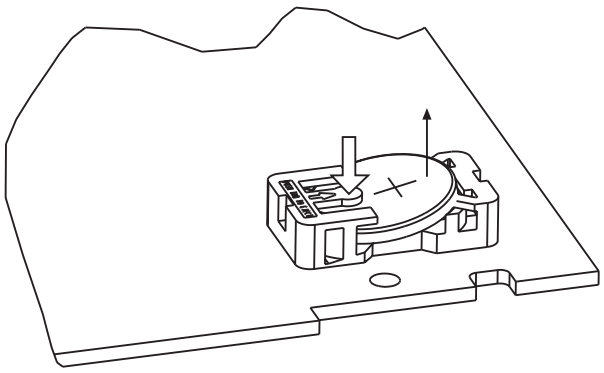
Observe the regulations applicable at your location! (particularly with regard to the lithium battery, electronic waste and the chlorine dioxide-charged activated charcoal filter)

Activated charcoal filter The activated charcoal filter is fitted inside the system (see Fig. 2, Item 14)

Battery The battery clips into a holder on the back of the top section of the case.

- ▶ To get to the battery, unscrew the 4 retaining screws at the front of the top section of the case and take the top section off the bottom section.
- ▶ To release the battery from the holder, press on the clip of holder (see Fig. 23).

Fig. 23: Removing the battery



17 Technical data

Allgemein	**CDLa 5**	**CDLa 10**
Capacity:	5 g/h	10 g/h
Dimensions (HxWxD):	approx. 650 x 550 x 310 mm	approx. 650 x 550 x 370 mm
Weight complete:	approx. 38 kg (incl. Packaging)	approx. 42 kg (incl. Packaging)
Vilution water:	3-6 bar, hose connection 8x5 mm	
ClO_2 stock solution batch volume:	approx. 0.8 l	
ClO_2 stock solution concentration:	2000 ppm	
ClO_2 dosing pump capacity:	3 l/h against 10 bar, 3.4 l/h against 5 bar	

Environmental conditions	
Storage temperature:	0...50 °C
Temperature in operation:	10...40 °C
Dilution water temperature:	10...30 °C
Temperature of water to be treated:	0...60 °C (dependent on the material of the dosing point and the pressure) (refer to dosing point documentation)
Protection class:	IP 65 (applies only for the controller, only with correctly seated gasket and with the interface cover closed. Applies for the system for spray water only when folded back against the wall (gap = less than 1 cm wide))
Climatic conditions:	max. permissible relative humidity: 92 %, non-condensing
Other:	Protect from direct sunlight

Materials	
Bracket:	PE
Cover:	Polycarbonate
Fixing material:	Stainless steel
Storage vessel	PVC
Reactor:	PVC
Controller case:	PPE GF10
Membrane keypad:	Polyester film PET
Pump casing:	PPE, glass-fibre reinforced
Liquid ends:	PP, PVDF

Technical data, electrical	
Average power consumption:	approx. 62 W 2,2 A (230 V, without ClO_2 metering pump) 7,1 A (100/115 V, without ClO_2 metering pump) 2,7 A (230 V, with ClO_2 metering pump) 8,4 A (100/115 V, with ClO_2 metering pump)

Controller Supply	
Nominal voltage:	230 V AC, 50/60 Hz or 115 V AC, 50/60 Hz or 100 V AC, 50/60 Hz Socket outlet fusing 16 A

Fuses: miniature fuse 5 x 20 mm:

		Order No.
Fuse F1 (controller):	for 100...230 V: 0.4 A extra slow-blow	712060
Fuse F2 (pumps, solenoid valves):	for 100...230 V: 3.15 A extra slow-blow,	712069

Inputs

- Contact inputs:
  for contacts or switching transistors:
  Open-circuit voltage: 5 V ± 1 V
  Input impedance: 400 ohm
  Switching point: closed 100 ohm, open 1 Mohm

  for IDM (open collector) with: frequency output up to 10 kHz (pulse width > 20 μsec)

  or contact water meter with: reed relay contact or Hall-effect sensor
  (integral supply voltage +11 V, 2 mA), pulse interval 0.1 - 10 l/pulse

- Digital input (two-wire):
  for contact water meter with: proximity switch as per Namur
  in line with DIN 19 234 (Namur)
  Open-circuit voltage supplied: 8.2 V
  Switching points: at approx. 2 mA
  volt-free contacts

- Digital inputs (two-wire):
  Inputs: in line with DIN 19 234 (Namur)
  Open-circuit voltage supplied: 8.2 V
  Switching points: at approx. 2 mA
  volt-free contacts

  The action of a contact, a link or open terminals is
  explained in Sect. 10.5 “Select digital input function”!

Outputs

- Digital outputs (relay contacts):
  Solid-state switch for pump control
  Contact type: normally open
  Contact rating: 24 V DC / 50 mA (resistive)
  Closing time: 100 ms
  Frequency: 0...120 /min

- Alarm relay (XR2):
  Contact type: changeover
  Contact rating: 250 V AC / 3 A / 100 VA
  Provide RC snubber circuit with inductive loads!

- Warning relays (XR1.1 and XR2.1):
  Contact type: normally open
  Contact rating: 250 V AC / 3 A / 100 VA
  Provide RC snubber circuit with inductive loads!

- Operator display relays (XR1.2 and XR2.1):
  Contact type: normally open
  Contact rating: 250 V AC / 3 A / 100 VA
  Provide RC snubber circuit with inductive loads!

18 Accessories

Chemicals	**Order No.**
• Bello Zon® acid in 25 l disposable container	1027594
• Bello Zon® chlorite in 10 l disposable container	1026422
• Chemical for elimination of the chlorine dioxide for use when flushing system	1029256

Safety bund

Safety bund for each 1 25 l and 10 l chemical container	1026744

Dosing point Legio Zon®

Corrosion-resistant dosing point Legio Zon® CDL made from PVC-U, PVDF and PTFE, with integral mixing elements and maintenance-free PVDF dosing valve;
for max. permissible pressure at various temperatures, see Sect. 8.1.4 “Dosing point”

	Material	Flow rate max. in m³/h	Installation length	Order No.
Flange connection DN 50	PVC-U	15	450 mm	1027611
Flange connection DN 65	PVC-U	25	400 mm	1026490
Flange connection DN 80	PVC-U	35	400 mm	1027612
Flange connection DN 65	PVC-C	25	400 mm	1029326
Flange connection DN 80	PVC-C	35	400 mm	1029327

Measurement equipment

DULCOMETER® D1C or D2C for online monitoring of limits for chlorine dioxide, chlorite and pH	(on request)
Hand-held photometer DULCOTEST® DT4 for check measurements of chlorine dioxide and chlorite	1022736
Hand-held photometer DULCOTEST® DT1 for check measurements of chlorine dioxide and pH	1003473

Multi-function valve

Multi-function valve with wall bracket type MFV-DK size I, 16 bar, with wall bracket, 6x4 hose connection	1027652

EC Declaration of Conformity

We,

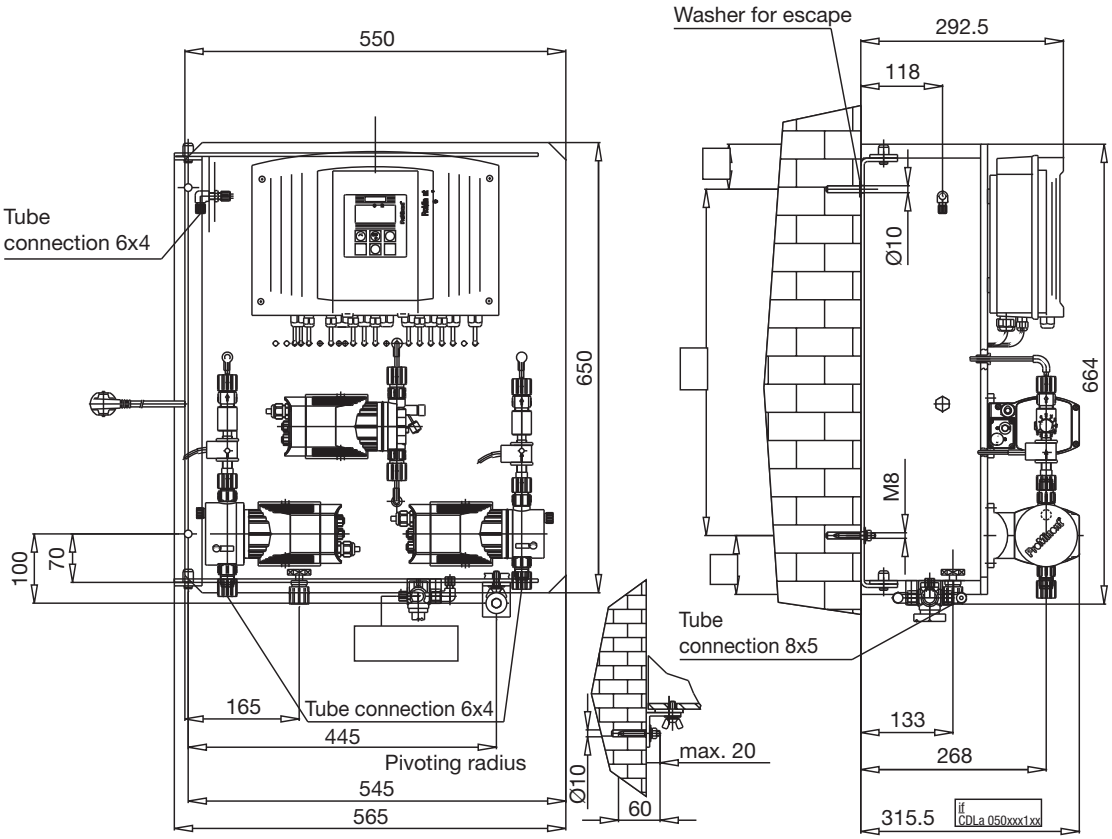
ProMinent ProMaqua GmbH
Maaßstraße 32/1
D - 69123 Heidelberg

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.
Any modification to the product not approved by us will invalidate this declaration.

Product description :	***System for generation of chlorine dioxide Legio Zon®***
Product type :	***Legio Zon CDL ...***
Serial number :	***see type identification plate on device***
Relevant EC regulations :	***EC - machine regulation (98/37/EC)*** ***EC - low voltage regulation (2006/95/EC)*** ***EC - EMC - regulation (2004/108/EC)***
Harmonised standards used, in particular :	***EN ISO 12100-1, EN ISO 12100-2*** ***EN 60204-1, EN 60335-1, EN 61010*** ***EN 61000-3-2, EN 610004-2/4//5, EN 61000-6-1//3/4*** ***EN 938, EN 939, EN 12671***
National standards and other technical specifications used, in particular :	***DVGW-compilation of rules, job-sheet W 224 and W 624***
Date/manufacturer´s signature :	*26.02.2008*
The undersigned :	*Dr. Andreas Wolf, Executive Vice President*

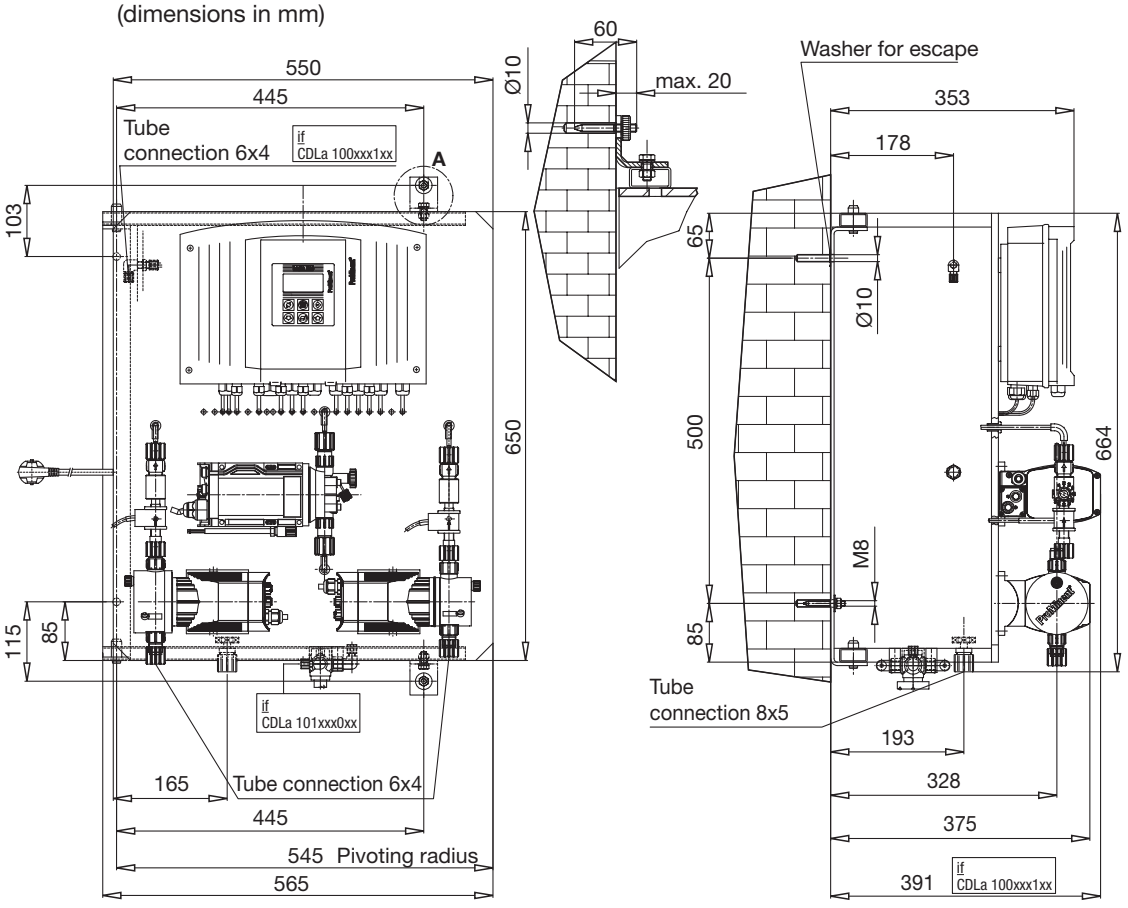
Dimension sheet – Legio Zon® CDLa

(dimensions in mm)

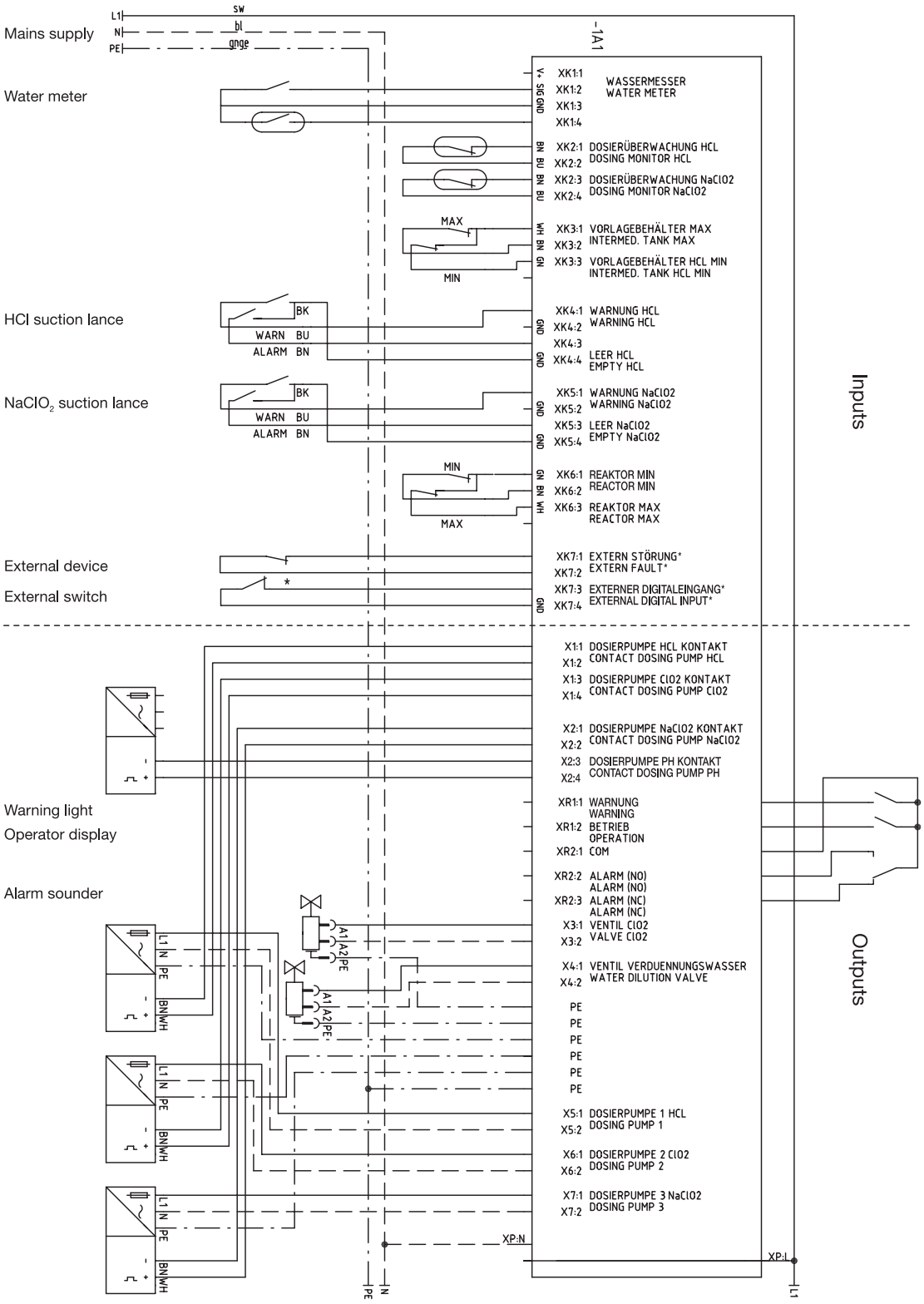


Dimension sheet – Legio Zon® CDL10

(dimensions in mm)



Terminal connection diagram Legio Zon® CDLa



**** CAUTION***

If an external switch is connected, remove the link between the two terminals (XK7:3 – XK7:4)!
Otherwise the system does not stop when in the "Pause" mode setting. With the other settings, the "Shock dosing", "Boost dosing" and "Manual dosing" modes cannot be activated!

If no external switch is connected to terminals XK7:3 – XK7:4 and they are not linked, the system does not dose in the "Pause" setting. With the other settings, the system is permanently switched to "Shock dosing", "Boost dosing" or "Manual dosing"!

Terminal arrangement Legio Zon® CDLa

Signal	Terminal marking/ pin	LED marking	Remarks
Water meter *	XK1/1,2,3,4	WZ	1 = +11 V, 2 = signal, 3 = GND, 4 = V^+ Namur
Dosing monitor HCL	XK2/1,2	DS	1 = +, 2 = -
Dosing monitor $NaClO_2$	XK2/3,4	DN	3 = +, 4 = -
Intermediate tank max.	XK3/1,2	VM	XK3/2 = GND
Intermediate tank HCl empty	XK3/3,4	VL	XK3/4 = GND
HCl warn.	XK4/1,2	ZW	XK4/2 = GND
HCl empty	XK4/3,4	ZL	XK4/4 = GND
$NaClO_2$ warn.	XK5/1,2	NW	XK5/2 = GND
$NaClO_2$ empty	XK5/3,4	NL	XK5/4 = GND
Reactor min.	XK6/1,2	NR	XK6/2 = GND
Reactor max.	XK6/3,4	RM	XK6/4 = GND
External fault	XK7/1,2	ES	XK7/2 = GND shipped with terminals linked, take note of Sect. 10.4
External digital input	XK7/3,4	PA	XK7/4 = GND shipped with terminals linked, take note of Sect. 10.4
Contact dosing pump HCL	X1/1,2	PS	
Contact dosing pump ClO_2	X1/3,4	PC	
Contact dosing pump $NaClO_2$	X2/1,2	PN	
Contact dosing pump pH	X2/3,4	PN	Electrically parallel with ClO_2 dosing pump
Warning	XR1	CN	Root: XR2 pin1
Operating	XR1	BE	Root: XR2 pin1
Alarm	XR2	AL	Root: XR2 pin1. pin 3: n.c. contact
ClO_2 valve	X3	VC	PE: XPE1. Solid on 115/230V
Dilution water valve	X4	VV	PE: XPE1. Solid on 115/230V
PE	XPE1, XPE2	-	
Dosing pumps 1-3	X5-7	-	PE: XPE1, XPE2
Supply terminals	XP1	-	

* Only 1 water meter can ever be connected!

Safety declaration form

A completed form must always be returned with the equipment!
This declaration must only be completed and signed by an authorized member of the technical staff!

The equipment or its parts will only be repaired or serviced if it is accompanied by a correctly completed and signed safety declaration form. The work could be delayed if no form is returned.

Legally binding declaration

We hereby assure that:
1. The enclosed equipment

Type: _____

Serial No.: _____

is free from any

- **toxic**
- **corrosive**
- **microbiological**
- **carcinogenic**
- **explosive**
- **radioactive substances**
- **or other substances that may be harmful to health.**

2. The equipment was thoroughly cleaned before being shipped.

3. There is no hazard due to residual contamination.

4. The details given in this form are correct and complete.

Company / Institute: _____

Street: _____ Postcode, Town: _____

Tel: _____ Fax: _____

Surname, First name: _____ Position: _____

Date: _____

_____ _____

Legally binding signature Company stamp

Part No. 986715 / AL_017_03/06 GB

Leaflet: "Hazardous Material Data Sheet Chlorine Dioxide: Properties of chlorine dioxide and notes on handling aqueous solutions"

BUNDESVEREINIGUNG DER FIRMEN IM GAS- UND WASSERFACH E.V.

FIGAWA

TECHNISCH-WISSENSCHAFTLICHE VEREINIGUNG

Sveb 1269 h
16.04.1998

Hazardous materials data sheet, chlorine dioxide

Characteristics of chlorine dioxide and notes for handling with aqueous solutions

The chlorine dioxide base solutions used in the treatment of water have a concentration of 2 g/l ClO_2. A temperature of up to 25 °C results in a chlorine dioxide concentration in the gas space of less than 100 g/m³. Thus appropriate preparation in both gas space and base solution eliminates an explosive disintegration.

1. Physical and chemical characteristics

1.1 Chemical characterisation

Aqueous solution of chlorine dioxide (ClO_2) c. 2g ClO_2/l physically dissolved chlorine dioxide gas

1.2 Characteristics of chlorine dioxide gas

Colour:	orange/yellow
Odour:	pungent
Melting point:	- 59 °C
Boiling point:	11°C
Stability:	chlorine dioxide gas disintegrates explosively in concentrations from 300 g/m³ (≙ 10 Vol%) in chloride and oxygen.
	Diluting reduces explosibility; the risk of explosion is eliminated where concentrations are less than 10 Vol% in gases, with which chlorine dioxide does not react (e.g. air, nitrogen, carbon dioxide).
	With a critical concentration of chlorine dioxide, for example in gas space above an aqueous chlorine dioxide solution, a chlorine dioxide concentration greater than 8 g/l (at a temperature of 20 °C) must be used.
	An extreme, or even explosive reaction similarly occurs with oxidisable substances.

1.3 Characteristics of chlorine dioxide aqueous solutions

The gas is critical.

Stability: With no gas space, aqueous chlorine dioxide solutions are explosive from a concentration of around 30g/l, i.e. they can disintegrate explosively by themselves, without the impact of external factors such as heat, sparking, dirt or rust.

Chorine dioxide is stable for several days in the form of an aqueous diluted solution, as long as the solution is pure and is stored in a dark place or as long as the temperature of the solution remains below 25°C and has a pH value less than 7.

2. Handling with aqueous chlorine dioxide solutions

2.1 Identification and notices

Workstation and work areas are identified via notices in compliance with the accident prevention regulations "Chlorination of water" (GUV 8.15, appendix 3)

2.2 Storage

Due to the danger of explosion, chlorine dioxide cannot be stored or transported either as a gas or as a concentrated aqueous solution. Hence it is only produced as a diluted (see section 1.3) aqueous solution in special equipment for immediate use.

2.3 Measures for filling, leaking, gas emissions

Condense gas by spraying with water.
Pour sodium thiosulphate solution onto any solution that has leaked, then dilute with plenty of water and rinse down the drain.

2.4 Actions in the event of fire

Chlorine dioxide itself is not flammable but can be combustible. Explosive disintegration at temperatures from 100°C. Cool containers with water, condense leaked chlorine dioxide gas by spraying with water.
There is no restriction on fire extinguishing substances in areas where there is a fire hazard.

2.5 Disposal

See section 2.3

3. Health protection

3.1 MAK value and odour threshold

MAK value: 0.1 ppm (ml/m^3) or 0.3 mg/m^3

Odour threshold the odour of chlorine dioxide gas can be detected in air in concentrations from around 15 mg/m^3.

3.2 Personal protection equipment

Respiratory protection:	breathing mask with filter B, coloured grey
Eye protection:	protective goggles, protective mask
Hand protection:	rubber gauntlets
Other:	protective clothing

3.3 Health hazards

A concentration of chlorine dioxide gas exceeding 45 mg ClO_2/m^3 causes breathing difficulties and leads to irritation of mucous membranes and headaches.

Generally chlorine dioxide causes severe reactions in mucous membranes pertaining to the eyes and respiratory organs. Depending on the concentration and duration of exposure it can lead to a danger of suffocation, coughing fits, vomiting, burning onto the skin and severe headaches, and in serious cases to pulmonary oedema with breathing difficulties, oxygen deficiency and circulatory collapse. With brief exposure to very high concentrations there is a risk that the person stops breathing or suffers glottal spasm or cardiac arrest. Damaging to the nerves (e.g. paralysis of the eye muscles).

3.4 First aid

You should immediately remove any clothing that has come into contact with chlorine dioxide or respective aqueous solution and wash the skin thoroughly with soap and plenty of water.

Rinse the eyes well for several minutes under running water, ensuring the eye is opened as widely as possible.

After inhaling chlorine dioxide, fresh air, lie down, keep still and keep warm.

Notify the doctor immediately, even if symptoms do not appear immediately. If necessary, smooth, fast transport to hospital.

4. *Further information*

DVGW-worksheet W 224 ”Chlorine dioxide in water treatment”
DVGW-worksheet W 624 “Metering systems for chlorine dioxide”
Accident prevention regulations ”Chlorination of water” (GUV 8.15)
Ullmann volume 5, page 551
Kühn-Birett, sheet C20

Notice:

Instructions are based on current knowledge. They are intended to contribute to the safe handling of aqueous chlorine dioxide solution and are in no way an assurance of particular characteristics.

Data relating to Bello Zon® ACID

WARNING

This summary does not replace the supplier's EC Safety Data Sheet!

ATTENTION

This data is in no way an assurance of particular characteristics.

Chemical characteristics

Hydrochloric Acid (HCl) 9 % (approx. 95 HCl/l)

CAS number : 7647-01-0

EC number : 017-002-02-7

UN number : 1789

EINECS number : 2315957

Purity : according to DIN EN 939

Potential product hazards

Irritant to eyes and skin!

First aid measures

After inhalation: See a physician in case of inhalation of aerosols

After skin contact: Rinse with plenty of water. Remove contaminated clothes and rinse thoroughly.

After eye contact: Rinse immediately with plenty of water (at least 10 minutes). See an oculist.

After ingestion: Drink plenty of water. See a physician.

Fire-fighting measures

Suitable extinguishing media: not applicable

Unsuitable extinguishing media for safety reasons: not applicable

Special risks caused by the product itself, its combustible products or gases:
Not combustible

Special exposure hazards: no special measures required

Accidental release measures

Personal precautions: avoid substance contact with skin and eyes.

Environmental precautions: do not allow to enter sewerage system.

Methods of cleaning up / of removing: dilute with plenty of water and wash away, neutralize with lime.

Handling and storage

Handling: Store in a well-vented place.

Storage: Keep original tank tightly closed until use of chemical. Avoid heat and frost.

Personal protective equipment

Hand protection: Protective gloves

Eye protection: Protective eyeglasses

Physical and chemical properties

Physical state:	liquid
Colour:	colourless
pH-value:	approx. 0.5 (delivery conditioned at 20 °C)
Freezing point:	below -10 °C
Flash point:	not applicable
Vapour pressure:	(aqueous solution)
Relative density:	approx. 1.05 kg/l (20 °C)
Solubility:	miscible in water

Stability and reactivity

Conditions to avoid:	No decomposition if used as directed	
Materials to avoid:	Reaction with Bello Zon®-Chlorite:	formation of chlorine dioxide
	Reaction with lyes:	heat formation
	Reaction with metal:	formation of hydrogen
Hazardous decomposition products:	none	

Disposal considerations

If recycling is not possible, disposal to be done according to local waste disposal regulations. (EAK): 06 01 02 Hydrochloric Acid

Risks and Safety

Irritant to eyes and skin!

Keep out reach of children.

After contact with skin wash immediately with plenty of water.

Data relating to Bello Zon® CHLORITE

WARNING

This summary does not replace the supplier's EC Safety Data Sheet!

ATTENTION

This data is in no way an assurance of particular characteristics.

Chemical characterisation

Aqueous solution of Sodium Chlorite ($NaClO_2$) 7.5 % (approx. 80 g/l)

CAS number: 7758-19-2

EC number: 231-836-6

UN number: 1908

Purity: according to DIN EN 938

Potential product hazards

Contact with acids liberates very toxic gas!

Irritant to eyes and skin!

First aid measures

After skin contact:	Rinse with plenty of water. Immediately remove contaminated clothes and rinse thoroughly.
After eye contact:	Rinse immediately with plenty of water (at least 10 minutes). See an oculist.
After ingestion:	Drink plenty of water. Avoid vomiting. See a physician.

Fire-fighting measures

Suitable extinguishing media: Water, extinguishing foam

Unsuitable extinguishing media for safety reasons: Halone, CCl_4, carbon dioxide

Special risks caused by the product itself, its combustible products or gases: Dried solution increase the flammability of combustibles, in event of fire risk of formation of toxic gases (chlorine dioxide)

Special exposure hazards: Breathe protection at formation of chlorine dioxide

Accidental release measures

Personal Precautions: Avoid substance contact with skin and eyes.

Environmental precautions: Do not allow to enter sewerage system.

Methods of cleaning up / of removing: Dilute with plenty of water and wash away, do not allow drying in of solution.

Handling and storage

Handling: Keep away from acids and reducing chemicals.

Storage: Keep original tank tightly closed until use of chemical. Avoid sun, heat and frostas well as contamination of the product.

Personal protection:

Hand protection:	Protective gloves (PVC, PE, no rubber)
Eye protection:	Protective eyeglasses
Respiratory protection:	Protection mask with suitable filter, when ClO_2 is liberated

Physical and chemical properties:

Physical state:	liquid
Colour:	colourless
pH-value:	approx. 12 (undiluted at 20 °C)
Freezing point:	below -5 °C
Flash point:	not applicable
Ignition temperature:	not applicable
Vapour pressure:	(aqueous solution)
Explosion limits:	not applicable
Relative density:	approx. 1.06 kg/l (20 °C)
Solubility:	miscible in water

Stability and reactivity

Conditions to avoid:	Drying of solution (oxidising)
Materials to avoid:	Reaction with acid: formation of chlorine dioxide (ClO_2) Reaction with reducing agents and sulfur containing substances: Vigorous reaction
Hazardous decomposition products:	Stable in original solution, with acids formation of Chlorine Dioxide

Disposal considerations

If recycling is not possible, disposal to be done according to local waste disposal regulations. (EAK): 06 07 04 - Solutions and acids

Risks and Safety

Contact with acids liberates very toxic gases!

Irritant to eyes and skin!

Keep away from acids!

In case of contact with eyes, rinse thoroughly with water and seek medical advice!

Wear suitable protective clothing, protective gloves, safety goggles/face mask when working with the product!

We reserve the right to make technical modifications.

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