Assembly and operating instructions

Controller AEGIS II
with web interface

EN



A2300

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. The document is always aimed equally at women, men and gender-neutral persons. We kindly ask readers for their understanding in this simplification of the text.

Supplementary information

→ Please read the supplementary information in its entirety.

Information



This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Warning information

Warning information includes detailed descriptions of the hazardous situation, see ↳ *Chapter 4.1 'Labelling of Warning Information' on page 15*.

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

Tab. 1: More symbols

Symbol	Description
1. →	Action, step by step.
⇨	Outcome of an action.
↳	Links to elements or sections of these instructions or other applicable documents.
■	List without set order.
[Button]	Display element (e.g. indicators). Operating element (e.g. button, switch).
'Display/GUI'	Screen elements (e.g. buttons, assignment of function keys).
`CODE`	Presentation of software elements and/or texts.

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1 Operating concept

The front panel of the AEGIS II features a display. The display provides real-time values from up to 6 sensors in the continuous display. Alarms and unusual operating statuses are also displayed by a multicoloured status LED and output statuses by 9 multicoloured LEDs.

The status LED is located in the top right corner of the keypad. In the event of an alarm, the controller’s status LED changes from ‘blue’ to ‘flashing red’. If one of the dosing units has been manually set to STOP, then the status LED lights up red continuously.

Tab. 2: Functions of the keys

Key	Function
	Confirmation in the setting menu: confirms and saves the input of values. Confirmation in the continuous display: displays all information about saved errors and warnings.
	Back to the continuous display or to the start of the respective setting menu in which you currently find yourself.
	Enables direct access to all the controller's setting menus.
	Enables direct access to the controller's calibration menu from the continuous display.
	Starts/Stops the controller's regulation and dosing function from any display. The LED on the front panel lights up continuously red.
	To increase a displayed number value and to move up in the operating menu.
	Confirmation in the setting menu: moves the cursor to the right. Confirmation in the continuous display: displays further information about the controller’s input and output values.
	To decrease a displayed number value and to move down in the operating menu.
	Moves the cursor to the left.

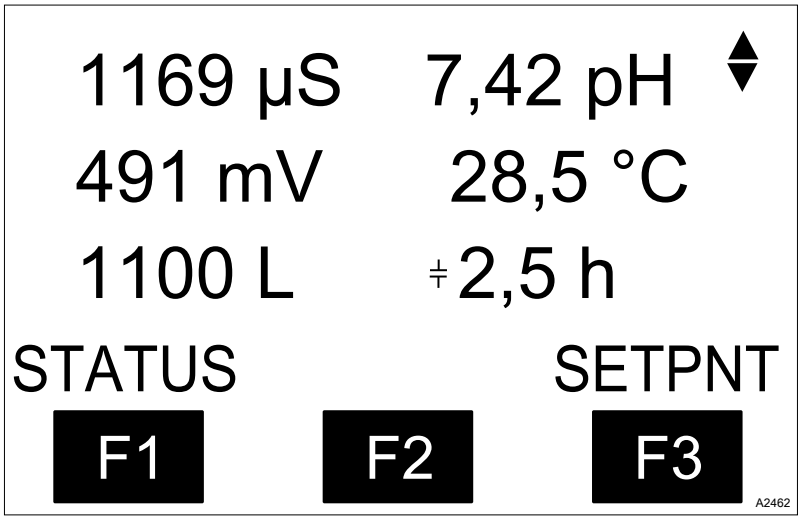


Fig. 1: Typical continuous display

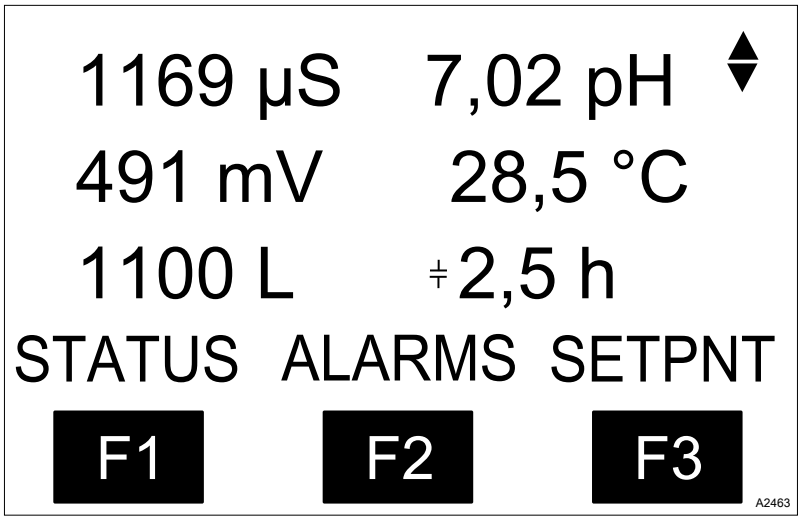


Fig. 2: Continuous display with alarm messages

The standard display shows up to 6 current sensor values as well as the keys F1=*[STATUS]*, F2=*[ALARM]* and F3=*[SETPNT]*. The sensor selection options can be changed or reorganised.

Function of the F keys:

- F1 = Status
- F2 = Alarm
- F3 = Setpoints

Function of the front panel display

The display on the front panel allows you to read off all the measured values directly on the controller without the need for further equipment. Essentially, you can also carry out all the setting work for the controller using the display and keys on the front panel. However, we strongly recommend that you use the browser application provided by the controller for all setting work, see *Chapter 1.1 'Connecting to the browser application' on page 9*.

The browser application provides all the setting options in a clearly arranged and colour-coded form.

Keypad lock

The controller provides the option of locking the keypad. When the keypad lock is enabled, an access code is needed for access. The password for the keypad is identical to the password used in the Ethernet or Wi-Fi browser connection.

1.1 Connecting to the browser application

You can connect to the controller using any Wi-Fi-capable terminal device, such as a PC, tablet etc.

1. To do so, simply search for the controller in the Wi-Fi settings of your Wi-Fi-capable terminal device, and connect to your Wi-Fi-capable terminal device.

> *Proxy server*
> *Make sure that any proxy server is switched off. You will find information on this in the instructions for the browser you are using.*

2. Then open the browser on your terminal device and enter the IP address *192.168.1.1*.
   ⇨ A connection is established to the user interface of the controller.
3. Now enter your username and password.
   ⇨ You can now use all the functions enabled for you as a user.

1.2 Wi-Fi web interface

PCs, tablets and smartphones can be connected by Wi-Fi to the controller.

The IP address and the net mask for Wi-Fi is programmed in. Therefore, the Wi-Fi SSID number is the only way of distinguishing between individual controllers.

The SSID is the name you see when establishing a Wi-Fi connection. The default factory setting has organised that the last 3 characters of the name are identical to the last 3 characters of the serial number of the controller. Should you find yourself in an account with multiple controllers, then you need to know the SSIDs of the units to understand to which unit you are connecting.

You can change the SSID however you wish once you have established a connection and logged in. The change then takes place once you have switched the power supply to the controller off and on again.

The diagram on the right shows the permanent IP address and the Wi-Fi net mask.

SSID: the *'Service Set IDentifier'* is a name for the wireless network.

The SSID cannot be edited from the keypad. A browser connection is needed for this.

2 Introduction

The controller AEGIS II is a multi-parameter-capable control and analysis unit.

The controller AEGIS II continuously measures and controls the conductivity and controls the biocide concentration to keep pipework and heat exchangers clean.

In the remainder of these instructions, the controller AEGIS II will simply be referred to as the controller.

The controller was developed for the continuous measurement and control of liquid analysis parameters in industrial water treatment processes. The controller can be operated together with conventional analogue and digital sensors and actuators. The controller can also communicate with certain sensors via a proprietary serial bus.

The controller records all the necessary measuring parameters for cooling water and steam generator water treatment, and controls the functions needed for their smooth operation:

- Electrolytic conductivity:
  - controls blowdown.
- Corrosion measurement:
  - determines whether enough corrosion inhibitor is being dosed.
- pH measurement:
  - measures and controls the pH value.
- Biocide measurement (e.g. chlorine):
  - measures and controls the biocide concentration.

Benefits:

- Biocide dosing is timer-controlled.
- The online measurement and control of the biocide concentration is continuous if required.
- Remote maintenance via a web interface with web server.
- Blowdown lock: locks blowdown after biocide dosing has taken place.
- Forced blowdown: performs blowdown before biocide dosing.
- Operating status displayed by 10 status LEDs.

Typical applications:

- Cooling water treatment.
- Data and event writer.
- Treatment of boiler feed water.
- Industrial process water treatment.
- Drinking water treatment.
- Waste water treatment.
- pH and/or temperature compensation for the measurement of free chlorine.

Field of application:

- Control of blowdown in evaporator cooling circuits.
- Volume-proportional control or regulation of corrosion inhibitor dosing, de-foamer dosing and dispersant dosing.
- Measurement and control of the inhibitor concentration through the use of a fluorescence sensor.
- Measurement and, if necessary, control of the pH value.
- Metering of up to 2 biocides based on time or measured value.

Standard equipment:

- 2 serial input channels for use with CTFS sensors (conductivity/temperature/serial flow switch), 2 serial corrosion rate sensors or DP sensors (differential pressure).
- 8 multi-purpose digital inputs (2 NAMUR - intrinsically safe) for turbine wheel and contact water meter, and limit switch.
- A 4 ... 20 mA output.
- 1 temperature analogue input.
- Temperature compensation for the pH and conductivity sensor signals.
- Output relays: On-Off, time-modulated (pulse width modulation) or PID controller using one or all of the following components:
  - Supply voltage relays.
  - Unpowered, potential-free contacts.
  - DC semiconductor contacts.
- 1 operating language.
- Saving and transfer (cloning) of the configuration of the controller by USB.
- Software function update by USB.
- Ethernet-LAN connection for remote operation or configuration.

Optional accessories:

- Up to 3 dual sensor input/output driver cards including:
  - Dual pH/ORP.
  - Boiler water conductivity.
  - Conductivity/temperature.
  - Dual output 4 ... 20 mA.
  - Dual input 4 ... 20 mA.
  - Or 1 serial dual input driver.
- A complete range of ProMinent sensors and the signals of most 4 ... 20 mA devices are compatible with the 4 ... 20 mA input. The sensors include:
  - Chlorine.
  - Bromine.
  - Peracetic acid.
  - Toroidal conductivity sensors, inductive.
- 1 extension card slot for subsequent use.
- 1 additional 10 mV/°C temperature sensor (future).
- Analogue input 4 ... 20 mA.
- Analogue output 4 ... 20 mA.
- Wi-Fi internet access.

Technical details:

- Degree of protection: IP 67
- 8 digital status inputs
- mA input for flow signal and temperature input
- 2 serial sensor inputs.
- 3 plug-in module slots:
  - Plug-in modules for two mA outputs.
  - pH/ORP inputs.
  - mA inputs for amperometric sensors and serial sensor inputs.
- 5 outputs for output relays
- 4 pulse frequency outputs

3 Identity code

AGIb											
	Regional code										
	EU	Europe									
		Design									
		00	with ProMinent logo								
			Operating voltage								
			6	100 ... 240 V, 50/60 Hz							
				Communication interface							
				LO	LAN						
				WO	LAN + Wi-Fi						
				L1	LAN without M12 LAN cable						
				W1	LAN + Wi-Fi without M12 LAN cable						
					Application pre-setting						
					XX	no default setting					
						Serial sensor A					
						XX	Selection during commissioning				
							Serial sensor B				
							XX	Selection during commissioning			
								Extension slot 1 (Input C/D)			
								XX	No module		
								L3	Conductivity/temperature sensor input		
								AA	mA/mA sensor input		
								H1	mA/mA output		
								D1	Serial sensor module		
									Extension slot 2 (Input E/F)		
									XX	No module	
									L3	Conductivity/temperature sensor input	
									AA	mA/mA sensor input	
									V2	mV/mV temperature sensor input	
									H1	mA/mA output	
									D1	Serial sensor module	
									V1	mV/temperature + mA module	
										Extension slot 3 (Input I/J)	
										XX	No module
										L3	Conductivity temperature sensor input
										AA	mA/mA sensor input
										V2	mV/mV temperature sensor input

H1	mA/mA output
D1	Serial sensor module monitoring
V1	mV/temperature + mA module
CM	Modbus RTU + mA/mA output
CA	Modbus RTU + mA/mA output + mA/mA sensor input

Pump activation (P/V)

0	Configuration during commissioning

Pre-wired relay outputs

0	Only for use outside Europe

Pre-wired output relays

0	Only for use outside Europe

Inhibitor dosing outputs

0	Configuration during commissioning

Biocide dosing outputs

0	Configuration during commissioning

Hardware extension

0	none

Approvals

01	CE
07	MET (USA)
08	CE + MET (Europe)

Documentation language

DE	German
EN	English
ES	Spanish
FR	French
BG	Bulgarian
CS	Czech
DA	Danish
ET	Estonian
EL	Greek
FI	Finnish
HR	Croatian
HU	Hungarian
IT	Italian
JA	Japanese

KO	Korean
LT	Lithuanian
LV	Latvian
NL	Dutch
PL	Polish
PT	Portuguese
RO	Romanian
SK	Slovakian
SR	Serbian
SL	Slovenian
SV	Swedish
RU	Russian
TH	Thai
TR	Turkish
ZH	Chinese

4 Safety and responsibility

4.1 Labelling of Warning Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed warning information and are provided as clear step-by-step instructions.

The warning information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.



DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Description of hazard

– Denotes an immediate threatening danger. If the situation is disregarded, it will result in fatal or very serious injuries.



WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in fatal or very serious injuries.



CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.



NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

– Denotes a possibly damaging situation. If the situation is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information.

Source of the information. Additional measures.

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

4.2 General safety information

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

Live parts!

- Measure: ensure that all equipment is de-energised before opening the housing or carrying out assembly work.
- Disconnect damaged or faulty instruments from the power supply, as well as instruments that have been tampered with.

Unauthorised access!

- Measure: ensure that there can be no unauthorised access to the unit

Operating faults!

- Ensure that the unit is only operated by adequately qualified and technically expert personnel
- Please also observe the operating instructions for sensors and fittings and any other assemblies that may be fitted, such as sample water pumps ...
- The operator is responsible for ensuring that personnel are qualified

Correct sensor operation

- Correct measuring and dosing is only possible if the sensor is working perfectly
- Check and calibrate the sensor regularly

The controller is constructed with IP 67 degree of protection, is protected against fluids, and complies with NEMA 4X degree of protection (interior areas) in terms of air impermeability. These standards are only met if all seals and threaded connectors are correctly dimensioned and fitted.

Only carry out the electrical installation once the mechanical installation has been completed.

Make sure that there is unimpeded access for operation.

Ensure safe and low-vibration installation.

Avoid direct sunlight.

4.3 Intended use

INFORMATION: Intended use

- The device is designed to measure and regulate liquid media. The labelling of the measured variables is indicated in the controller display and is absolutely binding.
- The protection provided by the device can be impaired if this device is used in a manner not specified in the operating instructions.
- Only use the device in accordance with the technical details and specifications provided in these operating instructions and in the operating instructions for the individual components (such as sensors, fittings, calibration devices, metering pumps etc.).
- All other uses or modifications are prohibited.

INFORMATION: Time constant > 30 seconds

- The controller can be used in processes, which have a time constant of > 30 seconds.

INFORMATION: Interference resistance

- The device complies with the interference resistance provisions in accordance with EN 61326-1 and is intended for use in industrial electromagnetic environments and in residential areas.



WARNING!

Disturbance signal emissions Class A or B / Protection of radio reception

The device complies with the disturbance signal emissions test requirements for residential areas as a Class B (Residential area), Group 1 device.

With devices with communication interface

- B = Profibus,
- E = LAN,
- G = Profinet,

the device only complies with the limit values for a Class A device (other areas apart from residential), Group 1.

This device is then not intended to be used in residential areas and cannot guarantee appropriate protection of radio reception in these environments.

4.4 User qualification



WARNING!

Danger of injury with inadequately qualified personnel

The operator of the system / equipment is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

- All work on the unit should therefore only be conducted by qualified personnel.
- Unqualified personnel should be kept away from the hazard zone.

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to.

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from the manufacturer or another authorised distribution partner.
Trained, qualified personnel	A trained, qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his training, knowledge and experience, as well as knowledge of pertinent regulations. A trained, qualified employee must be able to perform the tasks assigned to him independently with the assistance of drawing documentation and parts lists. The assessment of a person's technical training can also be based on several years of work in the relevant field.
Electrical technician	An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his technical training and experience as well as knowledge of pertinent standards and regulations. An electrical technician must be able to perform the tasks assigned to him independently with the assistance of drawing documentation, parts lists, terminal and circuit diagrams. The electrical technician must be specifically trained for the working environment in which the electrical technician is employed and be conversant with the relevant standards and regulations.
Service	The Service department refers to service technicians, who have received proven training and have been authorised by the manufacturer to work on the system.

4.5 Network security

The product is suitable for use in networks. Users are responsible for taking appropriate security measures for their own network and all components contained therein, in particular their computer systems and other systems. They must protect them adequately from unauthorised access by third parties, viruses, harmful software, and any other forms of harmful elements. In particular, users undertake to set up an appropriate firewall and, wherever possible, to use automatically generated passwords of an adequate length, which should be regularly changed. Alternatively, they can take other appropriate measures to establish or maintain network security. The operator/user should replace all default passwords with appropriate and adequately secure passwords during commissioning. Responsibility for network security lies with the operator of the system. ProMinent GmbH in particular is not liable for any consequences resulting from inadequate security measures and the potential misuse of the user's authentication features.

5 Ambient conditions: storage and transport

- **User qualification:** instructed user ↳ *Chapter 4.4 'User qualification' on page 18*

Ambient conditions: storage and transport

- Permissible ambient temperature: - 20 ... 60 °C (- 4 ... 140 °F)
- Humidity: maximum 95% relative air humidity, non-condensing.
- Other: no dust, no direct sunlight.

5.1 Transport

Only transport the sensor in its original packaging and in compliance with the permissible environmental conditions. No further special conditions have to be observed in relation to transport.

5.2 Disposal of Packaging



Packaging material

Dispose of packaging material in an environmentally responsible way. All packaging components carry the corresponding recycling code ♻.

6 Assembly and installation

- **User qualification, mechanical installation:** trained and qualified personnel ↳ *Chapter 4.4 'User qualification' on page 18*
- **User qualification, electrical installation:** electrical technician ↳ *Chapter 4.4 'User qualification' on page 18*

The controller must be installed in such a way that the mains power plug can be easily disconnected or the mains circuit breaker is easily accessible.

6.1 Wall mounting

Mounting materials (contained in the scope of delivery)

- 1 x wall bracket
- 4 x PT screws 5 x 35 mm
- 4 x washers 5.3
- 4 x rawl plug Ø 8 mm, plastic

Wall mounting

Take the wall bracket out of the housing

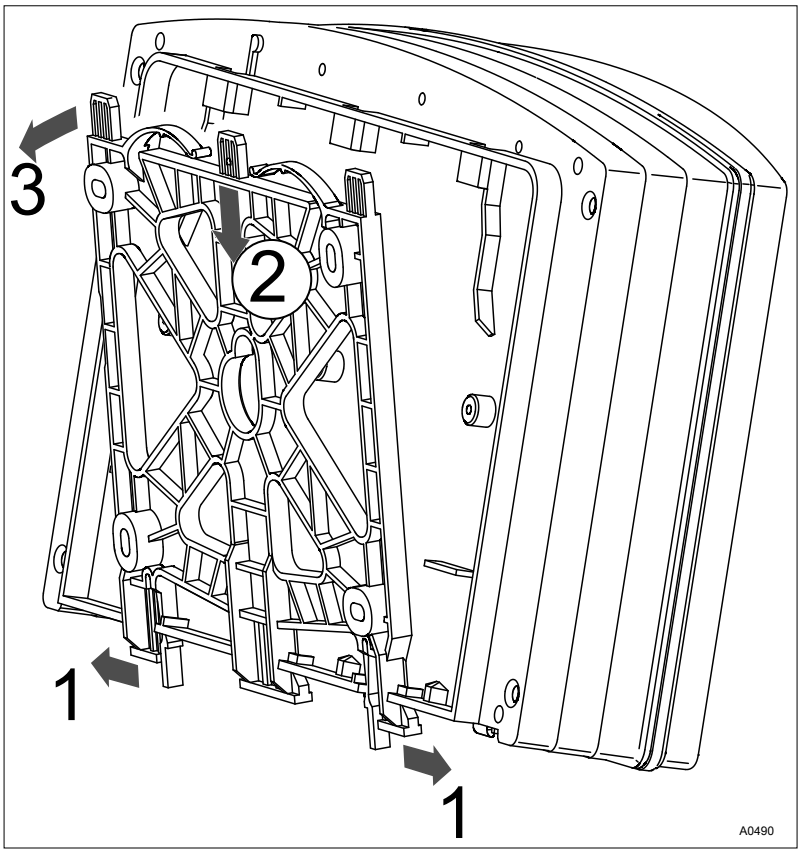


Fig. 3: Removing the wall bracket

1. Pull the two snap hooks (1) outwards
   ⇨ The wall brackets snaps slightly downwards.
2. Push the wall bracket downwards (2) from the housing and fold (3) it out
3. Use the wall bracket as a drilling template to mark the positions of four drill holes
4. Drill the holes: Ø 8 mm, d = 50 mm

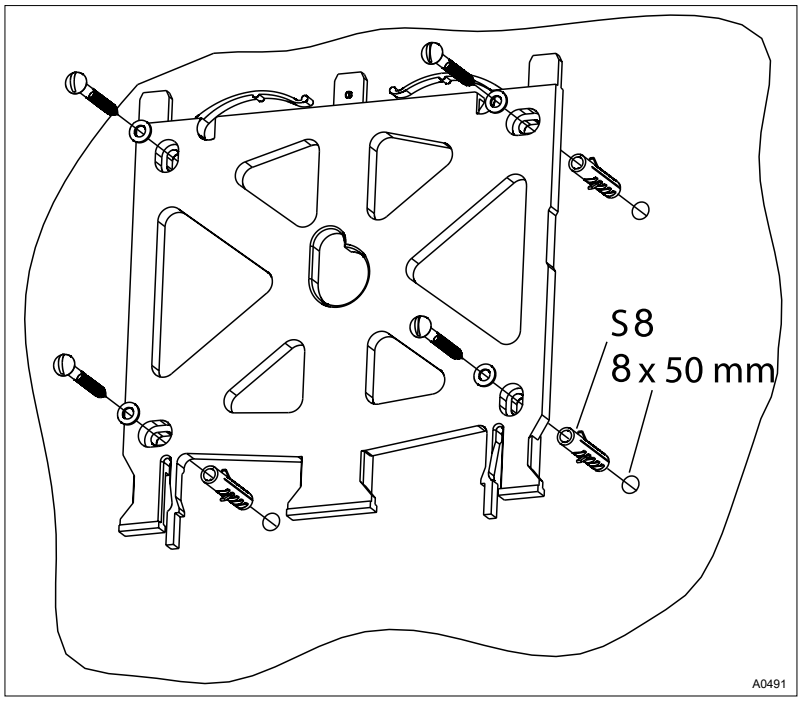


Fig. 4: Fitting the wall bracket

5. Screw the wall bracket into position using the washers, see Fig. 4

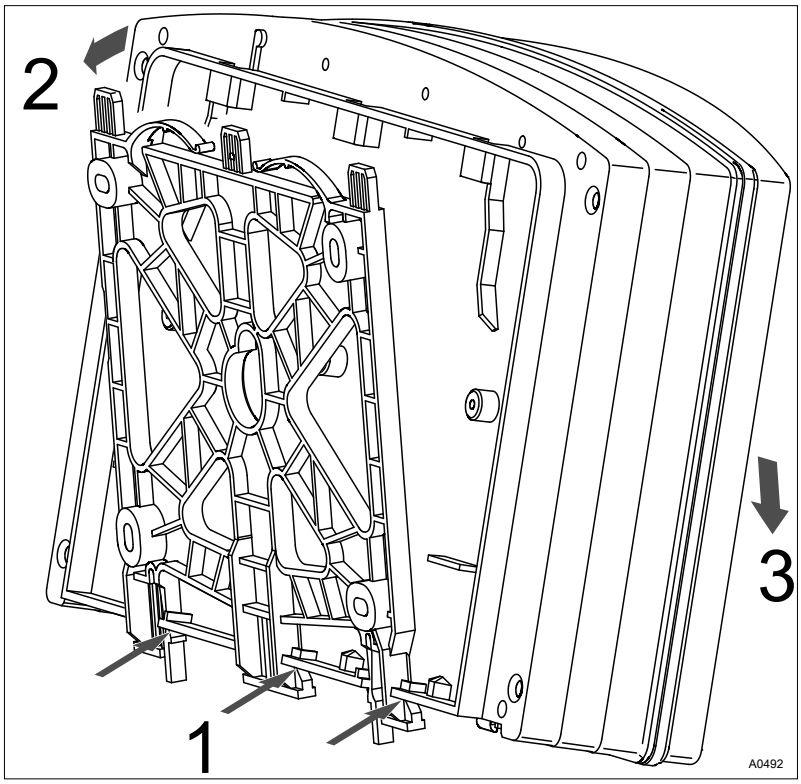


Fig. 5: Fitting the wall bracket

6. Hook the bottom of the housing (1) into the wall bracket
7. Lightly press the housing at the top (2) against the wall bracket
8. Then check that the housing is hooked in at the top and press down (3) until it audibly engages

6.2 Control panel mounting

CAUTION!

Thickness of the control panel

The control panel must be sufficiently thick to ensure that it does not bend once it has been fitted. Steel panels must be at least 2 mm thick, with plastic correspondingly thicker.

Only in this way can the IP 54 degree of protection be attained.

When fitted, the housing extends approx. 45 mm out of the front of the control panel. A drilling template is enclosed.

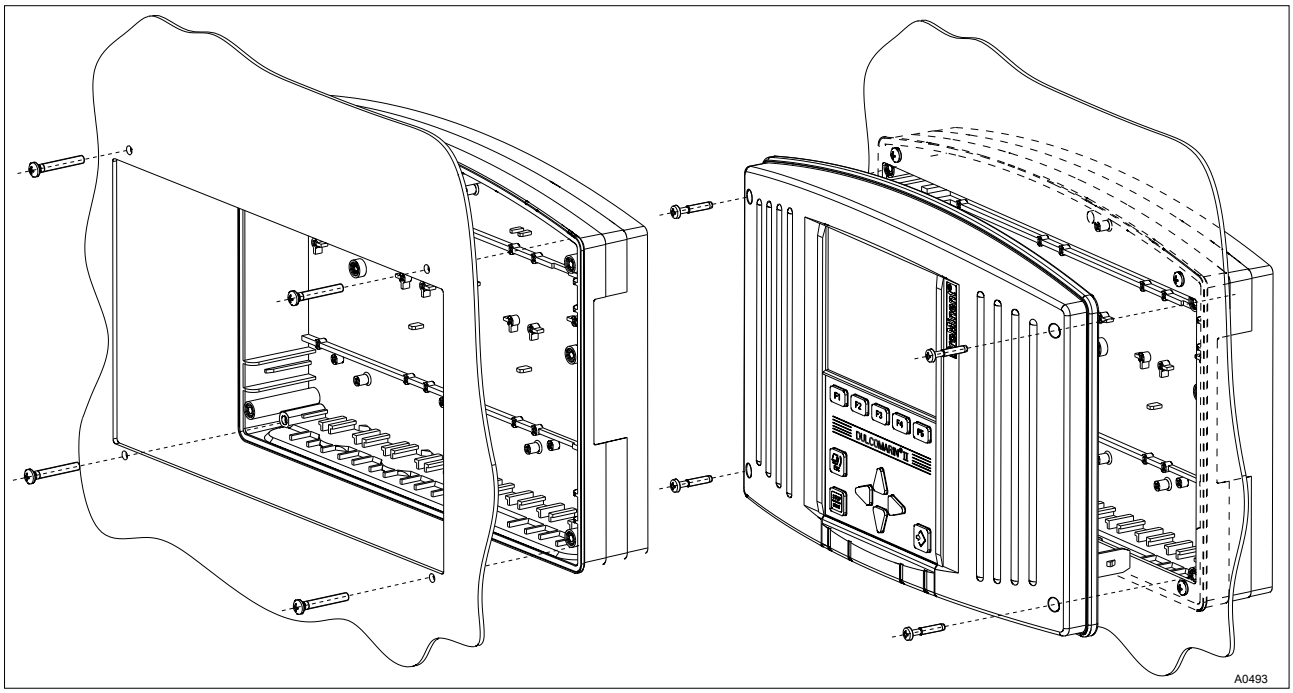


Fig. 6: Control panel mounting

1. Use the drilling template to establish the exact position of the housing on the control panel and secure it.
2. Mark the holes for the fixing bolts using a centre punch and the drilling holes for the cut-out using the drilling template.
3. Drill four fixing holes using a 5 mm Ø drill bit.

CAUTION!

Take care not to cut yourself on the sharp edges.

4. Either punch out the cut-out or drill four inner holes using a 5 mm Ø drill bit and then use a jigsaw to remove the cut-out.
5. De-burr the edges.
6. Loosen the four housing screws.
7. Lift the front part off and disconnect the ribbon cable from the P-module.
8. Remove the front part.
9. Now break out the threaded holes of the lower row that you need for your cabling, referring to the wiring diagram.

10. Screw the back part onto the control panel (using the PT screws supplied).
11. Reattach the ribbon cable.
12. Position the front part in its parked position.
    ⇨ First electrically wire the controller and then complete the control panel installation.
13. Position the front part on the rear part of the housing and screw the housing in place.

IP 54 degree of protection

14. Once again check that the seal is seated properly. Degree of protection IP 54 can only be achieved if it is correctly fitted.

6.3 Electrical installation

Put in place both hardware and software safety precautions to ensure that the controller switches to a safe operating status in the event of a fault. For instance, use limit switches, mechanical locks, ...

Ensure that the controller is not energised during installation.

Make sure that the installation is only carried out by technically trained personnel.

Observe the technical data in these instructions.

6.3.1 Cable Cross-Sections and Cable End Sleeves

	Minimum cross-section	Maximum cross-section	Stripped insulation length
Without cable end sleeve	0.25 mm^2	1.5 mm^2	
Cable end sleeve without insulation	0.20 mm^2	1.0 mm^2	8 - 9 mm
Cable end sleeve with insulation	0.20 mm^2	1.0 mm^2	10 - 11 mm

6.3.2 Preparation

NOTICE!

Cable strain relief

With control panel mounting, route the cables in a cable duct provided on site to provide strain relief.

1. Plan which threaded holes are to be broken out and label them.

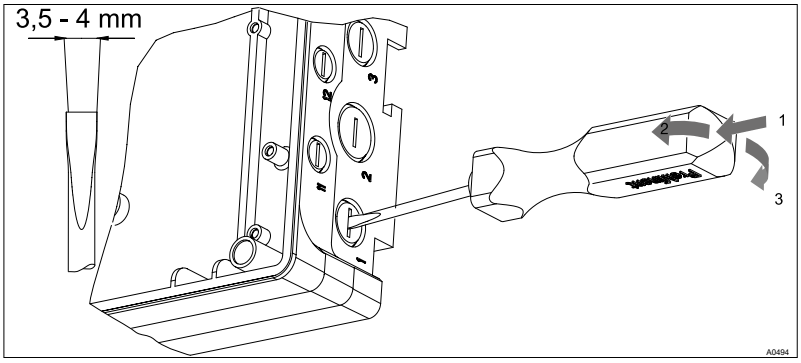


Fig. 7: Breaking out threaded holes

2. When breaking out the threaded holes, avoid pushing the screwdriver deep into the housing. Parts inside the unit could be damaged.

   To break out the threaded holes, use a screwdriver (width 3.5 ... 4 mm, see Fig. 7) to break the slot in the centre of the threaded holes and remove the material.

3. De-burr the edges.

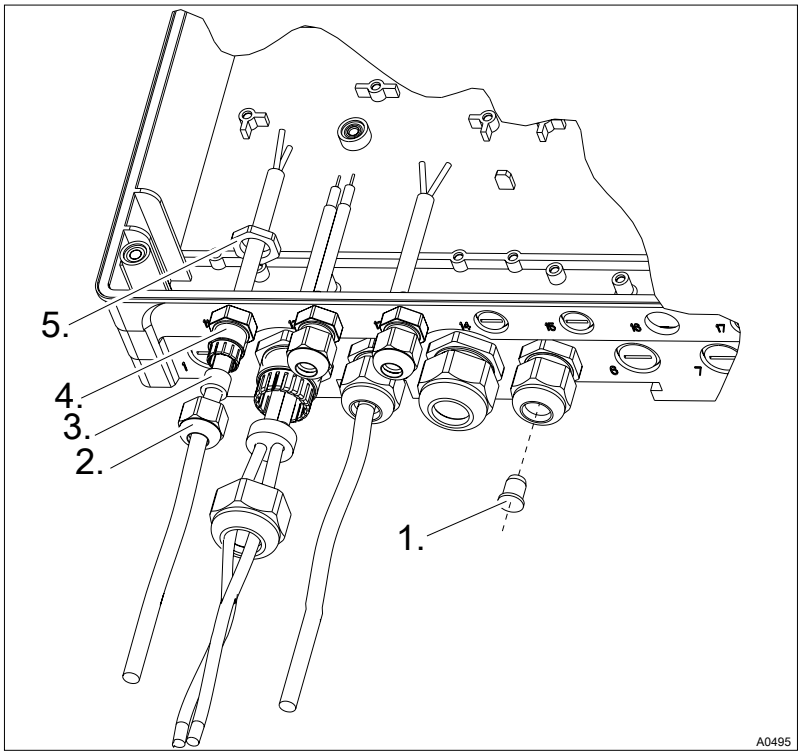


Fig. 8: Fitting the threaded connectors

1. Blanking plug
2. Union nut
3. Multiple sealing insert
4. Threaded connector
5. Locking nut

4. Screw the appropriate threaded connectors (4) using the corresponding locking nuts (5) and tighten firmly.

5. Insert multiple sealing inserts (3) into the threaded connectors depending on the cable diameter used.

6. Guide the cables into the threaded connectors.

7. Connect the cables as shown on the wiring diagram.

8. Tighten the union nuts (2) on the threaded connectors so that they are properly sealed.

9. Place the front part of the housing onto the rear part.

10. Manually tighten the four housing screws.

IP 65 degree of protection

11. Once again check that the seal is seated properly. Degree of protection IP 65 can only be achieved if it is correctly fitted.

6.3.3 Connecting the terminals

There is also a field containing connection information next to the terminals on the modules.

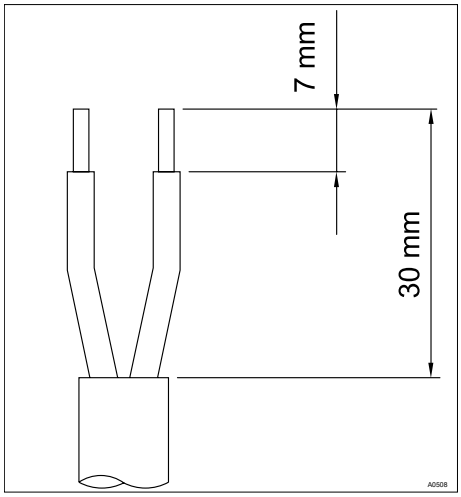


Fig. 9: Stripping back the cable sleeve

1. Strip the sleeve from the end of the cable as shown in Fig. 9 and press on the corresponding cable end sleeves.
2. To install the cables, push the screwdriver supplied right into the square opening of the respective terminal to insert the cable end into the terminal block.
3. Connect the cables according to the wiring diagram.
4. Check the cabling against the wiring diagram.

6.4 Wiring diagrams

6.4.1 Primary PCB wiring diagram

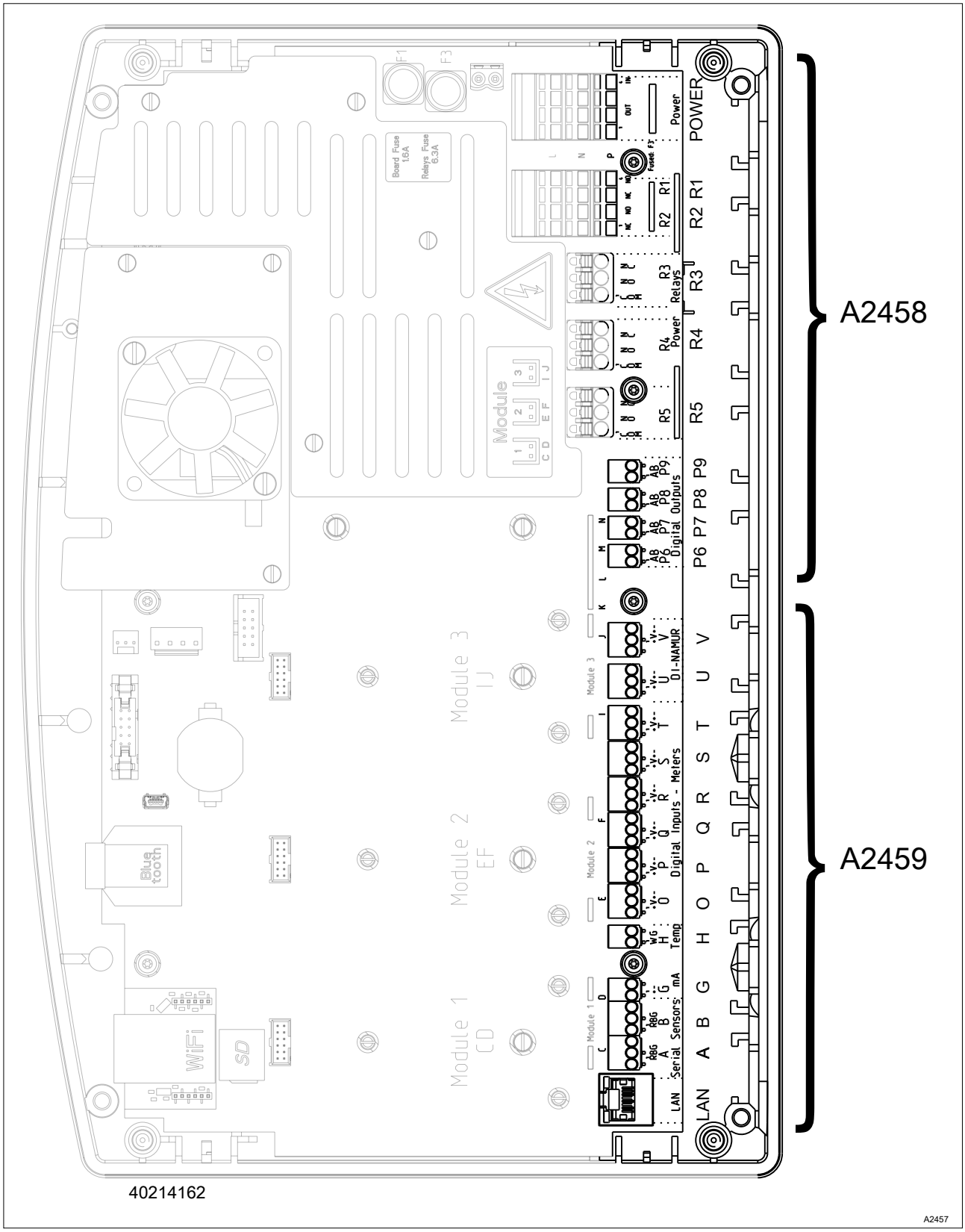


Fig. 10: Primary PCB wiring diagram for Fig. 11 *and* Fig. 12*.*

6.4.2 Controller connectors

Connector label on the base module	Function
LAN	LAN connector, RJ-45 plug
A	Digital sensor, CTFS and corrosion sensors
B	Digital sensor, CTFS and corrosion sensors
C	Module slot 1 for 2-channel IO modules
D	
E	Module slot 3 for 2-channel IO modules
F	
G	Passive mA input, e.g. for flow meter signal 4 ... 20 mA
H	Temperature sensor semiconductor input
I	Module slot 3 for 2-channel IO modules
J	
O	Digital input for potential-free signals (e.g. contact water meter, status)
P	Digital input for potential-free signals (e.g. contact water meter, status)
Q	Digital input for potential-free signals (e.g. contact water meter, status)
R	Digital input for potential-free signals (e.g. contact water meter, status)
S	Digital input for potential-free signals (e.g. contact water meter, status)
T	Digital input for potential-free signals (e.g. contact water meter, status)
U	Digital input for potential-free signals (e.g. contact water meter, status)
V	Digital input for potential-free signals (e.g. contact water meter, status)
P6	Potential-free digital output to control a dosing pump
P7	Potential-free digital output to control a dosing pump
P8	Potential-free digital output to control a dosing pump
P9	Potential-free digital output to control a dosing pump
R5	Alternating relay, unpowered
R4	Alternating relay, unpowered
R3	Alternating relay, unpowered
R2	Alternating relay, powered, fused, NO with RC circuit, for blowdown solenoid valve
R1	Alternating relay, powered, fused, NO and NC with RC circuit, for blowdown ball valve
Power IN	Infeed 100 ... 240 V AC, L, N, PE
Power OUT	Outfeed 100 ... 240 V AC, L, N, PE, max. 6.3 A to supply R3
Power OUT	Outfeed 100 ... 240 V AC, L, N, PE, max. 6.3 A to supply R4
Power OUT	Outfeed 100 ... 240 V AC, L, N, PE, max. 6.3 A to supply R5

6.4.3 Wiring diagram for pumps and relays

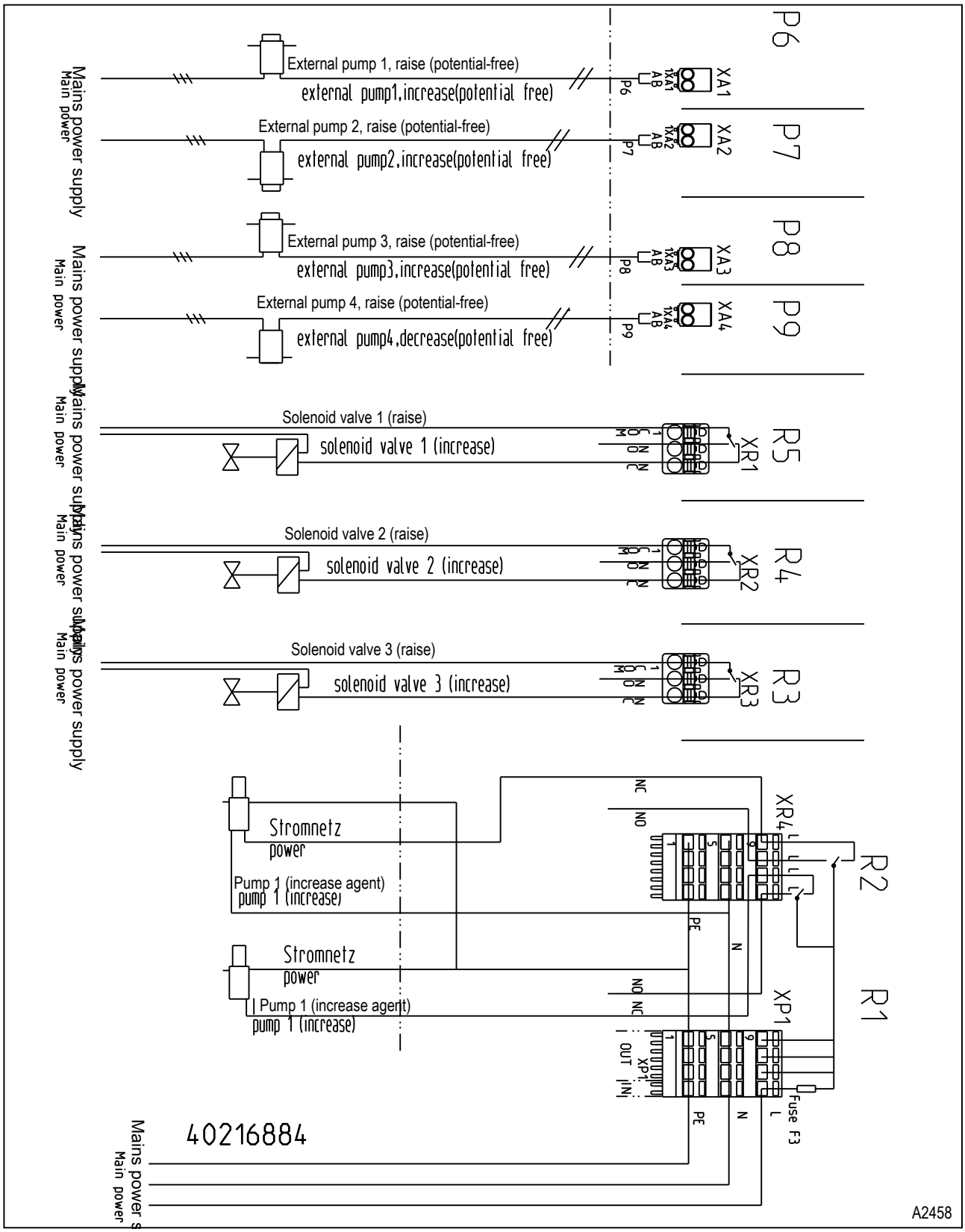


Fig. 11: Wiring diagram for pumps and relays for Fig. 10

6.4.4 Wiring diagram for CTF, standard signal input and digital contact input

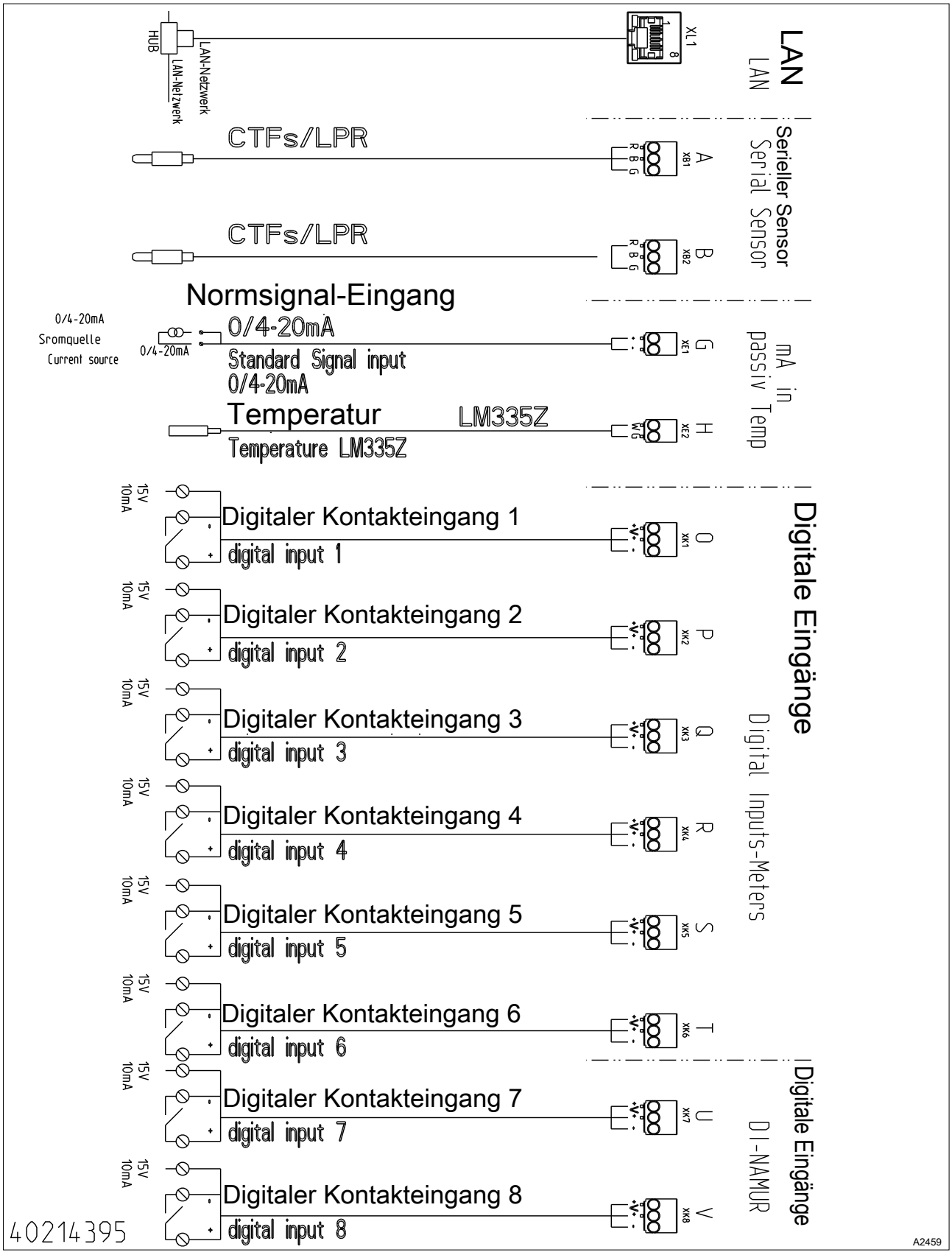


Fig. 12: Wiring diagram for CTF, standard signal input and digital contact input for Fig. 10

6.4.5 Module: mV temperature/mA input. Part number 1081808

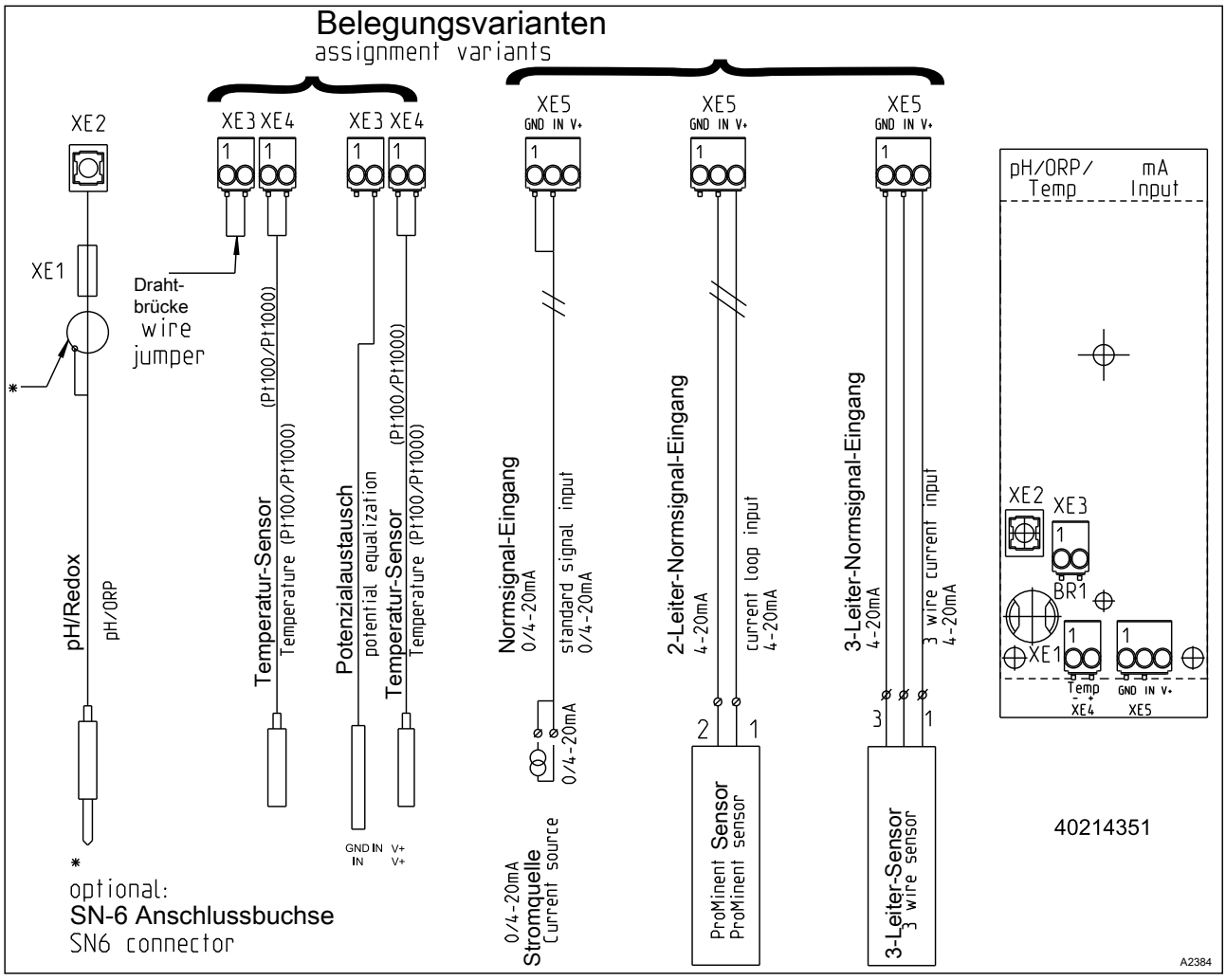


Fig. 13: Module: mV temperature/mA input. Part number 1081808

A module for the direct measurement of a pH value or redox potential via a coaxial cable and a sensor signal from an mA 2-wire sensor, e.g. for chlorine, bromine or peracetic acid (PES).

mA interface:

- For use with ProMinent 2-wire transmitters and sensors with 2-wire mA interface.
- Processing of active mA signals, type of connector: current source.
- Driver voltage: 24 V DC.
- Max. current 50 mA.
- Input switches off at 70 mA.
- Protection against reverse polarity and overvoltage up to max. 30 V DC.
- Maximum cable length: 30 m, limited by the EMC specification.

2-wire control line for the connection of mA sensors to terminals XE5.2 and XE5.3

Connectible conductor:

XE3, XE4, XE5: see terminal type 4

XE2: see terminal type 5a

XE1: see terminal type 5b

Control line LiYY, 2 x 0.25 mm^2, Ø 4 mm, part number 725122

mV interface:

- For the direct connection of pH and ORP sensors
- Maximum cable length: 10 m

Tab. 3: Sensor connection cable, coaxial, for terminal XE1/XE2

Designation	Part number
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 – pre-assembled.	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 – pre-assembled.	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 – pre-assembled.	1024107

6.4.6 Module: 2x mV inputs/temperature input. Part number 1081807

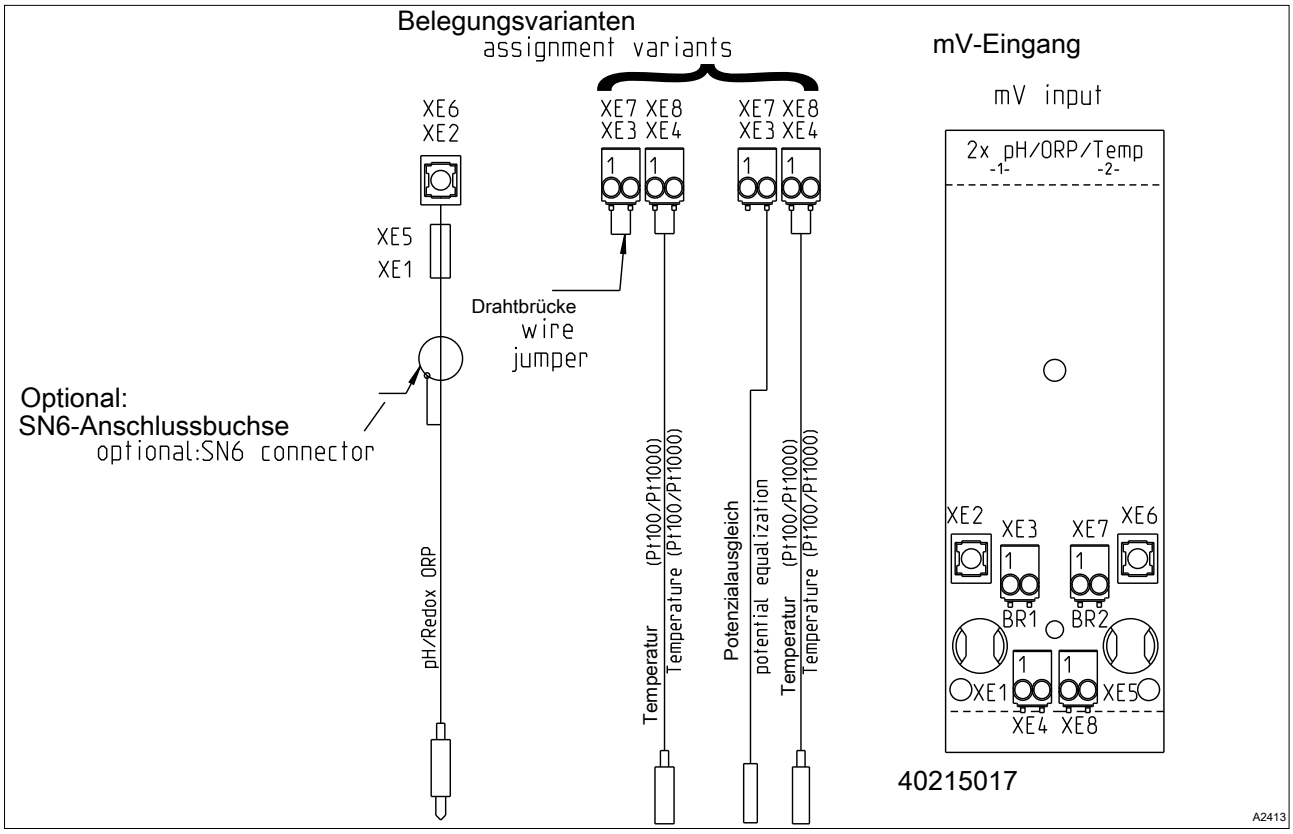


Fig. 14: Module: 2x mV inputs/temperature input. Part number 1081807

Connectible conductor:

XE3, XE4, XE7, XE8: see terminal type 4

XE2, XE6: see terminal type 5a

XE1, XE5: see terminal type 5b

A module for the direct measurement of two pH values or two ORP potentials or pH value and ORP potential via a coaxial cable.

- For the direct connection of pH and ORP sensors.
- Maximum cable length: 10 m

Tab. 4: Sensor connection cable, coaxial, for terminal XE1/XE2 and X5/X6

Designation	Part number
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 – pre-assembled.	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 – pre-assembled.	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 – pre-assembled.	1024107

6.4.7 Module: 2x conductive conductivity/temperature sensors. Part number 1081809

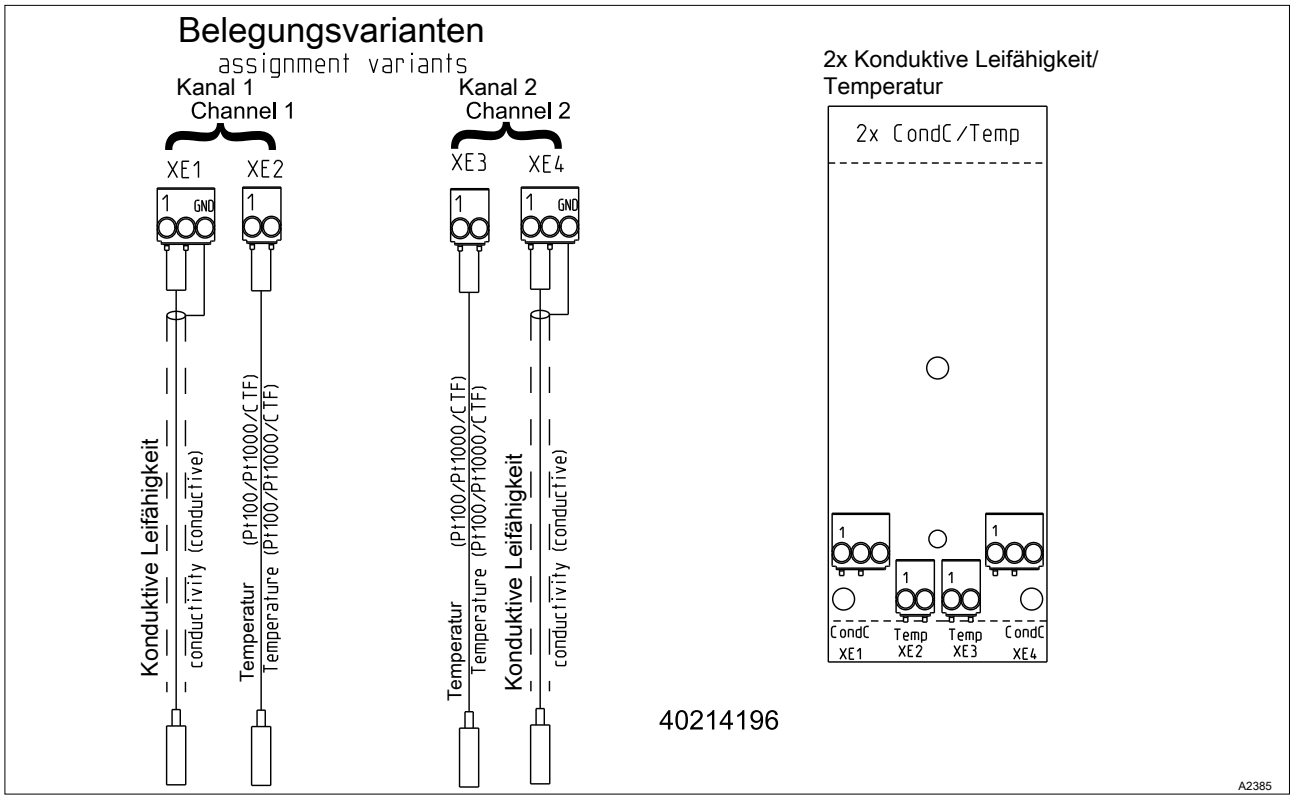


Fig. 15: Module: 2x conductive conductivity/temperature sensors. Part number 1081809

A module for the direct measurement of the electrolytic conductivity based on the conductive principle. For the direct connection of 2-electrode conductivity sensors.

Connectible conductor:

XE1, XE2, XE3, XE4: see terminal type 4

- Maximum cable length: 30 m, screened.

Electrical data

Parameter	Value
Cell constant:	0.005 1/cm ... 15 1/cm
Measuring ranges dependent on the sensor type:	
Specific conductivity:	0.001 µS/cm ... 200 mS/cm
Specific electrical resistance:	5 Ωcm ... 1000 MΩcm
TOS (total dissolved solids):	0 ... 9999 ppm (mg/l)
SAL (salinity):	0.0 ... 70.0 ‰ (g/kg)
Precision:	
Specific conductivity: 1 µS/cm ... 20 mS/cm:	better than 1% of the measured value ±1 µS/cm/±1 digit
Specific electrical resistance: 50 Ωcm ... 10 MΩcm:	better than 1% of the measured value ±1 digit
Specific electrical resistance: 10 MΩcm ... 100 MΩcm:	better than 10 MΩcm
Correction variable: temperature via Pt100/Pt1000, semiconductor temperature sensor	
Measuring range: (Pt100/Pt1000: sensor cable length up to 10 m)	-20 °C ... +180 °C
Measuring range: (Pt100/Pt1000: sensor cable length up to 50 m)	-20 °C ... +120 °C
Measuring range: (semiconductor temperature sensor)	-20 °C ... +125 °C
Precision of the temperature measurement: better than 1% of the measured value (maximum 1 °C)	

6.4.8 Module: 2x mA outputs. Part number 1092565

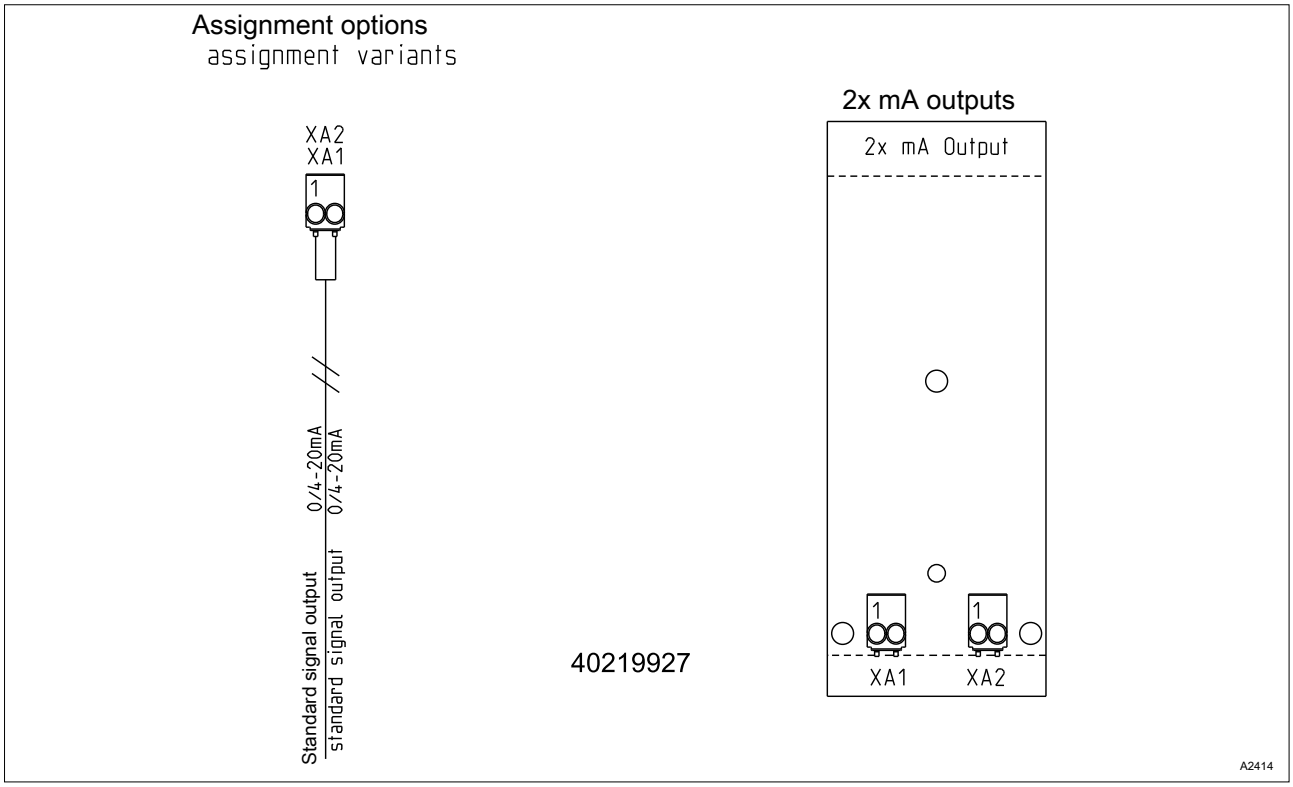


Fig. 16: Module: 2x mA outputs. Part number 1092565

A module for recording measured values, for example via a measured value recorder, control of actuators, such as a motorised ball valve.

- Maximum load: 450 Ω at 21.5 mA, (mA output current in the event of an alarm), 480 Ω at 20.5 mA.
- Driver voltage: 18 V, no load.
- Maximum cable length: 30 m, limited by the EMC specification.

6.4.9 Module: 2x serial sensors. Part number 1092566

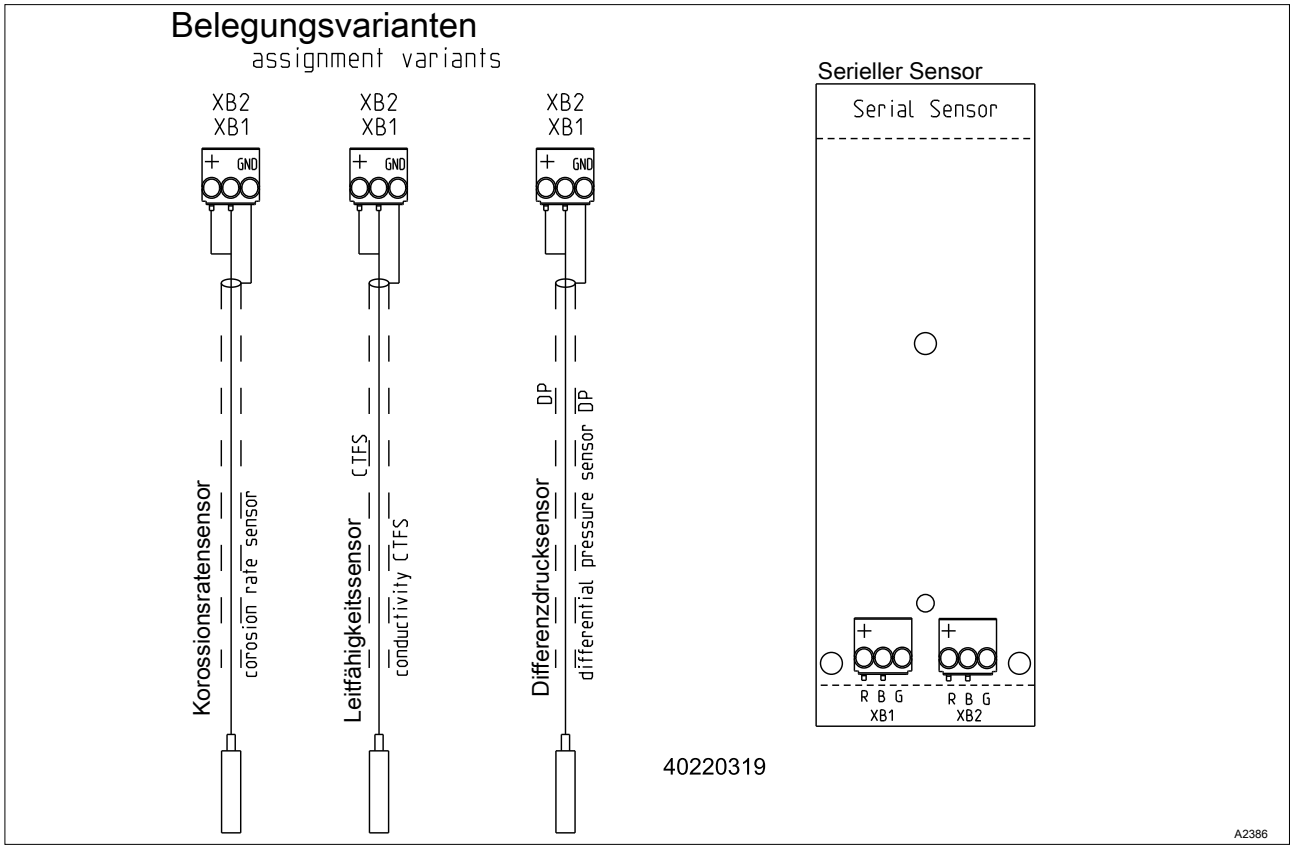


Fig. 17: Module: 2x serial sensors. Part number 1092566

A module for connecting digital sensors of type CTFS and digital corrosion sensors.

- Maximum cable length: 30 m, limited by the EMC specification.

6.4.10 Module: 2x mA inputs. Part number 734126

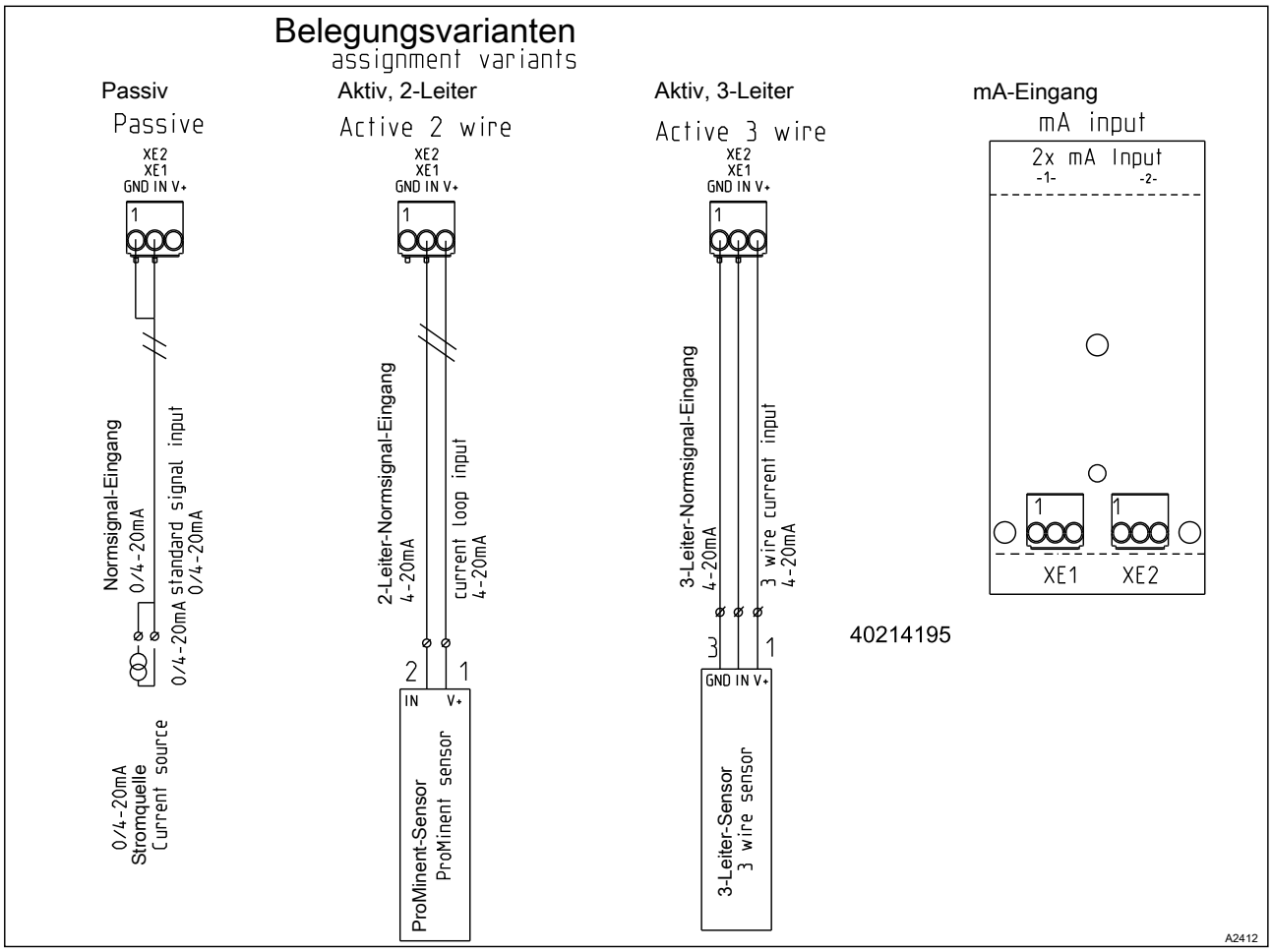


Fig. 18: Module: 2x mA inputs. Part number 734126

Connectible conductor:

XE1, XE2: see terminal type 4

A module for the measurement of sensor signals from a 2-wire sensor, e.g. for chlorine, bromine or peracetic acid (PES), and pH and ORP via the pH transmitters, pHV1, part number 809126, and ORP, RHV1, part number 809127.

- For use with ProMinent 2-wire transmitters and sensors with 2-wire mA interface.
- Processing of active mA signals (type of connector: current source).
- Driver voltage: 24 V DC.
- Max. current 50 mA.
- Input switches off at 70 mA.
- Protection against reverse polarity and overvoltage up to max. 30 V DC.
- Maximum cable length: 30 m, limited by the EMC specification.

Connect sensor 1 to terminal XE1 pin 2 and pin 3 with the control cable. Connect sensor 2 to terminal XE2 pin 2 and pin 3 with the control cable.

Control cable LiYY 2 x 0.25 mm^2, Ø 4 mm, part number 725122.

6.5 Inductive load

Contacts

[NC] – Normally Closed = idle contact

[NO] – Normally Open = working contact;

With relay R1, *[NO]* and *[NC]* both have a protective RC circuit.
With relay R2, *[NO]* has a protective RC circuit.

6.5.1 Switching of inductive loads

If you connect an inductive load, i.e. a consumer which uses a coil (e.g. an alpha motorised pump), then you must protect your controller with a protective circuit. If in doubt, consult an electrical technician for advice.

The RC member protective circuit is a simple, but nevertheless very effective, circuit. This circuit is also referred to as a snubber or Boucherot member. It is primarily used to protect switching contacts.

When switching off, the connection in series of a resistor and capacitor means that the current can be dissipated in a damped oscillation.

Also when switching on, the resistor acts as a current limiter for the capacitor charging process. The RC member protective circuit is highly suitable for AC voltage supplies.

The magnitude of the resistance R of the RC member is determined according to the following equation:

$R=U/I_L$

(Where U= Voltage across the load and I_L = current through the load)

The magnitude of the capacitor is determined using the following equation:

$C=k * I_L$

k=0,1...2 (dependent on the application).

Only use capacitors of class X2.

Units: R = Ohm; U = Volt; I_L = Ampere; C = µF

If consumers are connected which have a high starting current (e.g. plug-in, switched mains power supplies), then a means of limiting the starting current must be provided.

The switching-off process can be investigated and documented using an oscilloscope. The voltage peak at the switch contact depends on the selected RC combination.

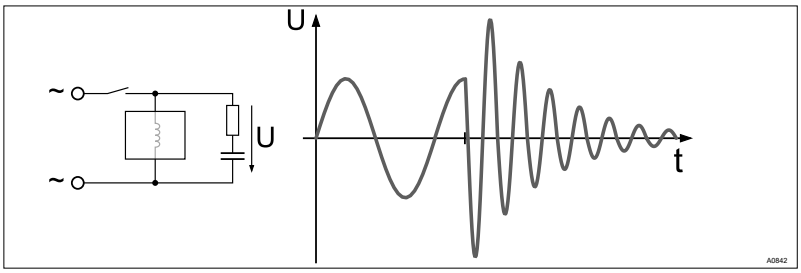


Fig. 19: Switching-off process shown on the oscillogram.

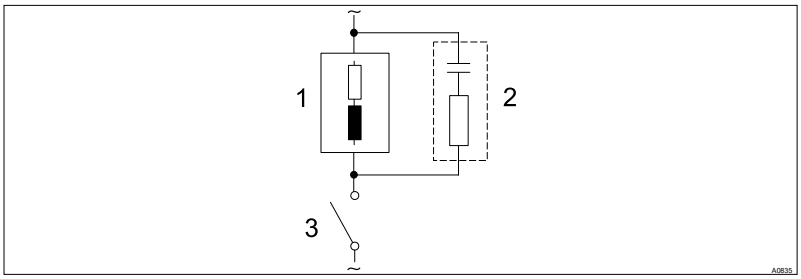


Fig. 20: RC protective circuit for the relay contacts

Typical AC current application with an inductive load:

- 1) Load (e.g. alpha motor-driven pump)
- 2) RC-protective circuit
  - Typical RC protective circuit at 230 V AC:
  - Capacitor *[0.22µF/X2]*
  - Resistance *[100 Ohm / 1 W]* (metal oxide (pulse resistant))
- 3) Relay contact (XR1, XR2, XR3)

7 Information on fieldbus products

You will find further information on our fieldbus products, including GSD files, operating instructions etc. at:
www.prominent.com/fieldbus

8 Commissioning

- **User qualification:** trained user, see *Chapter 4.4 'User qualification' on page 18*

1. Please change the default password for the unit as soon as you have switched it on.
2. Once fitted and installed, open the shut-off valves on the bypass fitting.
3. Check that the complete installation is leak-tight.
4. Remove any trapped air bubbles from the entire installation.

8.1 Switch-on behaviour during commissioning

1. The start display appears for 3 seconds during the power-on sequence.
2. This is followed by the continuous display with 6 sensor measured values and the designation of the 3 F-keys.

8.2 Configuring dosing and control processes with the browser application

The controller provides a graphical user interface (GUI) in a responsive web design. The graphical construction of this "responsive" website is based on the requirements of the respective unit that is used to view the site. This applies in particular to the layout and display of individual elements, such as navigation, page columns and wording, but also to the use of different mouse-based (clicking, hovering) or touchscreen-based (tapping, swiping) input methods. We can therefore only describe the basic procedure here. This procedure will deliver the required result regardless of the design of the interface.

Practical exercise

The following practical exercise describes how to perform the configuration with a controller connected to a measured value simulator. Values and actions are assigned to inputs and outputs. You can then also use this practical exercise in your real configuration to enter the parameters and actions required for your specific application.

8.2.1 Connecting to the browser application

You can connect to the controller using any Wi-Fi-capable terminal device, such as a PC, tablet etc.

1. To do so, simply search for the controller in the Wi-Fi settings of your Wi-Fi-capable terminal device, and connect to your Wi-Fi-capable terminal device.

> ***Proxy server***
> *Make sure that any proxy server is switched off. You will find information on this in the instructions for the browser you are using.*

2. Then open the browser on your terminal device and enter the IP address *192.168.1.1*.
   ⇨ A connection is established to the user interface of the controller.
3. Now enter your username and password.
   ⇨ You can now use all the functions enabled for you as a user.

8.2.2 Use the browser application to log in to the controller

Logging in

1. Click on *'Username'* and select *'ADMIN'*.
2. Enter *[AAAA]* as the *'Password'*.
3. Click on *'Login'*.
   ⇨ *'Logout (admin)'* appears.
   You can now start the configuration.

8.2.3 Working with the controller

Practical exercise: first, configure a simulated conductivity sensor at the input *[E]*

1. Click on *'E'*
2. Click on *'Diagnostic'* and select *'Setup'*.
3. Use your keypad to enter the name “Cooling Tower Conductivity” in the *'Descriptor'* field, and then click *'Submit'*.
   ⇨ The data will be transmitted to the controller.
4. Click on *'Sensor type'* and select *'Toroidal Cond.'* and then click on *'Submit'*.
   ⇨ A measuring range and the unit are automatically selected.
5. Close the browser window.

Practical exercise: assign a blowdown valve (motor-driven ball valve) to the simulated conductivity sensor at the input *[E]*

The input designated *'E'* is an mA input; the measured value is simulated with the simulator.

1. Click on *'Relay Outputs 1'*.
2. Click on *'Diagnostic'* and select *'Setup'*.
3. Click on *'Events Other'* and select *'Blowdown'* and then click on *'Submit'*.
4. Click on *'Set Blowdown Mode'* in the selection field and select *'Sensor Control'* and then click on *'Submit'*.

5. Click on *'Control by'* in the selection field and select *'E: Cooling Tower Conductivity'* and then click on *'Submit'*.

Practical exercise: assigning setpoints to the blowdown valve (motor-driven ball valve)

1. Click on *'Setup'* in the same open browser window.
2. Select *'Adjust Setpoint'*, *'ON 2000 µS'* and *'OFF 1500 µS'*, and then click on *'Submit'*.

   ⇨ Blowdown starts at 2000 µS and stops at 1500 µS.
3. Click on *'Adjust Setpoint'* and select *'Configure'*.
4. Use your keypad to enter the name “Blowdown valve” in the *'Descriptor'* field, and then click *'Submit'*.

   ⇨ *'Control Action' 'On decreases sensor'* means: the measured value decreases when the relay is active and the valve is open.
5. You can use *'Interlock '*to define which digital input is to lock blowdown, e.g. the *'Flowswitch'* (circulation monitoring). You can define up to 4 control inputs.
6. Use *'Blocked by'* to select up to 4 relays, which can block blowdown when the relays are active.
7. Close the browser window.
8. Now simulate the measured value. The blowdown valve opens, LED 1 *[Output R1]* lights up, and the relay clicks at > 2000 µS. The LED goes out again at < 1500 µS.

Practical exercise: setting a biocide timer

The frequency relay P6 is to be used to control a biocide pump.

1. Click on 6 under *'Pulse Outputs'*.
2. Click on *'Diagnostic'* and select *'Configure'*.
3. Use your keypad to enter the name “Biocide 1” in the *'Descriptor'* field, and then click on *'Submit'*.

   ⇨ The data will be transmitted to the controller.
4. In the same menu, click on Special Control and select *'Prebleed'* (forced blowdown) and *'Lockout'* (blowdown lock).
5. Enter 30 minutes under *'Prebleed'* (forced blowdown) and 120 minutes under *'Lockout'* (blowdown lock), and then click on *'Submit'*.
6. Select *'Pump Type ProMinent 0705'*, and then click on *'Submit'*.
7. Click on *'Configure'* and select *'Events'*.
8. Select *'Event Cycle'* = *'Weekly'*.
9. Select *'Select Activity '* = *'Add an Event'* = Assign an action.
10. Enter the following values: Enter *'Start Day'*. Day 1 is Sunday e.g. 5 of 1-7, the *'Start Time'* is 16:00, and the *'Volume'* is 500 ml.

    ⇨ 500 ml of biocide will be dosed every Thursday at 16:00.

    Additional days can be added using *'Add an Event '*or modified using *'Edit an Event'*.
11. *'Delete an Event'* deletes the selected action, and *'Delete all Events'* deletes all actions.
12. Selecting *'Interlock'* and *'Block'* lets you lock biocide dosing.

13. Close the browser window.

9 Input configuration

- **User qualification:** trained user *Chapter 4.4 'User qualification' on page 18*

The following operations are described in this section

- Editing the program.
- Calibrating the sensors.
- Finding information.

NOTICE!
Use a mobile, Wi-Fi-capable end device for configuration.

Configuration must be done by the customer. Configuration can include the control of relays for pumps and solenoid switches. Some inputs require further set-up. Analogue flow or level inputs are not factory-set up. Set-up can be done on site if the range of the analogue input is known, referring to the "Calibration" section.

1. Check whether all electrical connections have been established.
2. Check whether the supply voltage matches the controller, referring to the nameplate.
3. Note the run-in period of the sensors, referring to the operating instructions for the sensors.

The availability of sensors in the menus depends on the driver cards installed. All sensors possible for the individual driver cards are available at start-up. A sensor must be activated after the driver card and sensor(s) have been installed, and the controller has been restarted.

9.1 Analogue and digital inputs

9.1.1 Activating an analogue and digital input

This includes all analogue and digital outputs with the exception of the CTFS sensor input.

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[SYSTEM]* and press *[OK]*.
   ⇨ The display changes to the *[SYSTEM]* menu.
3. Use ⇑ or ⇓ to select *[ENABLE I/O]* and press *[OK]*.
   ⇨ The disabled inputs now appear on the display.
4. Use ⇑ or ⇓ to select the required input and press *[ENABLE]* F3.
   ⇨ The required input is enabled and the display returns to the *[SYSTEM]* menu.
5. Repeat the process for every input you require.
   ⇨ Then press *[ESC]* to exit the *[SYSTEM]* menu.

If you are enabling a serial conductivity sensor (CTFS), then input letters must be assigned to the temperature and flow switch at this time. The letters are factory-assigned if a CTFS sensor is ordered. To enable a second CTFS sensor, see ↳ *Chapter 9.1.2 'Enabling a CTFS sensor' on page 46*

9.1.2 Enabling a CTFS sensor

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[SYSTEM]* and press *[OK]*.
   ⇨ The display changes to the *[SYSTEM]* menu.
3. Use ⇑ or ⇓ to select *[ENABLE I/O]* and press *[OK]*.
   ⇨ The disabled inputs now appear on the display.
4. Use ⇓ to select the CTFS sensor you wish to enable and press *[ENABLE]* F3.
   ⇨ Note the letter assigned to the CTFS sensor.
5. Press *[OK]* from the line *[Enable I/O]*.
6. Use ⇓ to select an unused analogue input (A ... N) and press *[F3]*.
   ⇨ The analogue input is enabled.
7. Use ⇑ to select the temperature assignment for the new CTFS sensor, see ↳ *Procedure instructions on page 46* and press *[F3]*.
8. From the ENABLE I/O input, use ⇓ to select an unused digital input (O ... Z) and press *[F3]*.
9. Use ⇑ to select the contact set for the new CTFS sensor, see ↳ *Procedure instructions on page 46*, and press *[F3]*.
   ⇨ Then press *[ESC]* to exit the *[SYSTEM]* menu.

9.2 Naming an input or output

You need to assign the sensor a unique name once you have enabled an input or output for a sensor. We recommend using an abbreviation of the specific application e.g. pH Tower 2.

The procedure is the same for all I/O points (inputs/outputs/digital/analogue).

1. Press *[MENU]*.
2. Use ⇓ to select the *[I/O Setup]* menu point, and press *[OK]*.
3. Use ⇓ to select the relay you wish to name (e.g. *[1:Relay1]*) and press *[OK]* to name the relay. You can only name the relays that are enabled.
4. Use ⇓ to select the *[Descriptor]*, and press *[OK]* to name the relay.
   ⇨ Note that F2 stands for the word ALPHA.

   You have 3 selection options for the writing style, which can be selected using F2:

   - ALPHA (upper case letters)
   - alpha (lower case letters)
   - DIGITS (0)

5. Use ⇑ or ⇓ to change the first letter.
6. Use ⇒ to move to the next letter and then use ⇑ or ⇓ to change the letter.
   ⇨ Repeat this as often as you need to until you have written the name of the relay.
7. Press *[OK]*.
   ⇨ The change is saved.

9.3 Selecting an analogue sensor type

ProMinent amperometric sensors are compatible with the controller via the 4 ... 20 mA input driver. Once the sensor type has been selected, the controller scales the input, sets the calibration limits for the selected sensor type, and determines the measured sensor values so that an open measuring circuit does not measure negative values. If your 4 ... 20 mA unit does not appear in the list, then you can enter the data manually under *[other]*.

Selecting the sensor type:

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[SYSTEM]* and press *[OK]*.
   ⇨ The display changes to the *[SYSTEM]* menu.
3. Use ⇓ to select the required 4 ... 20 mA input to which the sensor is connected, and press *[F3 Select]*.
4. Use ⇓ to select the required sensor type and press *[OK]*.
5. Press *[F1]* to select the sensor range.
6. Use ⇑ or ⇓ to change the range if required.
7. Press *[F2 Select]* to save.
8. Press *[ESC]* to exit the menu.

9.4 Calibrating the analogue sensors

9.4.1 Remarks about calibration

ORP sensors measure more than just chlorine

Only calibrate an ORP sensor in a quality buffer solution. Do not use any undefined residual oxidising agent. Check whether the output signal of the ORP sensor still changes when the ORP sensor is immersed in a buffer solution. Replace the sensor if this is not the case.

Temperature compensation: conductivity sensors, with the exception of boiler water conductivity sensors, need to be temperature compensated. Conductivity temperature compensation in the controller can either be done with an integrated temperature sensor or a temperature sensor located outside the conductivity sensor.
Note: if the temperature display deviates by more than 3 C° (°F), your sensor may be faulty or there may be a wiring problem. Check the temperature sensor in an ice bath after every temperature calibration process. If calibration was unsuccessful (more than ± 50 mV offset), then *[Sensor fault Overrange]* appears.

Correct sensor operation/run-in period:

- Accurate measurement and dosing is only possible when the sensor is working correctly.
- Read the operating instructions for the sensor.
- Read the operating instructions for the fittings and other components used.
- You need to adhere to the run-in periods for the sensors
- Take into account the run-in periods when planning commissioning.
- The run-in period for a new sensor can take 24 hours.

Calibrating with pH compensation:

- First calibrate the pH sensor, and only then the pH-compensated sensor, *[e.g.]* a sensor for free chlorine. Otherwise, the calibration results will be incorrect.

9.5 General sensor calibration

You can calibrate all analogue sensors using the 1-point or 2-point method. You can also reset the sensor input to the factory setting.

Select the 1-point or 2-point process in the calibration menu.

1. Press *[CAL]*.
2. Use ⇑ or ⇓ to select the required sensor type and press *[OK]*.
   ⇨ Note the underscore under the actual value. The underscore is the cursor. Use ⇑ or ⇓ to adjust this position. Use the arrow keys ⇦ and ⇨ to move the cursor to a different position.
3. Select the 1-point or 2-point process in the calibration menu. You can select the procedure in the display that follows step 2. From this menu, you can either use *[F3 More]* to switch to the other procedure or use *[F Reset]* to restore the factory setting.

1-point process:

4. Edit the value and press *[F1 SAVE]*.
5. Select *[F1]* again to calibrate another sensor, or press *[ESC]* to exit the menu.

2-point process:

6. Immerse the sensor in a sample of water with a known value or in a pH buffer of 7.00.
7. Adjust the display value until the display value corresponds to the value of the water sample or the pH buffer.
8. Press *[F1 NEXT]* to continue with the second point.
9. Immerse the sensor in a sample of water with a known value or in a pH buffer of 10.00.
10. Adjust the display value until the display value corresponds to the value of the water sample or the pH buffer.
11. Press:
    - *[F1 SAVE]* to save and end,
    - or *[F3 CANCEL]* to cancel the process,
    - or *[ESC]* to cancel the process.

    ⇨ The controller accepts the value and displays *[Sensor Calibrated]* or the controller displays an error message because the value deviates too far from the specified value.

12. Press *[F1 RECAL]* to recalibrate the sensor, or press *[F2 IGNORE]* to ignore the fault.

    ⇨ The actual calibration value is retained with *[F2 IGNORE]*. This is not recommended. The controller then performs mathematical conversions so that your input corresponds to the display. Tracking changes is limited or impossible.

13. Press *[F3 RESET]* to cancel the calibration and return to the calibration value previously saved.

9.6 Calibrating an amperometric sensor

1. Press *[CAL]*.
2. Use ⇑ or ⇓ to select the required sensor type and press *[OK]*.

    ⇨ Note the underscore under the actual value. The underscore is the cursor. Use ⇑ or ⇓ to adjust this position. Use the arrow keys ⇦ and ⇨ to move the cursor to a different position.

3. Take a sample of water from the bypass fitting and perform a DPD test. Press *[F1 DPD]*to start the clock.
4. When the clock reaches the limit value for your test, read off the value and use the arrow keys to enter the value.
5. Press *[F1 SAVE]* to save the value.

    ⇨ The controller accepts the value and displays *[Sensor Calibrated]* or the controller displays an error message because the value deviates too far from the specified value.

6. Use *[MORE]* to reset the input to the factory setting if required.
7. Press *[F1 RECAL]* to recalibrate the sensor, or press *[F2 IGNORE]* to ignore the fault.

    ⇨ The actual calibration value is retained with *[F2 IGNORE]*. This is not recommended. The controller then performs mathematical conversions so that your input corresponds to the display. Tracking changes is limited or impossible.

8. Press *[F3 RESET]* to cancel the calibration and return to the calibration value previously saved.

9.7 Calibrating the flow monitoring function of the CTFS sensor

CTFS sensor

The ProMinent CTFS sensor (short for Conductivity / Temperature / Flow switch / Serial sensor) is used with the AEGIS II and SlimFlex5 controllers.



Fig. 21: CTFS sensor

The CTFS sensor features a calibration option for the conductivity and temperature inputs. The response threshold of the flow switch can be adjusted.

CAUTION!

The flow switch does not recognise a "no-flow" situation due to manufacturing tolerances

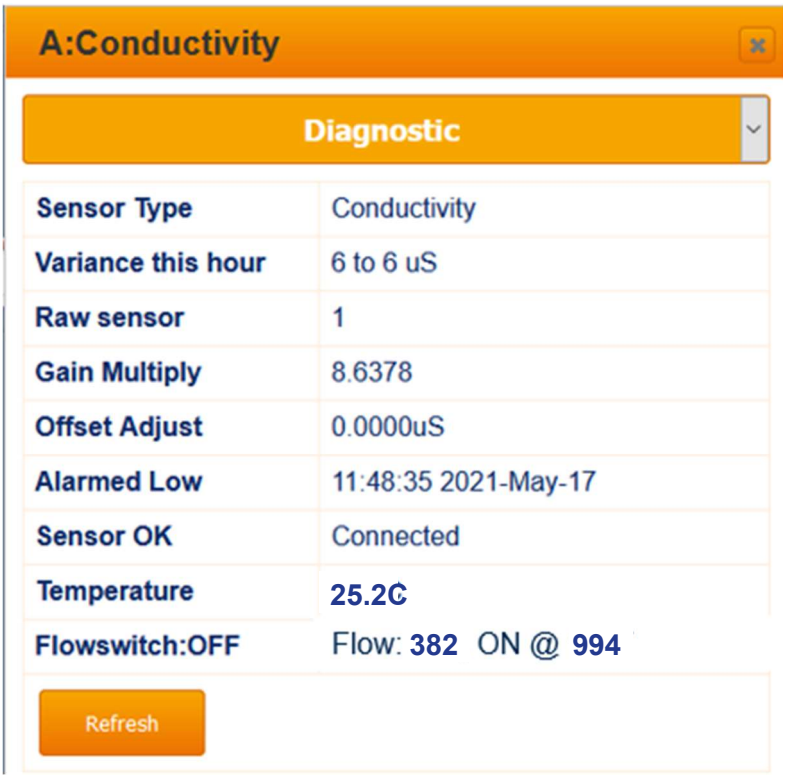
Incorrect measurements with incorrect metering are possible

– Adjust the upper and lower switching thresholds of the CTFS flow switch.
– Do not use the CTFS flow switch as an interlock for outputs during calibration.
  If the CTFS flow switch is used for outputs, the menu items required for calibration are not visible.

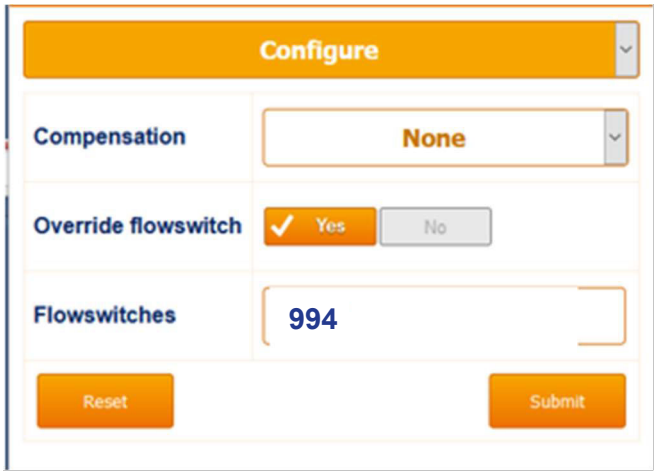
The sensor must be recalibrated if your flow switch does not change its status with the measured water flow / and no flow. Proceed as follows:

1. Establish a connection between the controller and the Wi-Fi of a mobile device.
2. Ensure that the CTFS sensor is not used as an interlock during the calibration process.
3. Open the conductivity menu for the sensor with the flow switch you wish to set up. (Typically input A)

   In the following example, the water temperature is 25.2 °C, the flow is *'ON'*, the current *'flow'* is 994 and the setpoint is 382.



4. If the CTFS sensor is used as an interlock, the following menu is hidden. Release any interlocks that have been set.
5. Switch to the *'ON/OFF'* range.
6. Switch off the sample water and read off the new FLOW value, referring to the example below.
7. Press the *'Refresh'* button repeatedly to display the current value.
8. Switch on the calibration menu for the flow switch. Use the configuration page for this.
9. Select *'Yes'* for *'Override flow switch'* and press *'Submit'*.



10. Alter the setpoint so that it is halfway between the values for *'ON'* and *'OFF'*.
11. Press *'Save / Submit'* to save the change.

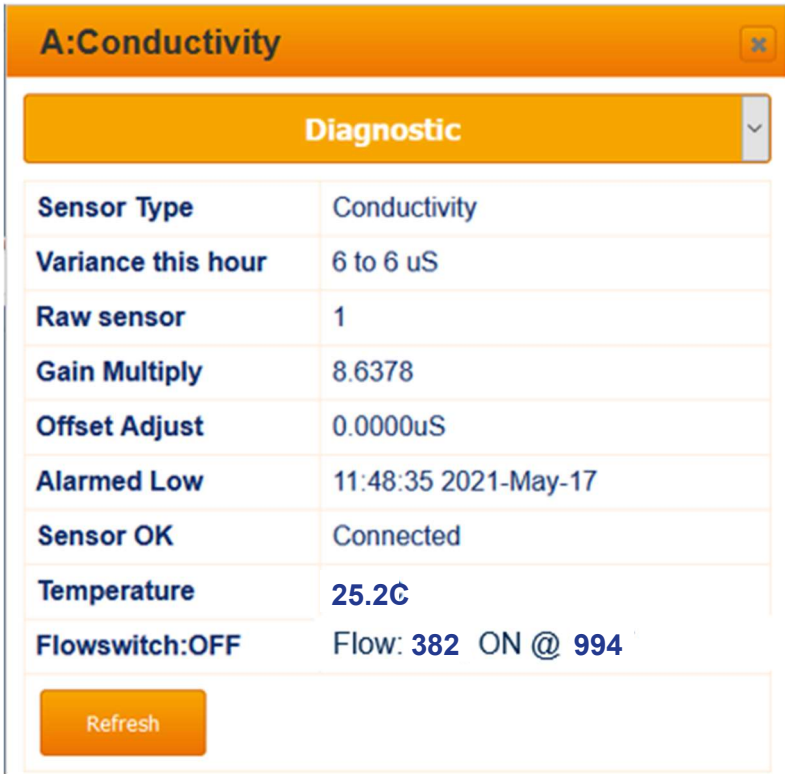
Example:

1. If the new flow rate value is 994 and the water is switched off, the On/Off range is 612 (994-382= 612).

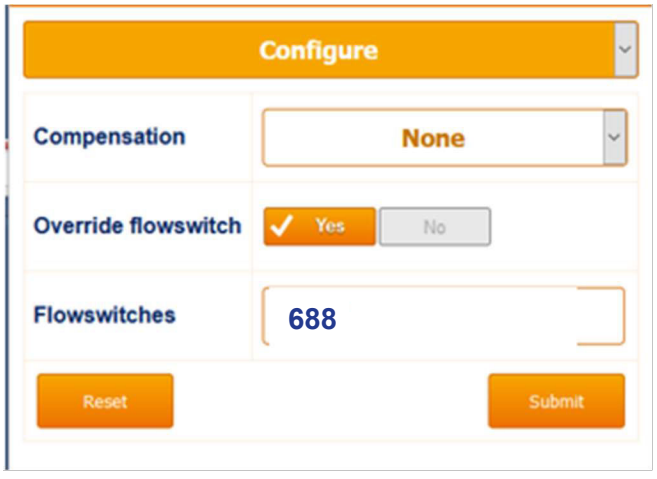
   ProMinent recommends keeping the setpoint close to the centre of this range.

2. Find the centre of the range: 612 / 2 = 306.
3. Add the value 306 to the switching-off point:
   306 + 382 = 688.

   ⇨ The setpoint must be close to this value.



4. Enter the determined value.
5. Press *'Save / Submit'* to apply the value.



6. Test again whether the flow switch responds correctly.
7. Restore the previously released interlocks.

9.8 Analogue sensor alarm

Inputs have upper and lower alarm limit values to alert the operator when a measured value is outside the normal operating range. All alarms in the controller are interlocking alarms. Interlocking alarms do not reset themselves when the parameter in question returns to the acceptable range. The operator must acknowledge the alarm to revert the alarm light and relay to OFF mode. Interlocking alarms are particularly useful in remote installations where the operator never or rarely sees the system.

The controller features an option to delay an alarm before the operator is warned. This feature is useful in applications where trapped air or other conditions occasionally cause sensor measured values to peak even though this process is during normal operation. Without the delay, the controller would often trigger false alarms, which would have to be acknowledged by the operator. This option is in the order of minutes and can be set from the *[Alarms]* menu.

The alarm settings for all inputs and outputs work in the same way. There are 3 kinds of settings for the alarms on each I/O.

- *[Adjust Alarms]* changes the upper and lower alarm limit values.
- *[Delay on Alarm]* is used to set the delay time that the controller waits before activating an alarm and then interlocking.
- *[Clear Alarms]* clears all alarms. Perform the following steps to change the alarm limit value settings for an alarm.

9.8.1 Analogue alarm configuration

Note the underscore of the upper alarm limit value. It is essentially the cursor.

1. Press *[MENU]*.
2. Use ⇓ to select the required sensor type and press *[OK]*.
3. Scroll down and use ⇓ to select *[Adjust Alarms]* and press *[OK]*.
4. Scroll down and use ⇓ to select your sensor and press *[OK]*.
   ⇨ You now have three selection options:
   - Edit the upper and lower alarm limit values,
   - Switch off the alarm,
   - Set a delay time

The controller emits an alarm when the sensor has been in an alarm status for the number of minutes that you have selected as the delay time.

Set the upper and lower limit values:

1. Use the arrow keys to set the upper alarm limit value as required.
2. Press *[F1]*.
   ⇨ The controller moves to the lower alarm limit value.
3. Use the arrow keys to set the lower alarm limit value as required.
4. Press *[OK]* to save the setting or press *[F2]* to switch off the alarm.

If you wish to change the delay:

1. Press *[F3]*.
2. Use the arrow keys to set the delay time as required.
3. Press *[F1]*.
   ⇨ The controller saves the changes.

9.9 Analogue sensor diagnostics

1. Press *[F1]* to access the diagnostic function for any I/O channel from the main display.
2. Scroll to any I/O channel.
3. Then press *[F3]* to show this parameter.

A CTFS sensor displays the current temperature of the sample water and indicates whether or not there is a flow. This display also shows a voltage, which corresponds to the flow rate. It displays the point up to which flow is interpreted as being present.

A corrosion rate sensor has an entry for pitting and a metallurgy list.

Driver cards have a list of items required for factory tracking.

1. Press *[MENU]*.
2. Scroll up to *[I/O-Status]* and press *[OK]*.
3. Use ⇑ or ⇓ to select the required I/O point and press *[OK]*.
4. Press *[F3 MORE]* to call up initial diagnostic information for this sensor.
5. Press ⇓ to call up further diagnostic information.
   ⇨ List of typical sensor diagnostic information:
   - Sensor type
   - Sensor input value
   - Gain factor
   - Offset adjustment
   - Last alarm
   - Current status

9.9.1 pH-ORP driver card diagnostic functions

1. Press F1 to access diagnostic information
2. Use ⇑ or ⇓ to navigate to the required analogue conductivity input and press *[OK]*.
3. Diagnostic 1: Sensor type – pH sensor.
4. Diagnostic 3: The gain changes depending on the sensor calibration.
5. Diagnostic 4: The offset changes depending on the sensor calibration.
6. Diagnostic 5: Reporting of all kinds of alarms
7. Diagnostic 6: Type of driver: dual pH or ORP
8. Diagnostic 7: For internal factory purposes

9. Diagnostic 8: For internal factory purposes (type of driver and product code)
10. Diagnostic 9: Driver card serial number
11. Diagnostic 10: For internal factory purposes
12. Diagnostic 11: Firmware version of the driver card, for instance “01.00.00.02”

9.9.2 CT driver card diagnostic (conductivity, boiler conditions, condensate and temperature)

1. Press F1 to access diagnostic information
2. Use ⇑ or ⇓ to navigate to the required analogue conductivity input and press *[OK]*.
3. Diagnostic 1: Type of sensor (conductivity, boiler conditions, condensate).
4. Diagnostic 2: Raw sensor value.
5. Diagnostic 3: The gain changes depending on the sensor calibration value = Raw * Gain + Offset, for example 999 * 0.16 + 0 = 1599 µS.
6. Diagnostic 4: The offset changes depending on the sensor calibration.
7. Diagnostic 5: Reporting of all kinds of alarms.
8. Diagnostic 6: Driver type, dual conductivity.
9. Diagnostic 7: For internal factory purposes.
10. Diagnostic 8: For internal factory purposes (type of driver and product code).
11. Diagnostic 9: Driver card serial number.
12. Diagnostic 10: For internal factory purposes.
13. Diagnostic 11: Firmware version of the driver card, for instance “01.00.00.02”.
14. Diagnostic 19: Temperature input value, for example 75 °F.

9.9.3 Diagnostic functions on the 4 ... 20 mA input driver card

1. Press F1 to access diagnostic information
2. Use ⇑ or ⇓ to navigate to the required 4 ... 20 mA input I/O channel and press *[F3]*.
3. Diagnostic 1: Sensor type (CLE3=chlorine, CBR=bromine, CGE=oxidising agent, CLO=chlorine, CTE=chlorine, fluorescence, PAA=peracetic acid, pH sensor, ORP sensor, temperature, toroidal conductivity sensor)
4. Diagnostic 2: Diagnostic 2: Sensor raw value, 11.99 mA= 66.6%, use amperometric sensors 4 ... 16 mA for the Min. and Max. range.
5. Diagnostic 3: The gain changes depending on the sensor calibration value = Raw * Gain + Offset, for example 11.99 mA * 0.833 + (-3.333) = 6.655 ppm
6. Diagnostic 4: The offset changes depending on the sensor calibration.
7. Diagnostic 5: Reporting of all kinds of alarms.

8. Diagnostic 6: Driver type, for instance dual 4 ... 20 mA input.
9. Diagnostic 7: For internal factory purposes.
10. Diagnostic 8: For internal factory purposes (type of driver and product code).
11. Diagnostic 9: Driver card serial number.
12. Diagnostic 10: For internal factory purposes.
13. Diagnostic 11: Firmware version of the driver card, for instance “01.00.00.02”.
14. Diagnostic 14: Sensor range, for example 0 ... 10 ppm.

9.9.4 Diagnostic functions on the 4 ... 20 mA output driver card

1. Press F1 to access diagnostic information.
2. Use ⇑ or ⇓ to navigate to the required 4 ... 20 mA output I/O channel and press *[F3]*.
3. Diagnostic 1: Sensor type 4 ... 20 mA output.
4. Diagnostic 3: The gain changes depending on the sensor’s calibration value.
5. Diagnostic 4: The offset changes depending on the sensor calibration.
6. Diagnostic 5: Reporting of all kinds of alarms.
7. Diagnostic 6: Driver type, for instance dual 4 ... 20 mA output.
8. Diagnostic 7: For internal factory purposes.
9. Diagnostic 8: For internal factory purposes (type of driver and product code).
10. Diagnostic 9: Driver card serial number.
11. Diagnostic 10: For internal factory purposes.
12. Diagnostic 11: Firmware version of the driver card, for instance “01.00.00.02”.

9.9.5 Diagnostic functions for driver cards for serial sensors (CTF, LPR, DP).

1. Press F1 to access diagnostic information.
2. Use ⇑ or ⇓ to navigate to the required 4 ... 20 mA output I/O channel and press *[F3]*.
3. Diagnostic 1: Sensor type 4 ... 20 mA output.
4. Diagnostic 2: Sensor raw value.
5. Diagnostic 3: The gain changes depending on the sensor’s calibration value.
6. Diagnostic 4: Offset.
7. Diagnostic 5: Reporting of all kinds of alarms.
8. Diagnostic 12: If a sensor is connected, *[Sensor OK Connected]* is displayed; if no sensor is connected, *[Sensor disabled Disconnected]* is displayed.
9. Diagnostic 13: The phantom input temperature value is displayed, as is the status of the thermal flow switch (ON/OFF).

In this example, the flow value should be higher than 960 so that flow “ON” is displayed.

Note: Sensor value = Raw * Gain + Offset.

Example: 235 * 8.5 + 0 = 1998 µS, approx. 2000 µS.

9.10 Configuring digital inputs

9.10.1 Configuring digital inputs as water meters

All digital inputs from O ... V can be configured as water meters.

You may wish to rename the relays, for instance to “Post-flow”.

1. Press *[OK]* to enable and set a digital input.
2. Scroll to *[System]* and press *[OK]*.
3. Scroll to *[Enable I/O]* and press *[OK]*.
4. Scroll to the input you require (O ... V) and press *[F3]*.
5. If necessary: press *[F3]* once again to switch *[METER]* to *[CONTACT]*.
6. Press *[OK]*.
7. Press *[MENU]*.
8. Scroll to the dosing unit you require and press *[OK]*.
9. If necessary: use *[F3]* to switch between *[Vol/Contact]*, and then use ⇑ or ⇓ to set the litres per contact signal or adjust the K-factor.
10. Press *[F1]* to save the settings.

9.10.2 Linking a water meter to the relay (applies to all relays)

Relays must be configured for the dosing mode.

Frequency relays set to ON/OFF mode are configured in the same way as relays 1 ... 5.

1. Press *[MENU]*.
2. Scroll to *[SET FEED MODE]* and press *[OK]*.
3. Scroll to the relay you require and press *[OK]*.
4. Select *[WATER METER]* as the *[FEED MODE TYPE]* required and press *[OK]*.
5. Scroll to the dosing unit you require and press *[F1]* to select.
6. Press *[OK]*.
7. Press *[F1 (OTHER)]* to move to the value for the dosing volume.
8. Set the relay ON time in seconds or set the ppm setpoint.
9. Press *[OK]* to save the settings.

9.11 Disabling an analogue or digital input

Inputs linked to outputs cannot be disabled.

1. Press *[MENU]*.
2. Scroll to *[I/O SETUP]* and press *[OK]*.

3. Scroll to find the corresponding analogue or digital input and press *[OK]*.
4. Scroll to *[CONFIGURE]* and press *[OK]*.
5. If the sensor is used by a relay, scroll to *[USED BY I/O]* to see which relay is using the sensor. Press *[ESC]*.

   ⇨ Use the following sections to disconnect an output, and then return to this menu to delete the input

9.11.1 Changing or disconnecting an analogue input linked to an output relay

The inputs linked to outputs must be disconnected from the outputs before the inputs can be disabled.

1. Press *[MENU]*.
2. Scroll to *[SET FEED MODE]* if a pump is controlled, or to *[SET BLOWDOWN MODE]* if the relay is used for blowdown, and press *[OK]*.
3. Scroll to the relay shown as *[IN USE]* and press *[OK]*.
4. Switch the relay to another control program type and press *[OK]*.

   Continue with step 6 or press *[OK]* for *[SENSOR CONTROL]*.
5. Scroll to the new sensor and press *[OK]*.
6. Press *[F1 Select]* to save.
7. Press *[ESC]* to exit the menu.

9.11.2 Changing or disconnecting an analogue input linked to a 4 ... 20 mA output

Relay outputs are numbered from 1 to 9. 4 ... 20 mA can be identified by the letters C, D, E, F, I, or J. This process can be used to change the input that the mA output represents, or you can select *[NONE]*.

Inputs linked to outputs must be disconnected from the outputs before the inputs can be disabled.

1. Press *[MENU]*.
2. Scroll to *[I/O SETUP]* and press *[OK]*.
3. Scroll to the letter of the output and press *[F2 NEXT]*.
4. Use ⇑ or ⇓ to select another input or select *[NONE]* and press *[OK]*.
5. Press *[ESC]* to exit the menu.

9.11.3 Changing or disconnecting a digital input linked to a digital output

If a digital input is used as an interlock for a relay, then the digital input must be disconnected before the digital input is disabled.

1. Press *[MENU]*.
2. Scroll to *[I/O SETUP]* and press *[OK]*.
3. Scroll to the relay or 4 ... 20 mA output for which the interlock is used and press *[OK]*.
4. Scroll to *[INTERLOCK]* and press *[OK]*.

5. Press *[F1 REMOVE]*.
   ⇨ The digital input is now disconnected from the output.
6. ■ Select a new interlock,
   ■ or press *[OK]* to save the change,
   ■ or press *[ESC]* to cancel the changes.
   ⇨ Repeat the entire procedure for every digital input you wish to disconnect, if need be.

9.11.4 Changing or disconnecting a digital input linked to a 4 ... 20 mA output

If a digital input is used as an interlock for a relay, then the digital input must be disconnected before the digital input is disabled.

1. Press *[MENU]*.
2. Scroll to *[I/O SETUP]* and press *[OK]*.
3. Scroll to the 4 ... 20 mA output for which the interlock is used and press *[OK]*.
4. Press *[F2 NEXT]* twice to go to the interlocks.
5. Press *[F1 REMOVE]*.
   ⇨ The digital input is now disconnected from the output.
6. ■ Select a new interlock,
   ■ or press *[OK]* to save the change,
   ■ or press *[ESC]* to cancel the changes.
   ⇨ Repeat the entire procedure for every digital input you wish to disconnect, if need be.

9.12 Phantom inputs

Phantom inputs are inputs that do not have connecting terminals.

The controller has a maximum of 10 analogue inputs A to J. Analogue inputs are linked to the first 14 letters of the alphabet A to N. The 4 letters K to N cannot be assigned to a wired input. K to N have no terminals. These are phantom inputs or virtual analogue inputs. Digital inputs are labelled O to Z. Wired inputs are identified using the letters O to V. The input identifiers W, X, Y, and Z can be used as phantom digital inputs.

In some cases, it is advantageous to create a phantom sensor to duplicate an existing hardware sensor. Another application option is to define a virtual phantom input to display and record the data of a temperature sensor or flow switch that is an integral part of another sensor. We will use the popular CTF sensor as an example to show how this works. Any analogue input, including a phantom input, can be used as a manual input to record operator test data. When you test the water, you can record the value on this controller. This value is given a timestamp and, together with all sensors, phantom inputs and relays, is part of the entire historical database. Analogue phantom inputs can be configured for use in control outputs in the same way as any sensor input.

10 Configuration of the control outputs (relays and 4 ... 20 mA)

- **User qualification:** trained user *Chapter 4.4 'User qualification' on page 18*

This section describes how relays are configured to control a process and 4 ... 20 mA outputs are configured to control or as the display for an analogue input sensor.

Outputs can be based on:

- A sensor with ON/OFF setpoints,
- A timed event,
- A combination of an event and a sensor,
- A basic feed,
- A percentage timer,
- A *[bleed-and-then-feed]* process
- and other options.

They can include:

- An interlock with digital inputs,
- Blocks of other relays,
- Certain special control functions

Special control functions can include:

- Boiler water sampling routines,
- Variable cycles,
- Timed cycle operation,
- Timed modulation,
- PID control.

The article number and identification code in the order to ProMinent define the sensors and outputs that have been factory-configured as standard. Some sensors can be pre-wired, e.g. pH and ORP coaxial cables, some conductivity and temperature sensors, and ppm residual value sensors. Other sensors, such as water meters and chemical dosing units, may have been configured, but need to be installed, wired, enabled, and possibly reconfigured during commissioning on site.

3 types of relay are available when enabling them:

- *[Blowdown]*,
- *[Events Other]*
- *[Feed]* (metering).

Once a relay has been enabled, the only way to change its assignment is to disable the relay and enable it for another use. The *[Blowdown]* option means that the relay must be linked to a conductivity sensor, which can include a 4 ... 20 mA input from our toroidal sensor. The output switches on and off depending on setpoints. The *[Events Other]* and *[Feed]* selection options also require further configuring. These steps will be explained in more detail later.

When an output is disabled and then re-enabled, the control is reset, and all control settings entered by the user are removed. This operating behaviour shifts the relay control to a defined status prior to reconfiguration.

A sensor input can be used as an analyser or monitor. However, the sensor input must be linked to an output in order for the sensor input to control a dosing unit or valve. The link is established during the configuration process.

10.1 Frequency/pulse outputs

Frequency-controlled pumps dose chemicals at different feed rates. Outputs 6 ... 9 are used for frequency-controlled pumps. Every analogue sensor (temperature, flow rate, corrosion rate, ORP etc.) can be used to control the frequency of a pulse-controlled pump. The output is proportional to the input sensor using the entire sensor range or part of it.

Example: when using a pH sensor with an input of 0 ... 14 pH, you could set 0 pulses at 14 pH and the maximum pulse count at 0 pH. The higher the pH value, the slower is the output pulse sequence. You could also set the output to a range of 0 pulses at 7.2 pH and the maximum pulse count at 7.8 pH. Within this shortened range, the pump speed would increase and decrease faster when the pH value changes, and would do so in the opposite direction to the one you might select with an acid pump. The pump speed is controlled without the use of a 4...20 mA pump.

The alarm settings for the volume at the maximum number of strokes per minute and the volume/day are limited to 500 gallons. These alarms can be set in the output alarm menu. The alarm for the volume at the maximum number of strokes per minute was intended to be used in the event that a pump is running at full speed for too long a period of time. For example, an acid pump that cannot lower the pH value far enough could be considered as an alarm status. Then the maximum speed would be lowered after 10 minutes, for example. The waiting time required for the pump to deliver more than the volume per day would be far too long. When the pump batches, say, 24 GPD (Gallons per day) at 100% speed, you know that the volume at the maximum number of strokes, when set to 1 gallon, will trigger an alarm after one hour. (24 GPD/24 hours = 1 GPH). If the pump is to trigger an alarm after 10 minutes, enter 1/6 of a gallon or 0.1667 gallons; if the pump runs at 100% speed for 10 minutes, the pump will have delivered 0.1667 gallons and an alarm will be triggered.

The four OptoMOS-DOs (digital/frequency outputs) P6, P7, P8 and P9 can each be set to:

- Pulse output/frequency
- ON/OFF

This is done when enabling the output. Output relays must be disabled after configuration and then re-enabled if you need to change the type.

10.2 Determining whether a relay is enabled

1. From the main display, press *[F1 STATUS]*.
2. Scroll through the enabled I/O channels. The relay is not enabled if you cannot see it.

10.3 Enabling and configuring a relay

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[SYSTEM]* and press *[OK]*.
   ⇨ The display changes to the *[SYSTEM]* menu.
3. Use ⇑ or ⇓ to select *[ENABLE I/O]* and press *[OK]*.
   ⇨ The display changes to the *[ENABLE I/O]* menu.
4. Use ⇑ or ⇓ to select the relay in question and press *[F3 ENABLE]*.
   ⇨ You need to select a relay type to complete the enabling process. This menu shows the standard output type as *[ON/OFF]* and the control as *[Events Other]*. *[ON/OFF]* is the only selection option for relays 1 ... 5.
   Relays 6 ... 9 can be *[ON/OFF]* or frequency.
5. This step is sub-divided into 2 processes. Process 1 relates to relays 1 ... 5, and process 2 to pulse relays 6 ... 9.
   Relays 1 ... 5: select the type of relay program you wish to use. Press *[F1 (FEED)]* for a metering pump, *[F2 (BLOWDOWN)]* for a blowdown relay, or *[OK]* to retain the *[Event Other]* selection option. Follow *[F1]* or *[F2]* with *[OK]* to select the control.
   Pulse relays 6 ... 9: if you wish an *[ON/OFF]* output, press *[OK]*, to select the menu type *[Event Other]*, or *[F1]* for the feed type.
6. Press *[OK]* to save the change.

Name the relay to avoid confusion during configuration. You can then define the remaining relay attributes once the relay has been named.

10.4 Naming the output

↳ *Chapter 10.3 'Enabling and configuring a relay' on page 62* showed how a relay is enabled. The next step is to name the relay.

Select a name that will help you to easily identify the relay: Blow-down, Acid, LJ25X, Heidelberg etc.

The naming/descriptor process is the same for all I/O points (inputs and outputs, digital and analogue), also including 4 ... 20 mA ports.

Please note that the *[F2]* key stands for the word *[alpha]*. You have three selection options. *[ALPHA]* (upper case letters), *[alpha]* (lower case letters) and *[DIGITS]* 0 ... 9. Lower case *[alpha]* is the default selection option. You can use ⇑ and ⇓ to change the R in relay to the B in Blowdown or A in Acid etc.

1. Press *[MENU]*.
2. Scroll to *[I/O SETUP]* and press *[OK]*.
3. Scroll to the relay to be named and press *[OK]*.
   The relay is not enabled if it is not listed.
4. Press *[OK]* to edit the name of the relay.
5. Use ⇒ to move to the second position. Press *[F2]* to select the *[alpha]* lower case letters. Note that the *[F2]* selection option now displays *[DIGITS]*. *[DIGITS]* would be the next selection option.

6. Use the arrow keys to change the next letter or next space and continue until the name is finished.

7. Once you have named the relay, press *[OK]* to save.

[B'down] sets the output for blowdown. You need to identify the conductivity sensor in this process. Enable and configure the conductivity sensor if it is not currently enabled.

The *[Feed]* option prepares the output for a chemical pump, based on a sensor or water meter.

[Event Other] is used to configure a relay for a timed event. Timed events are often used for non-oxidising biocides.

Special control functions are available for each of these relay types. With *[Blowdown]* these are the *'Sampling'* and *'Variable Cycles'* Prebleed/Lockout functions. This is not displayed as a separate option and is included when configuring an Event Other relay.

There are three types with *[Feed]*:

- Timed cycle mode,
- Timed modulation,
- PID control,

With *[Event Other]* there is:

- *[Prebleed/Lockout]*.
  - This option is not displayed as a separate option. Setting the option is described in the section on configuring an *[Event Other]* relay.

10.5 Configuring a blowdown relay

Name or enable the relay if you have not yet done so.

Blowdown relays require the use of a conductivity sensor.

Relays that are set to blowdown mode offer the following options:

- Simple blowdown based on conductivity setpoints,
- Inverse conductivity inhibitor feed,
- The special control process using our sampling routine.

The simple blowdown of the cooling water is used in cooling tower applications with continuous blowdown.

Blowdown:

1. Press *[MENU]* and scroll down to *[Set Blowdown Mode]*.
2. Press *[OK]*.
3. Press *[OK]* for *[SENSOR CONTROL]*.
4. Scroll down to your conductivity sensor and press *[OK]* to select the conductivity sensor.
5. Enter the setpoints for *[ON]* and *[OFF]*.

   Use ⇑ and ⇓ to change the value at the underscored position (cursor).

   Use ⇨ and ⇦ to move between the points.

   Press *[OTHER]* to switch between the setpoints for *[ON]* and *[OFF]*.
6. Press *[OK]* to save the changes and exit the menu.

10.6 Configuring a dosing relay

There are 3 relay operating modes

- *[Blowdown]*
- *[Feed]* (dosing)
- *[Event/Other]*

There are 5 types of dosing relay selection options:

- Dosing based on a contact water meter,
- Dosing based on any analogue sensor including any 4 ... 20 mA input,
- Blowdown and/or dosing,
- Use of a percentage timer,
- Use of a sensor during an event.

10.6.1 Dosing based on a contact water meter

With contact water meter dosing, you can select how long a pump or dosing unit should run, based on a specific number of gallons or litres cumulated on a contact water meter. You can change the set-points to set the chemical feed at any time. You need to enable a water meter input before these program steps.

If you have a pulse frequency output relay, the *[Feed]* selection option is not specified in seconds. The figure is given in ppm. Based on the size of the pump, the controller emits pulses through the output until the calculated number of millilitres has been delivered.

The pulse outputs 6 ... 9 use a ppm setpoint, not a time value.

1. Press *[MENU]* and scroll down to *[Set Feed Mode]*.
2. Press *[OK]*.
3. Scroll down to the relay that you wish to configure and press *[OK]*.
4. Scroll down to *[WATER METER]* and press *[OK]*.
5. Scroll down to the water meter on which the feed is based and press *[F1 SELECT]*.

   ⇨ A box appears in the display to the left of the input.
6. Press *[OK]*.
7. Use the arrow keys to edit the litres needed to start the dosing timer, and then edit the dosing time value. Use *[F1 OTHER]* to switch between these values.
8. Press *[OK]* to save.

10.6.2 Metering based on any sensor

A sensor-based relay switches on a pump or valve depending on the *[ON]* and *[OFF]* setpoints you set for that relay. You need to enable an analogue sensor input before these program steps.

Pulse outputs use a proportional range to control the frequency of the pulses transmitted to the pump.

1. Press *[MENU]* and scroll down to *[Set Feed Mode]*.
2. Press *[OK]*.

3. Scroll down to the relay that you wish to configure and press *[OK]*.
4. Scroll down to *[SENSOR CONTROL]* and press *[OK]*.
5. Scroll down to the sensor you would like to use and press *[F1 SELECT]*.
6. Use the arrow keys to edit the ON setpoint. Use *[F1 OTHER]* to switch between *[ON]* and *[OFF]*.
7. Press *[OK]* to save.

10.6.3 Metering based on blowdown and/or dosing

Blowdown (bleed), then dosing (feed):

You need to enable a blowdown relay before these program steps.

There are two types of dosing modes based on how long the blowdown valve is open. The dosing relay in the *[Bleed then Feed]* program waits until the blowdown has ended. The dosing relay then calculates how long dosing needs to be, based on the selected percentage.

A pulse relay doses X millilitres per minute.

Blowdown (bleed), then dosing (feed):

1. Press *[MENU]* and scroll down to *[Set Feed Mode]*.
2. Press *[OK]*.
3. Scroll down to the relay that you wish to configure and press *[OK]*.
4. Scroll down to *[BLEED THEN FEED]* and press *[OK]*.
5. Scroll down to the relay you would like to use and press *[F1 SELECT]*.
6. Press *[F2 SETPNT]*.
7. Use the arrow keys to edit the % value.
8. Press *[OK]* to save.

Blowdown (bleed) and dosing (feed):

You need to enable a blowdown relay before these program steps.

There are two types of dosing modes based on how long the blowdown valve is open. The dosing relay in the *[Bleed and Feed]* program is based on a period of 5 minutes. The controller calculates for how long the dosing pump has to be switched on, based on 300 seconds times the percentage entered, and starts dosing when the remainder of the 300-second blowdown is equal to this calculated amount.

Example: If the percentage is 80, the controller calculates 80% of 300 or 240 seconds and starts dosing when the blowdown countdown reaches 240 seconds. Both relays count down to 0. The dosing relay stops. The blowdown is reset to 300 seconds and the countdown continues. Metering stops and the counters are reset when blowdown stops.

A pulse relay displays X millilitres per minute contrary to a percentage.

Blowdown (bleed) and dosing (feed):

1. Press *[MENU]* and scroll down to *[Set Feed Mode]*.
2. Press *[OK]*.
3. Scroll down to the relay that you wish to configure and press *[OK]*.
4. Scroll down to *[BLEED THEN FEED]* and press *[OK]*.

5. Scroll down to the relay you would like to use and press *[F1 SELECT]*.
6. Press *[F2 SETPNT]*.
7. Use the arrow keys to edit the % value.
8. Press *[OK]* to save.

10.6.4 Metering based on a percentage time and basic load

This process relates to the first relays 1 ... 5 and the pulse relays if the pulse relays are programmed for *[ON/OFF]* mode. The *[PERCENT TIME]* program is based on a period of 5 minutes. The controller calculates the percentage of 300 seconds and switches on the dosing relay for this calculated time. Every 5 minutes, the calculated time is reapplied to the dosing relay. You need to enable a dosing relay before these program steps.

A pulse relay has a base load dosing option in frequency mode.

Select *[BASE FEED]* and enter the volume in millilitres per minute. This pump then constantly delivers this volume.

Metering based on a percentage time and basic load:

1. Press *[MENU]* and scroll down to *[Set Feed Mode]*.
2. Press *[OK]*.
3. Scroll down to the dosing relay that you wish to configure and press *[OK]*.
4. Scroll down to *[PERCENT TIME]* and press *[OK]*.
5. Use the arrow keys to edit the % value.
6. Press *[OK]* to save.
   ⇨ Exit the menu.

10.6.5 Dosing based on a sensor with event control

Relays in dosing mode can feature event control. With event control, the relay controls based on a sensor, but only during the event time. Set up a relay using the dosing mode with an oxidising agent sensor, ORP sensor or any 4 ... 20 mA input.

Selecting a cycle:

1. Press *[MENU]* and scroll down to *[BIOTIMING EVENTS]*.
2. Press *[OK]*.
3. Scroll down to the relay that you wish to configure and press *[OK]*.
4. If you have no events, you can add an event to configure the relay. Press *[F3 CONFIG]* to configure the relay.
5. The Configure menu lets you to set up a prebleed, a lockout and the cycle. Scroll down to *[EVENT CYCLE]* and press *[F1 SELECT]*.
6. Use the arrow keys to select the daily, weekly and 28-day cycle.
7. Press *[F1]* to select.

These menus are identical for the pulse relay event configuration.

10.7 Configuring an *[Event Other]* relay

Make sure that cooling water circulation is in operation at the time of biocide dosing, i.e. for the time of prebleed + biocide dosing + blowdown lock, to ensure that the biocide is mixed through and can act.

10.7.1 Schedules, prebleed or forced blowdown, lockout and with one sensor

Events are typically used to add biocides according to a predetermined schedule, with weekly or daily schedules most common. One example might be: every Monday addition of Biocide A for 20 minutes at 7:00, then addition of Biocide B every Thursday for 25 minutes at 7:00. You can select a 28-day cycle to add biocide every second week. Schedules generally do not follow a calendar. Daily selection options are repeated every day. If you select the 28-day cycle, the next screen tells you which week you are in: 1 ... 4 weekly entries match a weekly calendar. Sunday is day 1 and Saturday is day 7.

With an event, there is an option to configure forced blowdown and/or blowdown lock to maximise the effect of the product. The concept of blocking the blowdown valve during and after the addition of a non-oxidising biocide increases the effectiveness by increasing the contact time. The programming of forced blowdown ensures that the cooling tower does not operate beyond the blowdown setpoint, thereby avoiding crusting. When forced blowdown is set up, the blowdown valve is open until a timer has expired or a lower conductivity setpoint is reached. This will delay addition.

10.7.1.1 Forced blowdown/blowdown lock

This menu is identical for the pulse relay event configuration.

1. Press *[F3 CONFIG]* in the *[Daily]* *[Weekly]* or *[28 Day]* screen.
2. Press *[F1 SELECT]* and select *[PREBLEED]*.
3. Scroll down to the blowdown relay and press *[F1 SELECT]* to select the blowdown relay.
4. Scroll down to the conductivity sensor and press *[F1 SELECT]* to select the conductivity sensor.
5. Press *[F3]* to return to the configuration menu.
6. Press *[F1]* and select *[PREBLEED]*.
7. Use the arrow keys to set the forced blowdown time.
8. Press *[F1 SAVE]*.
9. Press *[F3 CONFIG]*.
10. Press *[F1]* to select *[LOCKOUT]*.
11. Use the arrow keys to edit the blowdown lockout time. The value of the blowdown lockout time needs to include the delivery time of the pump. The blowdown lockout time is not the time after the pump has stopped.
12. Press *[F1 SAVE]* to save the settings.

    ⇨ You can now add events to the relay. The relay also needs to be named to enable assignment of the relay.

10.7.2 Adding, removing, and editing events

10.7.2.1 Adding events

You can add, remove, or edit the event once a relay has been enabled as an *[EVENT OTHER]* output.

Pulse relays use a similar menu.

1. From the *[PREBLEED/LOCKOUT]* menu, press *[F1 ADD]*.
2. If you are not in this menu, press *[MENU]* and scroll down to *[BIOTIMING]*, *[EVENTS]* and press *[OK]*.
3. Scroll down to your relay and press OK.
4. Press *[F1 ADD]*.

The pulse relays use a similar menu.

1. The *[ADD]* screen displays a pre-set day, a start time, and a pump ON time. Use the arrow keys to change these values.
2. Press *[F1]*.
   ⇨ The changes are saved.
3. Use ⇨ and ⇦ to set the frequency.
4. You can set the fixed event under *[ONCE]*.
   ⇨ The event is repeated in each cycle. Once a day, once a week or once every 4 weeks.

   Selecting *[HOURLY]* means that the pump operates 24 times each day. Note the underlined word. With the *[28 DAY]* cycle, the pump operates every day, and every week with the *[WEEKLY]* cycle.
5. Press:
   - *[F1 ADD]* to create another event,
   - *[F2 ADJUST]* to make changes to the current events,
   - Or *[F3 CONFIG]* to make changes to the cycle.

   ⇨ End programming.

10.7.2.2 Removing or editing an event

This process applies to all relays.

1. Press *[MENU]*.
2. Scroll down to *[BIOTIMING EVENTS]* and press *[OK]*.
3. Scroll down to the relay and press *[OK]*.
4. Use ⇑ or ⇓ to select the event on which you wish to work.
5. Press *[F2 ADJUST]* to edit or clear an event.

   Press *[F3 CONFIG]* to reconfigure a relay.
6. Once you have pressed *[F2 ADJUST]*, use the arrow keys to change the start time and duration.
7. Press *[F1]* to save and exit.

10.8 Interlocks

The interlocks can be initiated via the digital inputs, which temporarily disable an output (relays 1 ... 9 and 4 ...20 mA outputs). A program to control a cooling tower will typically include a digital input signal from a flow switch. If the flow switch signals that no sample water is flowing, each relay for which this digital input is listed as a interlock stops working until the flow is restored.

10.8.1 Adjusting/releasing interlocks

Note that *[F2]* has the meaning *[OR]*. This means: if an interlock is ON (short-circuited), the relay will not function. When you press *[F2]*, the display changes from *[OR]* to *[AND]*. *[AND]* means that all the selected interlocks must be ON for the pause status to occur. Multiple interlocks are not typical. Every interlock can be used in conjunction with several relays and 4 ... 20 mA outputs. Typically, all outputs on a cooling tower are switched to pause status by the flow monitor input.

1. From the *[MENU]* entry, scroll down to *[I/O SETUP]*.
2. Press *[OK]*.
3. Scroll down to the relay and press *[OK]*.
4. Scroll down to the *[INTERLOCK]* entry and press *[OK]*.
5. Use ⇑ or ⇓ to select the interlock on which you wish to work.
6. Press *[F1]* to select the interlock.
   ⇨ The block ▉ signals that this input is currently selected.
7. From this screen, you can select or remove multiple interlocks. After selecting an interlock, you can remove the interlock by pressing *[F1]*.

10.9 Blocks

Blocks are used to ensure that two or more relays (relays 1 ... 9) are not switched on simultaneously, if relays are incompatible with each other or could otherwise cause problems. Often, the chemical pump relay is blocked by the blowdown valve relay to prevent feed chemicals from simultaneously being dosed to the open blowdown valve and directly back into the sewer system.

Setting up blocks, all relays 1 ... 9

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[I/O SETUP]*.
3. Press *[OK]*.
4. Use ⇑ or ⇓ to select *[1: BLOWDOWN]*.
5. Press *[OK]*.
6. Use ⇑ or ⇓ to select *[BLOCKED BY]*.
7. Press *[OK]*.
8. Use ⇑ or ⇓ to select an output.
9. Press *[F1 SELECT]*.
   ⇨ The block ▉ signals that this output is currently selected.
10. Press *[F1 REMOVE]* to deselect an output.
11. Once you have correctly selected all outputs, press *[OK]* to save your changes.

10.10 Control action: *[ON]* decreases / *[ON]* increases the measured value of a sensor

INFORMATION: is used for R1 ... R5 and P6 ... P9 in *[ON/OFF]* mode.

The control action tells the controller which change direction of the sensor value is to be expected when the relay is switched on.

As dosing acid lowers the pH value, set this parameter to "*[ON]* decreases".

As dosing chlorine increases the ORP voltage, set this parameter to "*[ON]* increases".

The *'control action'* selection option enables the output control to be inverted. This can be useful if the only available blowdown valve is a working contact solenoid switch or other controls require the inverted control signal. If you need to switch from acid to alkaline in a pH control or with conductivity-dependent inhibitor feed, you can invert the control with these steps.

1. Press *[MENU]*.
2. Use ⇑ or ⇓ to select *[I/O SETUP]*.
3. Press *[OK]*.
4. Use ⇑ or ⇓ to select the required relay.
5. Press *[OK]*.
6. Use ⇑ or ⇓ to select *[CONTROL ACTION]*.
7. Press *[OK]*.
8. The display now shows *[ON DECREASES SENSOR]* (ON lowers the sensor value).
9. Press *[F1 SWITCH]* to invert the output to *[ON INCREASES SENSOR]* (ON increases the sensor value).
10. Press *[OK]*.
    ⇨ As the basic control has changed, the display changes to the display to set the relay setpoints, where you can edit the new setpoints. You will notice that the values *[ON]* and *[OFF]* have been swapped.
11. If necessary, use the arrow keys to change the limit values.
12. Press *[OK]* to save the changes.

10.11 Special control functions

When using "Timed cycle mode", "Timed modulation" or PID control methods of control, the best results are obtained by changing only one variable at a time and waiting two or three cycles to observe the effect of this change to coordinate the control loop. This would involve changing the stroke of the pump to a % and all settings in the special control program.

Special controls are additional types of control that offer improvements over simple ON/OFF controls. The three general types of control feature the following special controls:

Types of dosing control: timed cycle mode, timed modulation and Proportional, Integral and Differential control (PID control).

Types of blowdown control: sample taken/varying cycles.

[EVENTS OTHER] types of control: prebleed/blocking, alarm output, washing sensor.

Useful hint about special controls: when using “Timed cycle mode”, “Timed modulation” or PID control methods of control, the best results are obtained by changing only one variable at a time and waiting two or three cycles to observe the effect of this change to coordinate the control loop. This would involve changing the stroke of the pump to a % and all settings in the special control program.

10.11.1 Timed cycle mode

Special control for dosing-type relays.

These instructions work with relays 1 ... 5. These instructions work with relays 6 ... 9, if the relays are in ON/OFF mode.

There is often a long delay time between adding a chemical substance and measuring its effect on a sensor. This results in the setpoint being overshot and poor control characteristics. Examples: pumping acid into a large swimming pool or adding bleach to a large tank volume in a cooling system. Timed cycle mode actuates dosing for a user-defined ON time and waits for a user-defined time before renewed dosing so that the system can respond to the chemical being added. During the ON time, ON/OFF pumps and frequency-controlled pumps operate under setpoint control. The ON time and period parameters can be set. The OFF time is the difference between the two values. If the period is 50 seconds and the ON time is 10 seconds, the OFF time is 40 seconds. The *[Chemical 123 Diagnosis]* display adds the time to the ON time.

1. Press *[MENU]* to set timed cycle mode.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required relay *[2 :CHLORINE PUMP]*.
5. Press *[OK]*.
6. Scroll to *[SPECIAL CONTROL]*.
7. Press *[OK]*.
8. Scroll to *[TIMED CYCLE]*.
9. Press *[F1]*.
10. Use the arrow keys to edit the value for *[PERIOD]*, e.g. 900 seconds.
11. Press *[F2]*.
12. Use the arrow keys to edit the *[ON TIME]*, e.g. 120 seconds.
13. Press *[F2]*.
    ⇨ Relay 2 is now ON for 120 seconds and OFF for 780 seconds, during any period of 900 seconds (900 seconds - 120 seconds = 780 seconds).
14. Press *[ESC]* to save and exit.

10.11.2 Timed modulation/pulse-width modulation

Control of dosing-type relays.

The relays P6 ... P9 need to be set to ON/OFF mode. Timed modulation features switching-on and switching-off setpoints, a period and a direction, which can be set, and enables the variables to be increased or decreased. Example of increase: a chlorine pump increases the ORP display. Example of decrease: a blowdown valve reduces conductivity.

If you use timed modulation in an increasing control loop, then the switching-on setpoint is lower than the switching-off setpoint. If the ORP value is below the switching-on setpoint, the output relay is continuously on. If the ORP value is above the switching-off setpoint, the output relay is permanently switched off. In both cases, timed modulation is not in operation until the ORP value lies between the setpoints. In operation, timed modulation is proportional to the ORP value in relation to the range between the setpoints.

Example: period = 100 seconds, ORP switching-on setpoint = 400 mV and ORP switching-off setpoint = 500 mV, current ORP value = 450 mV. 450 mV lies in the middle between 400 and 500 mV, so that the pump is switched on for 50% of the time, or in this example 100 x 50% = 50 seconds, and switched off for 50% or 50 seconds. If the ORP value drops to 430, the pump is switched on for 70%, and switched off for 30% of the 100-second period. Timed modulation works for both increasing and decreasing control loops.

This process works with relays 1 ... 5 and 6 ... 9, if the relays are in ON/OFF mode.

1. Press *[MENU]* to set time-based modulation.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required relay *[2 :CHLORINE PUMP]*.
5. Press *[OK]*.
6. Scroll to *[SPECIAL CONTROL]*.
7. Press *[OK]*.
8. Scroll to *[TIME MODULATE]*.
9. Press *[F1]*.
10. Use the arrow keys to edit the value for *[PERIOD]*, e.g. 120 seconds.
11. Press *[F2]*.
12. Press *[ESC]* to save and exit.

10.11.3 PID control

Control of dosing-type relays.

The relays P6 ... P9 need to be set to ON/OFF mode.

Each of the outputs P6 ... P9 and R1 ... R5 can be configured for PID control. PID control can also be used in conjunction with 4 ... 20 mA outputs.

We expressly recommend timed cycle mode or timed modulation over PID control, as these processes are highly functional, and are also easy to set up and understand.

In most water treatment applications, full PID control does not significantly improve the control or regulation of the process. PID control is more difficult to set up and optimise. However, implementation using only the proportional fraction of a PID control is simple and effective if the default values are retained for the remaining settings. If the relay outputs 1 ... 5 are configured for PID control, then the relay outputs are used by continuously modifying the pump relay ON and OFF times.

Frequent updates are useful for most dosing systems, and especially slow-acting systems. (*[Kd]* updated = 1), differential control (*[Kd]* > 1.0).

Tab. 5: Setting the PID control of relays 1 ... 5 and relay 6 ... 9 in ON/OFF mode.

Parameter	Minimum	Maximum	Default value	Note
[Kp] Proportional	0.001	10.0	0.5	PID update once per second
[Ki] Integral	0.001	10.0	0.000	Disabled with Ki= 0.000
[Ki] updated	1	10000 seconds	30 seconds	
[Kd] Differential	0.001	10.0 seconds	0.000	Disabled with Ki= 0.000
[Kd] updated	1	300 seconds	15 seconds	
Relay period	30 seconds	600 seconds	120 seconds	

1. Press *[MENU]* to set the PID control.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required relay *[6 :CHLORINE PUMP]*.
5. Press *[OK]*.
6. Scroll to *[SPECIAL CONTROL]*.
7. Press *[OK]*.
8. Scroll to *[PID]*.
9. Press *[F1]*.
10. Use the arrow keys to edit the value for *[Kp]*.
11. Press *[F2]*.
12. Use the arrow keys to edit the value for *[Ki]*.
13. Press *[F2]*.
14. Use the arrow keys to edit the updated value for *[Ki]*.
15. Press *[F2]*.
16. Use the arrow keys to edit the value for *[Kd]*.
17. Press *[F2]*.
18. If P6 ... P9 are set to pulse output, then skip step 18.

    Use the arrow keys to edit the value for the relay period.
19. Press *[F2]*.
20. Press *[ESC]* to save and exit.

10.12 How to set up a relay as an alarm output

An alarm relay changes its status whenever the controller signals an alarm status on the alarm side. This process applies to all 9 outputs; however, if you are enabling a pulse output, relay 6 ... 9, then select the ON/OFF setting. See *Chapter 10.3 'Enabling and configuring a relay' on page 62*.

Note: R1 ... R5 are type C relays (SPDT, single-pole changeover contacts). If you use the NC contact (normally closed contact) for an alarm, the NC contact is not kept closed. The contact will not open in the event of a power failure. R6 ... R9 are optoMOS relays. optoMOS relays can be operated with 24 V DC/250 mA. The optoMOS relays must be in ON/OFF mode.

1. Press *[MENU]*.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the relay e.g. *[5 UNUSED]*.

   If no selection is possible (empty list), this means that you have not set up any relays as *[EVENT OTHER]* types of relay.
5. Press *[OK]*.
6. Scroll to *[SPECIAL CONTROL]*.
7. Press *[OK]*.
8. Scroll to *[ALARM OUTPUT]*.
9. Press *[F1]*.
10. Press *[ESC]* to save and exit.

10.13 Switching on a relay first (forcing it to switch on)

All relays can be temporarily forced to an On state if the relays are not disabled, blocked, or interlocked.

- If the relay is disabled, see *Chapter 10.3 'Enabling and configuring a relay' on page 62*.
- If the relay is blocked, see *Chapter 10.9 'Blocks' on page 69*.
- If the relay is interlocked, see *Chapter 10.8 'Interlocks' on page 69*

1. Press *[MENU]*.
2. Scroll to the *[PRIME FORCE ON]* selection.
3. Press *[OK]*.
4. Scroll to the relay.
5. Press *[OK]*.

   ⇨ The standard timer setting is 5 minutes.
6. Use the arrow keys to edit the settings as required. The underline under a digit is the cursor.
7. Press *[F3 START]*.
8. Press *[F3 CANCEL]* if you wish to stop the relay before the time has ended.

10.14 Sensor washing

A special control function that allows pH and ORP sensors in the sensor head to be washed with acid in a time-controlled manner. R6 ... R9 must be in *[ON/OFF]* mode.

The relay stops the acid and oxidising agent outputs for a predetermined period of time so that the sensors can recover from acid washing.

10.15 4 ... 20 mA outputs

4 ... 20 mA outputs show both the loop current and its associated value as 0 ... 100%.

Manual = The user sets the current.

Auto = The sensor controls the current. The current output setpoint of 0% ... 100% is displayed.

Manual mode:

Use *[MANUAL MODE]* to check 100% as ON = 20 mA, OFF = 4 mA, or the modulation mode of the proportional pump or proportional valve, which is controlled by the respective 4 ... 20 mA output.

Use *[MANUAL MODE]* to check the monitoring input.

The monitoring input evaluates the current loop value for display of:

- The conductivity of the controller,
- A pH value,
- An ORP value,
- A value of a corrosion rate sensor,
- A ppm calculation.

Load-fed 4 ... 20 mA current loop

The 4 ... 20 mA current outputs are galvanically isolated and are fed by a current loop (24 V DC).

Idle alarm:

The DC-isolated 4 ... 20 mA output alarms with an open current loop. This function can be switched ON/OFF.

Calculating the loop current:

4... 20 mA output current (mA) = 4 + 16 x (sensor value / (20 mA setpoint minus 4 mA setpoint)). Use the absolute value of the setpoint difference for 20 mA setpoint < 4 mA setpoint.

Example: 15.42 mA = 4 + 16 (1785 / 2500-0))

10.15.1 Assigning a 4 ... 20 mA output to a measured value decrease (e.g. with the addition of acid):

1. Press *[MENU]*.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required output, e.g. *[E:4 ... 20 mA output]*.
5. Press *[F2]*.
6. Scroll to the required input e.g. pH sensor.

7. Press *[F1]*.
8. The next menu asks if interlocks are needed. If not, scroll to *[NONE]*.

   You could create an interlock with any digital input, such as a flow switch or a phantom DI.
9. Press *[F1]*.
10. Set the upper pH value.
11. Press *[F1]*.
12. Set the lower pH value.
13. Press *[F1]*.
14. Press *[ESC]* to save and exit or *[F1]* to continue configuring the output.

You can switch the idle alarm on or off and then set it up so that the output drops to 0% (4 mA) or maintains its value when the Stop button on the keypad is pressed. In this way, you can cause the output to a pump to be shut down or continue to transmit a value to a DCS.

10.15.2 Assigning a 4 ... 20 mA output to a measured value increase (e.g. with the addition of alkali)

1. Press *[MENU]*.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required output, e.g. *[E:4 ... 20 mA output]*.
5. Press *[F2]*.
6. Scroll to the required input e.g. pH sensor.
7. Press *[F1]*.
8. The next menu asks if interlocks are needed. If not, scroll to *[NONE]*.

   You could create an interlock with any digital input, such as a flow switch or a phantom DI.
9. Press *[F1]*.
10. Set the lower pH value.
11. Press *[F1]*.
12. Set the upper pH value.
13. Press *[F1]*.
14. Press *[ESC]* to save and exit or *[F1]* to continue configuring the output.

You can switch the idle alarm on or off and then set it up so that the output drops to 0% (4 mA) or maintains its value when the Stop button on the keypad is pressed. In this way, you can cause the output to a pump to be shut down or continue to transmit a value to a DCS.

10.15.3 Assigning a 4 ... 20 mA output to a measured value (application: PLC feedback):

1. Press *[MENU]*.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required output, e.g. *[E:4 ... 20 mA output]*.
5. Press *[F2]*.
6. Scroll to the required input, e.g. pH input.
7. Press *[F1]*.
8. The next menu asks if interlocks are needed. If not, scroll to *[NONE]*.

   You could create an interlock with any digital input, such as a flow switch or a phantom DI.
9. Press *[F1]*.
10. Set the upper pH value.
11. Press *[F1]*.
12. Set the lower pH value.

    ⇨

    The customer must use this same scale. If the scales are different, then the scales need to be adapted to each other.
13. Press *[F1]*.
14. Press *[ESC]* to save and exit or *[F1]* to continue configuring the output.

You can switch the idle alarm on or off and then set it up so that the output drops to 0% (4 mA) or maintains its value when the Stop button on the keypad is pressed. In this way, you can cause the output to a pump to be shut down or continue to transmit a value to a DCS.

10.15.4 Setting a 4 ... 20 mA output to manual mode

1. Press *[MENU]*.
2. Scroll to the *[I/O SETUP]* selection.
3. Press *[OK]*.
4. Scroll to the required output, e.g. *[E:4 ... 20 mA output]*.
5. Press *[F3]*.

   ⇨ The output is now *[MANUAL]*.
6. Use the arrow keys to set the percentage (0 ... 100 % is 4 ... 20 mA).
7. Press *[F1]*.
8. Press *[F2]*.
9. Press *[F2]* to go to the next display, as we do not control the output with any type of sensor in manual mode.

10. The next menu asks if interlocks are needed. If not, scroll to *[NONE]*.

    You could create an interlock with any digital input, such as a flow switch or a phantom DI.

11. Press *[F1]*.

12. Press *[F2]*.

    ⇨ You move to the next display.

13. If you require an idle alarm, then use *[F3]* to toggle between ON and OFF.

14. Press *[F1]*.

    ⇨ The changes are saved.

10.15.5 Linking a 4 ... 20 mA input to a 4 ... 20 mA output

Every analogue input from A to N, including phantom inputs in this range, can be used to control a 4 ... 20 mA output. .

1. Press *[MENU]*.

2. Scroll to the *[I/O SETUP]* selection.

3. Press *[OK]*.

4. Scroll to the required output, e.g. *[E:4 ... 20 mA output]*.

5. Press *[F3]*.

    ⇨ The output is now *[MANUAL]*.

6. Use the arrow keys to set the percentage (0 ... 100 % is 4 ... 20 mA).

7. Press *[F1]*.

8. Press *[F2]*.

9. Press *[F2]* to go to the next display, as we do not control the output with any type of sensor in manual mode.

10. The next menu asks if interlocks are needed. If not, scroll to *[NONE]*.

    You could create an interlock with any digital input, such as a flow switch or a phantom DI.

11. Press *[F1]*.

12. Press *[F2]*.

    ⇨ You move to the next display.

13. If you require an idle alarm, then use *[F3]* to toggle between ON and OFF.

14. Press *[F1]*.

    ⇨ The changes are saved.

10.15.6 Calibration of a 4 ... 20 mA output

Calibrating a 4 ... 20 mA output requires a multimeter set to mA, which is connected in series with the output card and a load.

1. Press *[CAL]* from the continuous display.

2. Use the arrow keys to scroll to the 4 ... 20 mA input that you need to calibrate.

3. Press *[OK]*.
4. Observe the display on your multimeter. The multimeter is connected in series with your power circuit. The display should show approx. 4.00 mA.
5. Use the arrow keys to set the mA value read off on the multimeter in your control.
6. Press *[OK]*.
7. Press *[F1]* to calibrate the 20.0 mA.

   Observe the display on your multimeter. The multimeter is connected in series with your power circuit. The display should show approx. 20.00 mA.
8. Use the arrow keys to set the mA value read off on the multimeter in your control.
9. Press *[F1]*.

   ⇨ The changes are saved.
10. Press *[F1]*.

    ⇨ You move to the next display.
11. Select another output or press *[ESC]* to move to the main display.

If calibration was unsuccessful (calibration limits +/- 0.5 mA at 4 mA and +/- 15% of the range (approximately +/-2.4 mA)), then *[SENSOR FAULT OVERRANGE]* is displayed.

Consider three selection options after an error:

- *[RECAL]* for recalibration,
- *[IGNORE]* to ignore the error and accept the calibration,
- *[RESET]* to reset the calibration to the factory setting.

11 System menu

The system menu is accessed by pressing *[MENU]* followed by ⇑ and *[OK]*. The following sections describe the available options and how to edit the information. The following options appear in the order in which the options are displayed when you press ⇓.

The selection options are:

- Communication,
- System set-up,
- Time and date,
- Set sensor type,
- Enable I/O,
- Passwords,
- Action log,
- Diagnostics,
- Configurations.

11.1 Communication

The “Communication” area contains the IP addresses for the LAN and Wi-Fi connections.

Scroll down through:

- LAN IP address,
- Wi-Fi net mask address,
- Wi-Fi IP address,
- LAN gateway,
- MAC address,
- LAN net mask.

The LAN address and the net mask can be changed if the controller is integrated within a network. The network administrator must assign a LAN address to this unit.

Wi-Fi is used for wireless networking. Enable Wi-Fi on your PC, notebook or smartphone.

The MAC address is factory-assigned to the controller and cannot be changed. The MAC address is unique worldwide.

11.1.1 How to change the IP address:

The factory-set IP address of the controller is 10.1 0.6.1 06.

You can connect any PCs with an Ethernet port to the controller using a CATS Ethernet cable. Set your unit to a static IP address of 10.10.6.nnn, where 'nnn' is a three-digit number between 000 and 255 apart from 106. 106 is the address of the controller. Open a browser and enter 10.10.6.1 06 in the search field to establish an HTTP connection to the controller. More information on this can be found in the browser manual.

If your controller is connected to a local area network (LAN), the IP address of the controller must be changed according to the site scheme. This address is possibly issued by the IT department at the site. Enter this IP address as described here.

1. Press *[MENU]*.
2. Scroll to *[SYSTEM]*.
3. Press *[OK]*.

4. Scroll to *[COMMUNICATION]*.
5. Press *[OK]*.
6. Press *[F1]* to move to editing mode.
7. Use the arrow keys to edit the settings as required.
8. Press *[F1]* to save the changes.
9. Press *[NEXT]* to set the net mask.
10. Press *[F1]* to move to editing mode.
11. Use the arrow keys to edit the settings as required.
12. Press *[F1]* to save the changes.
13. Press *[ESC]* to go to the main display.

11.1.2 Wi-Fi web interface

PCs, tablets and smartphones can be connected by Wi-Fi to the controller.

The IP address and the net mask for Wi-Fi is programmed in. Therefore, the Wi-Fi SSID number is the only way of distinguishing between individual controllers.

The SSID is the name you see when establishing a Wi-Fi connection. The default factory setting has organised that the last 3 characters of the name are identical to the last 3 characters of the serial number of the controller. Should you find yourself in an account with multiple controllers, then you need to know the SSIDs of the units to understand to which unit you are connecting.

You can change the SSID however you wish once you have established a connection and logged in. The change then takes place once you have switched the power supply to the controller off and on again.

The diagram on the right shows the permanent IP address and the Wi-Fi net mask.

SSID: the *'Service Set IDentifier'* is a name for the wireless network.

The SSID cannot be edited from the keypad. A browser connection is needed for this.

11.2 System set-up

The system set-up offers 9 options:

- Site name.
- Controller name.
- Keypad passwords.
- Metric units.
- Sunday = first day of the week.
- Number of systems.
- Alarm with stops.
- System reboot.
- Reset to factory setting.

11.2.1 Site name/Controller name

You can give this unit two separate names. These names appear in every downloaded data file and help to describe these documents. The name of the controller also appears on the browser tab when you connect to a PC, tablet or smartphone.

You can use the keypad to edit these names: note that the *[F2]* key stands for the word *[alpha]*. You have three selection options, *[ALPHA]* (upper case letters), *[alpha]* (lower case letters), and DIGITS from 0 ... 9.

1. Lower case letters are the default option.

   Use ⇑ and ⇓ to change the first position.

2. Scroll to change the selection to upper case letters. Press and hold the key to fast scroll, or press the key to move one letter at a time.

3. Press ⇨ when you have reached the required letter in order to move to the next position.

4. Press *[F2]* to select the *[alpha]* lower case letters.

   Note that the *[F2]* selection option now displays DIGITS. This would be the next selection option.

5. Press *[OK]* to save the changes.

11.2.2 Keypad passwords

You can switch password protection on and off on this page. There are 4 operator levels, 3 configuration levels and 1 Admin login. The permitted passwords on the keypad are identical to the ones created/modified using a browser. This means that you can edit your password from either place. Operator-level users can view the program parameters, but cannot edit them. Configuration-level users can modify the entire configuration, but cannot edit system parameters. Admin users can edit all user parameters. There is no mfg password. If you forget your password, the manufacturer can reset the password list. All users then need to reset their passwords.

User	Standard password
Operator 1	1
Operator 2	2
Operator 3	3
Operator 4	4
Configuration 5	5
Configuration 6	6
Configuration 7	7
Administrator	AAAA

11.2.3 Metric units

Switching from technical units to metric units.

11.2.4 Sunday = first day of the week

Use this when setting up timers with a 28-day cycle. As a 28-day cycle includes 4 weeks of timers, setting it up as Week 1 means that you know that what you set up in Week 1 will occur during the coming week. Every week is Week 1 in a 7-day cycle.

11.2.5 Stop alarm

Pressing the Stop key at any time stops all outputs. An alarm status is also triggered if you do not switch this over here.

11.2.6 Restarting the system and resetting to factory settings

A system restart resets the timers and clears all alarms.

Resetting to factory settings restarts the system and clears the entire configuration. The date and time are reset and the controller is restarted.

None of the operations resets passwords or changes IP addresses.

11.3 Time and date

1. Press *[MENU]*.
2. Scroll to *[SYSTEM]*.
3. Press *[OK]*.
4. Scroll to *[TIME&DATE]*.
5. Press *[OK]*.
6. Use the arrow keys to set the time.
7. Use *[F3]* and the arrow keys to set the date.
8. Use *[F2]* and the arrow keys to set the day.
9. Press *[OK]*.
10. Press *[ESC]* to go to the continuous displays.

11.4 Setting the sensor type

Set the sensor type, ↳ *Chapter 9.3 'Selecting an analogue sensor type' on page 47*.

11.5 Enable I/O

Set enable I/O, ↳ *Chapter 9.1.1 'Activating an analogue and digital input' on page 45*.

11.6 Password login/logout

You can change your password in this area if the password option is enabled. If the password option is not enabled, see *Chapter 11.6.1 'How to set up a keypad password' on page 84*.

11.6.1 How to set up a keypad password

Bear in mind that the selection is the character type selected just before the key is pressed. Example: if the wording above [F2] is [alpha], pressing [F2] once will change over to lower case letters.

1. Press *[MENU]*.
2. Scroll to *[SYSTEM]*.
3. Press *[OK]*.
4. Scroll to *[PASSWORD]*.
5. Press *[OK]*.
6. Use the arrow keys to set your required password.

   (F2 to *[alpha]* for lower case letters, F2 to *[NUMBER]* for digits, F2 to *[ALPHA]* for upper case letters.
7. Press *[F1]* to save the changes.
8. Press *[ESC]* to go to the main display.

11.7 Activity log

The most recent activities appear first.

1. Press *[MENU]*.
2. Scroll to *[SYSTEM]*.
3. Press *[OK]*.
4. Scroll to the *[ACTIVITY LOG]* selection.
5. Press *[OK]*.
6. Press *[F3]*.

   This is the date on which you wish to see the activities for all I/O channels.
7. Use the arrow keys to set the date.
8. Press *[F1]*.
9. Press *[F1]*.

   ⇨ The display changes to *[NEXT ACTIVITY]*.
10. Press ⇓ to briefly see the timestamp for this activity.
11. Press *[ESC]* to go to the main display.

11.8 System diagnostics

[SERIAL NUMBER]: serial number of the controller.

[FAN SPEED]: displays the fan speed. The fan is monitored. An alarm is triggered if the fan fails.

[O-V WIRING]: only with 3-wire counters and if the digital input power supply fails due to incorrect wiring.



Digital inputs O-T have a different power supply to U and V.

[ADMIN PASSWORD]: displays *[DEFAULT]* if the password was not changed from *[AAAA]*. If the password was changed, then the display shows *[CHANGED]*.

[WATCHDOG RESET]: a *[WATCHDOG RESET]* should always display *'0'*. An increasing number of resets indicates damaged firmware, an electrical malfunction of the controller, or another fault.

11.9 Configurations

[RELAY FUSE]: an alarm is triggered should it fail.

[HOME INPUTS]: you can set which I/O points are displayed in the standard menu. See section

[HMI Firmware]: the firmware version indicates the release date of the operating software for the keypad and display (16.04.06.00 means 2016-April-6).

[Firmware]: the motherboard firmware version indicates the release date of the operating software for the controller (16.08.01.00 means 2016-August-1).

[RELAY FUSE]: displays the status of the AC mains fuse of relay 1 and relay 2. *[LOAD FUSE OPEN]* appears when the mains fuse has burned through. There is no alarm for the circuit board fuse. The controller is not powered if the circuit board fuse blows.

12 Maintenance and repair

ProMinent recommends checking the following components:

Component	Maintenance	Interval
Battery	Replace	Min. every 5 years or as required
Threaded cable connectors	Check, tighten or replace if necessary	As required
Fuses	Check, replace if necessary	As required
Upper part of the housing	Check, replace if necessary	As required

13 Technical data

13.1 Technical data and sensors

Parameter	Value
Measuring range of the mV sensors:	0 ... 14 pH - 1500 mV ... 1500 mV ORP
Measured variable of the mA sensors. Measuring range according to the sensors.	Chlorine Bromine Peracetic acid Inductive conductivity
Temperature	0 ... 150 °C with Pt100/Pt1000 sensors
pH resolution	0.01
Resolution of the ORP voltage	1 mV
Temperature resolution	0.1 °C
Amperometric analysis resolution	0.001/0.01 ppm, 0.01 % by volume, 0.1% by volume
Precision	0.3% based on the measuring range end value
pH/ORP measuring input	Input resistance > 0.5 x 10^{12} Ohms
Temperature compensation range	0 ... 150 °C
pH compensation range for chlorine	6.5 ... 8.5 pH
Interference variable	Flow as an mA or frequency signal
Control	9 relays
Current output signal	4 ... 20 mA, electrically isolated, max. load 450 Ω, range and assignment (measured, correction and control variable) can be set.
Control output:	4 relays, optional pulse frequency outputs or ON/OFF signal to control dosing pumps 2 supply voltage relays 3 relays, potential-free contacts
Alarm relay:	All relays can be programmed as alarms.
Electrical connection:	100 ... 240 V, 50/60 Hz, 30 watts
Ambient temperature:	Ambient temperature 0 ... 50 °C, for use indoors or with a protective housing.
Degree of protection:	With wall mounting: degree of protection IP65 NEMA4X (leak-tightness)
Tests and certifications	CE, MET (complies with UL as per IEC 6101 0)
Material:	PC housing, flame-retardant configuration
Dimensions:	356 X 235 X 105 mm (W X H X D)
Weight:	2.1 kg net

13.2 Fuse data

Output relay fuse 6.3 A at 250 V AC. Similar to the relay fuse used in the MultiFLEX and in the Aegis, except that this is a slow-acting fuse. Do not use the Aegis II fuse in the MultiFLEX and in the Aegis. However, you can use the fast-acting fuses supplied with the MultiFLEX and the Aegis in the Aegis II. A fast-acting fuse does not harm the Aegis II.

Component	Nominal value/type	Supplier	Part number
Controller, complete	100 ... 230 V AC, 50/60 Hz, 0.5 ... 0.26 A No external load	ProMinent	AGIb
Controller, complete	100 ... 230 V AC, 50/60 Hz, 7.8 A With external load	ProMinent	AGIb
Output relays R1, R2 and power terminals	6.3 AT at 250 V AC, 5 x 20 mm, slow-acting, glass fuse	ProMinent	732379
Mains fuse	1.6 AT at 250 V AC, 5 x 20 mm, 1.5 kA at 250 V AC, ceramic fuse	ProMinent	732411

14 Data recording

The controller records the following data every 5 minutes:

- Sensor values,
- Flow switch values,
- Counter values,
- Relay switching-on times,
- Delivery volumes,
- Status information.

This data can be easily collected through the USB port. The USB port is located behind the communication light cover.

1. Insert a USB memory stick into the USB port.
   ⇨ The screen confirms the USB memory stick as a drive.
2. Press *[F1 LOG]* to initiate the download.
3. Select the extent of the history, i.e. *[DAY]*, *[WEEK]* or *[MONTH]*.

   The download will start as soon as you have selected the time period.

   The keypad and browser connection are locked during the download.
4. The display shows the download progress and prompts you to remove the USB drive once the download has ended.

No Excel add-in is needed in order to import the CSV data in Microsoft Excel® or a similar spreadsheet program. Details on importing CSV data can be found in the instructions for your software product.

Installing a firmware upgrade from a USB memory stick

If you need to, you can update the firmware of your controller.

1. Obtain the hex file from ProMinent.
2. Insert the USB memory stick with the new hex file into the USB port behind the communication light cover.
3. Press *[F2 UPDATE]*.
   ⇨ The display now shows the hex file currently being used.
4. Press *[F1 LOAD]* to install the new hex file.
   ⇨ The firmware will be copied to the controller.
5. The display prompts you to remove the USB memory stick when the process has ended.
6. Once the USB memory stick has been removed, the controller will delete the existing firmware and install the new firmware.
   ⇨ The controller is rebooted once the new firmware has been installed.

USB: saving the program

A program is a list of instructions that the user can edit. All setpoints, calibrations and names of I/O points are stored in the program.

1. Insert a USB memory stick into the USB port behind the communication light cover to save a copy of your current program on a USB memory stick.
2. Press *[F3 CONFIG]*.

3. If you have not previously saved a program to this USB memory stick, you can only save a copy to the USB stick.

   If you previously saved a program to this USB memory stick, you have the choice of saving and loading.

   Press *[F1 SAVE]* in both cases.

   ⇨ The display prompts you to remove the USB memory stick when the save process has ended.

USB: loading the program

A program is a list of instructions that the user can edit. All set-points, calibrations and names of I/O points are stored in the program.

A saved program file can also be loaded onto another Aegis II controller. This controller then works with the same program.

Press *[F3 LOAD]* to load a program previously saved from the USB memory stick to your controller.

⇨ The controller will download the program from your USB memory stick and then prompt you to remove the USB memory stick.

15 Spare parts and accessories

15.1 Spare parts for the Controller AEGIS II with web interface

Tab. 6: Retrofit modules

Description	Part number
Module with 2x mA output	1092565
Module with 2x conductive conductivity temperature sensor inputs	1081809
Module with 2x mA sensor inputs	1081806
Module with 2x mV sensor inputs	1081807
Module with 2x serial sensor inputs	1092566
mA/mV module + temperature sensor inputs	1081808
Modbus RTU module + 2 mA outputs	1094377
Modbus RTU module + 2 mA outputs + 2 mA inputs	1094350
Wi-Fi module	734211
Fuse 5x20 slow-acting 6.3 A, 250 V	732379
Fuse 5x20 slow-acting 1.6 A, 250 V	732411
3 V battery approx. 190 mAh Li cell BR2032, backup battery for internal clock, service life. approx. 5 years	732829
Cable threaded connector set Comprising: ■ 1 x skintop threaded connector. M20x1.5 (5-10) ■ 3 x skintop threaded connectors. M16x1.5 (5-10) ■ 3 x skintop threaded connectors M12x1.5 (4-6) including locknuts and multiple seals	1022582
AEGIS II complete upper housing section, including display and keypad	1109361

Tab. 7: Spare parts for the corrosion sensor

Description	Part number
Basic corrosion sensor CRS LPR	1092242
CRS-AM Admiralty brass corrosion tip set	1092274
CRS-CN Cu/Ni corrosion tip set	1092275
CRS-CS mild steel corrosion tip set	1092276
CRS-CU copper corrosion tip set	1092277
CRS-SS 1.4301/304 SS corrosion tip set	1092278
CRS-ZN zinc corrosion tip set	1092279

16 Disposal of used parts

- **User qualification:** instructed user, see *Chapter 4.4 'User qualification' on page 18*

NOTICE!

Regulations governing the disposal of used parts

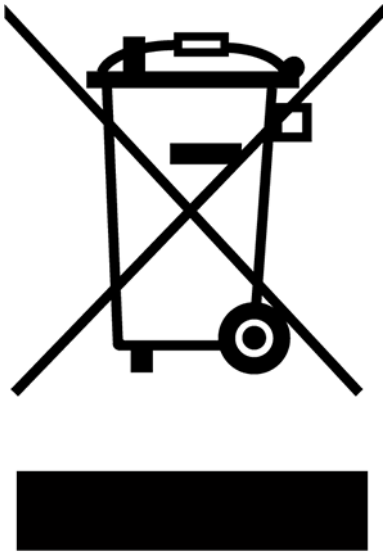
– Note the national regulations and legal standards that currently apply in your country

The manufacturer will take back decontaminated used devices providing they are covered by adequate postage.

Decontaminate the device before returning it for repair. To do so, remove all traces of hazardous substances. Refer to the Material Safety Data Sheet for your feed chemical.

A current Declaration of Decontamination is available to download on the ProMinent website.

Sign indicating EU collection system



In accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment, this device features the symbol showing a waste bin with a line through it. The device must not be disposed of along with domestic waste. To return the device, use the return and collection systems available and observe the local legal requirements.

17 Standards complied with and Declaration of Conformity

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg, Germany,

hereby declare that the product specified below complies with the relevant basic health and safety requirements of the EU Directives, on the basis of its functional concept and design and in the version distributed by us. Any modification to the product not approved by us invalidates this declaration.

Tab. 8: Extract from the EC Declaration of Conformity

Designation of the product:	AEGIS II
Product type:	AGlb ...
Serial number:	see nameplate on the unit
Relevant EC Directives:	Low Voltage Directive (2014/35/EU) EMC Directive (2014/30/EU) Radio Equipment Directive (2014/53/EU) RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 EN 61326-1: 2013, Class B, industrial sector EN 300 328 V2.2.2 EN IEC 63000:2018
Place/Date:	Heidelberg 02.08.2021

The EC Declaration of Conformity is available to download on our homepage.

18 Additional notes for the markets: USA & Canada

USA:

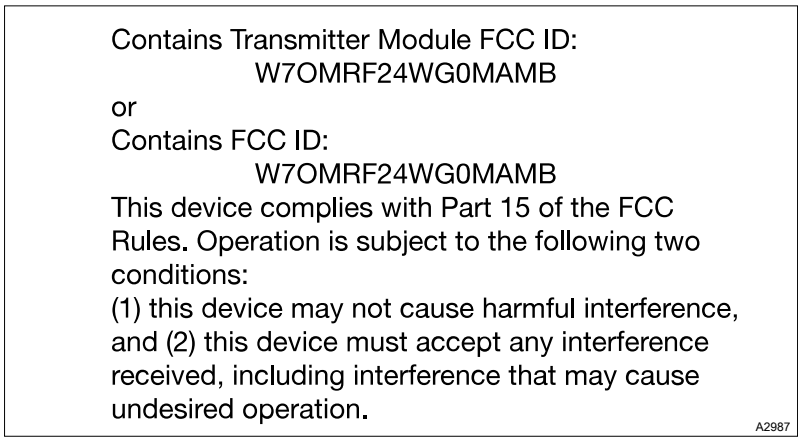


Fig. 22: Label on the Aegis II housing

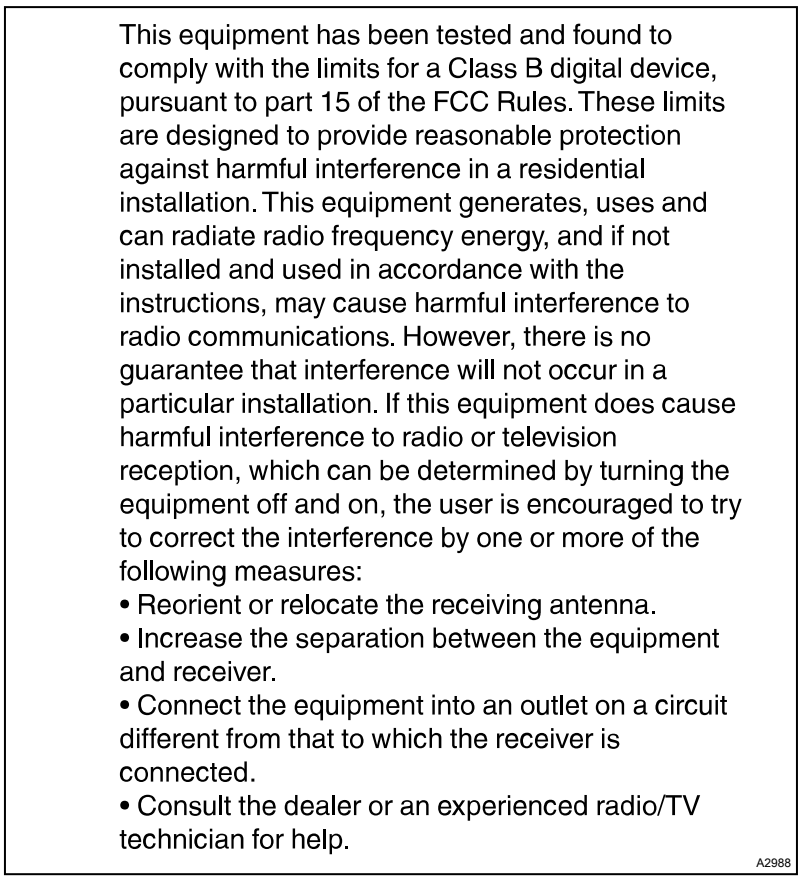


Fig. 23: Explanation of the label on the Aegis II housing

Canada:

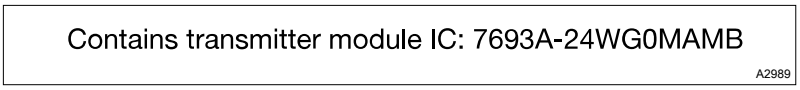


Fig. 24: Label on the Aegis II housing

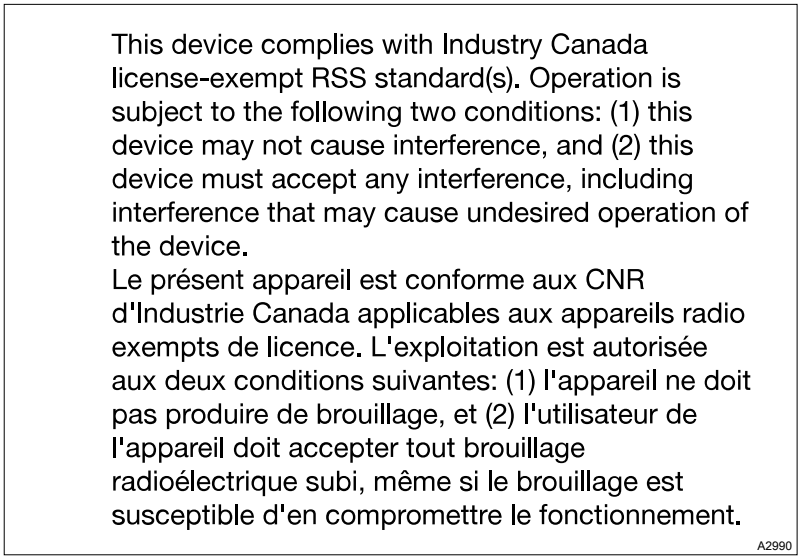


Fig. 25: Explanation of the label on the Aegis II housing

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