

Electronics Module

Rivo™ I Municipal/Industrial
Rivo™ I Municipal/Industrial PC

Analyser
Analyser & Controller (PC)



NOTICE

- Device name: Electronics Module
 - Rivo™ I Municipal/Industrial – Analyser
 - Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)
- Software version:
from Rivo OS Version 1.3.x
- Note on Original Language:
This instruction manual was originally written in German. The present English version is a translation. In case of discrepancies or ambiguities, the German original shall prevail.

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1	General notes	6	2.7	Extensions and modifications.....	22
1.1	General precept of non-discrimination	6	2.8	Electrical power.....	22
1.2	Target groups.....	7	2.9	IT security	23
1.3	Information in the instruction manual	7	2.10	Safety instructions for specific operating phases	23
1.4	Associated documents	8	2.11	Warranty conditions	24
1.5	Retention of the documentation	8	2.12	Liability for defects	25
1.6	Associated documents	8			
1.7	New functions and firmware updates	9	3	Delivery, Transport and Storage	26
1.8	Digital Instruction Manual	9	3.1	Scope of delivery	26
1.9	Warnings on the device.....	9	3.2	Required components	26
1.10	Device ID/type plate	10	3.2.1	Flow-through adapters	26
1.11	Important System Information - Recovery Key -	11	3.2.2	Sensors	27
1.12	Warnings and safety instructions	12	3.2.3	Measuring Modules.....	28
1.13	Notes and information	13	3.2.4	Modules and Sensor Kits	28
1.14	Design features	14	3.2.5	Output Modules for installation in the module slot.....	29
2	Safety	15	3.2.6	Expansion board for installation on the HMI ..	29
2.1	Intended use	16	3.2.7	Impedance converter	29
2.2	Improper use	18	3.3	Checking incoming goods	29
2.3	Safety instructions.....	19	3.4	Packaging	29
2.4	State-of-the-art technology.....	19	3.5	Transport.....	30
2.5	Personnel qualification	20	3.6	Storage	30
2.6	Spare parts/components	22			

4	Technical Data	31	7.3.4	Fluoride measurement	60
4.1	Electronics Module	31	7.3.5	Conductivity measurement.....	62
4.2	Output Modules	34	7.4	Controller modes (for W3T586961 only).....	63
4.3	Measuring Modules (optional).....	36	7.4.1	Proportional without process measurement...	63
4.4	Expansion board (optional)	42	7.4.2	Proportional with process measurement.....	66
5	Design	43	7.4.3	Single feedback control with process measurement	68
5.1	General	43	7.4.4	Compound loop with process measurement..	70
5.2	Rivo™ Backboard 4 (Basic housing)	44	7.5	Dosing contact	78
5.3	HMI.....	45	7.6	Control parameters	78
6	Description	46	7.7	Display of dosing quantity	86
6.1	General	46	7.8	Control connections 1 and 2	87
6.2	Configuration options	47	7.9	Sample water monitoring	88
6.2.1	Electronics Module and Flow-through Adapter.....	47	7.10	mA inputs, Rivo™ Backboard 4	89
6.2.2	Electronics Module with "Rivo™ Flex Mod" Modules.....	48	7.11	Connections to visualization systems	89
7	Function.....	50	7.12	Controller outputs.....	90
7.1	General function.....	50	7.12.1	Positioner (with feedback).....	90
7.2	Areas of application and examples	50	7.12.2	2-point or 3-point pulse-duration controller for dosing pumps	91
7.3	Measurement inputs.....	51	7.12.3	2-point or 3-point pulse-frequency controller for solenoid pumps	92
7.3.1	Measurement of disinfectants	52	7.12.4	Analog 2-point output/Analog 3-point output..	92
7.3.2	pH measurement.....	58	7.13	mA outputs	93
7.3.3	Redox measurement.....	59			

7.14	Positioner feedback.....	94
7.14.1	Automatic Calibration (2-Point)	95
7.14.2	Manual Calibration (2-Point)	95
7.15	Dosing Linearization (only for W3T586961)...	96
7.16	Relay outputs and Digital outputs	99
7.17	Relay outputs	99
7.18	Alarms and messages.....	100
7.19	Configuration.....	101
7.19.1	Without Acknowledge.....	102
7.19.2	ACK with reset	102
7.19.3	Simple ACK.....	102
7.19.4	Safety functions.....	103
7.20	Status LED states	103
7.21	Auto tune	108
7.21.1	Completing auto tune without errors	110
7.21.2	Completing auto tune with error	111
7.22	Sample water inlet disinfection (Sample line dosing)	112
8	Interfaces	117
8.1	USB interface	117
8.2	Firmware update (Software version)	117
8.3	RS485 interface (optional)	118
8.4	Ethernet interface.....	118
8.5	Modbus TCP Interface	120

9	Installation	121
9.1	Requirements with regard to the environment and installation location.....	122
9.2	Installation location for drinking water, industrial water and waste water.....	123
9.2.1	Installation site for swimming pool water.....	123
9.3	Installation the device	124
9.3.1	Installation with DIN rail.....	125
9.3.2	Installation without DIN rail (wall installation).....	125
9.3.3	Installation drawings.....	126
9.4	Removing and fitting the housing cover	129
9.4.1	Removing	129
9.4.2	Fitting	129
9.5	Installation of "Rivo™ Flex Mod" Modules ...	130
9.6	Remove the battery insulator	131
9.7	Connecting the Ethernet cable.....	132
9.8	Electrical installation.....	132
9.9	Firmware update (software version).....	135
9.9.1	Firmware update via USB memory stick.....	136
9.9.2	Firmware update via Internet browser.....	136
9.10	RS485 interface (optional)	137

10	Start-up138	12.18	Menu field measurement channel 184
10.1	Initial commissioning and putting back into operation 139	12.19	Service-Center 192
10.2	Start up Electronics Module 140	12.20	Resetting a password in the Service Center 197
11	Shut-down143	13	Calibration 198
12	Operation144	13.1	Temperature calibration 198
12.1	Display and control elements 144	13.2	Chlorine calibration 199
12.2	Menus, icons and buttons 145	13.3	Membrane sensors calibration 200
12.3	Symbol "Login and Logout" 146	13.4	pH calibration 201
12.4	Password protection and user administration 147	13.5	Redox calibration (mV)..... 202
12.5	Resetting a password..... 148	13.6	Conductivity calibration 202
12.6	Menu bar 148	13.7	Fluoride calibration 203
12.7	Application Bar 149	14	System messages 204
12.8	System menu 150	15	Troubleshooting..... 205
12.9	Operation mode 151	16	Maintenance 206
12.10	Calibration 153	16.1	Maintenance intervals 206
12.11	Application settings 155	16.2	Replace battery 206
12.12	System Setup..... 174	16.3	Replacing the fuses on the CPU board..... 207
12.13	User administration 179	16.4	Cleaning 207
12.14	Factory settings 180	16.4.1	Cleaning the housing 207
12.15	System information 181	16.4.2	Cleaning the display..... 207
12.16	Trend view..... 182		
12.17	Acknowledge and Messages 183		

17	Dismantling and disposal	208	20	Marking and approval.....	225
17.1	Dismantling	208	20.1	CE mark	225
17.2	Disposal	208	20.2	UKCA mark	225
17.2.1	General information.....	208	20.3	CSA mark.....	226
17.2.2	Used electrical/electronic equipment	208	20.4	Australian approval	226
17.2.3	Used batteries and used storage batteries ..	209			
18	Spare parts, accessories, retrofit kits	210	21	LICENSE AGREEMENTS	227
18.1	Spare parts.....	210			
18.1.1	Modules for connection to sensors	211			
18.1.2	Plug-cable combination for sensor	211			
18.2	Optional accessories	212			
19	Wiring Diagram	213			

1 GENERAL NOTES



WARNING

Danger in the case of failure to observe the instruction manuals

Possible consequence: fatal or serious injury and significant material damage.

- All persons working with the following Rivo™ Electronics Modules (Mod. E10) or the Rivo™ I System must have read and understood these instruction manual and the associated manuals:
 - Rivo™ I Municipal/Industrial – Analyser
 - Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)
- This instruction manual is only valid in conjunction with the following instruction manuals or Quick Guides:
 - Rivo™ Series Flow Cell Modules (Mod. D10) – DEPOLOX Pool®-R, DEPOLOX Pool®-R, Varia Sens™
 - Flow Sens-R Flow-through Adapter (Mod. D12)
 - Flow Mem-R Flow-through Adapter (Mod. D13)



WARNING

- Sensors compatible with the Rivo™ I System.
- Output modules, measurement modules or sensor kits of the Rivo™ series compatible with the Rivo™ I System.
- The warnings and safety instructions must be observed.
- The owner/operator is responsible for ensuring compliance with the relevant accident prevention regulations, other statutory provisions and the accepted rules of safety engineering.

1.1 General precept of non-discrimination

In the interest of better legibility, the linguistic forms male, female and diverse (m/f/d) are not used in parallel in this instruction manual. Nevertheless, all personal nouns and pronouns are understood to apply equally to all genders. We apologize for any inconvenience this may cause.

1.2 Target groups

Only trained and authorized specialist personnel are permitted to work on the following Electronics Modules (Mod. E10) or the Rivo™ I System:

- Rivo™ I Municipal/Industrial – Analyser
- Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)

All electrical work (e.g. electrical installation, installation of “Rivo™ Flex Mod” Modules) must be performed by a qualified electrician. The sections on assembly, installation, start-up, system messages, faults, maintenance, shut-down and dismantling are intended exclusively for trained specialist personnel. Operation, storage, transport and disposal can be carried out by instructed personnel.

1.3 Information in the instruction manual

The Rivo™ I System always consists of the Rivo™ Electronics Module (Mod. E10)

- Rivo™ I Municipal/Industrial – Analyser
- or
- Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)

with different Rivo™ Flex Mod Modules and an optional Flow Cell Module (Mod. D10) or an optional Flow-through Adapter (Mod. D12 and D13) as well as a sensor.

For clarity, the Rivo™ I System is referred to in this instruction manual as the System.

The Rivo™ I Municipal/Industrial – Analyser and Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC) Electronics Module (Mod. E10) are referred as the Electronics Module or the device.



The Electronics Modules have different functions. These functions are highlighted by the device name and article number.

The Flow Cell Modules DEPOLOX®-R, DEPOLOX® Pool-R and Varia Sens™ (Mod. D10) are referred as the Flow Cell Module or the Flow-through Adapter or by the product name.

The Flow Sens-R (Mod. D12) and the Flow Mem-R Flow-through Adapter (Mod. D13) are referred as the Flow-through Adapter or by the product name.

The electrode, the 3-electrode single-rod measuring sensor, the combination electrode and the membrane sensor are referred to as the sensor.

The output modules, the measurement modules or the sensor kits of the Rivo™ series are only referred to as the module or the sensor kit or by the product designation.

Example:

- Output module, e.g. Rivo™ Flex Mod 2AO-mA
- Measuring module, e.g. Rivo™ Flex Mod Mod Dis
- Sensor kit, e.g. Rivo™ Flex Sens pH Kit

The article number is the order number.

Details of the actual equipment may differ from those shown in the illustrations.

1.4 Associated documents

All operating, assembly and installation instructions for assemblies and components as well as Quick Guides must be observed. These manuals are included with the respective assemblies and supplementary components.

1.5 Retention of the documentation

The instruction manual form part of the device and must be kept in the immediate vicinity of the device and accessible at all times. The instruction manual must be passed on to third parties with the device.

1.6 Associated documents

All operating, assembly and installation instructions for assemblies and components as well as Quick Guides must be observed. These manuals are included with the respective assemblies and supplementary components.

1.7 New functions and firmware updates

A new firmware version may contain new, enhanced or improved functions that are not yet or not fully described in these instruction manual. The latest version of the instruction manual can be downloaded online at www.xylem.com.

1.8 Digital Instruction Manual

You can download the digital version of the instruction manual from our official website.

- Scan the QR code.
- OR enter the following link in your browser:
<https://www.xylem.com>



1.9 Warnings on the device

There is a warning label attached to the device. Read the warnings through carefully. Do not remove this label. If the label is missing or illegible, please contact your contractual partner.

1.10 Device ID/type plate

The type plate is affixed to the device. The type plate identifies the specific device. Please use or state this information if you need service support.



Fig. 1 For example, type plate

- 1 Device name
(shown here: Rivo™ I Municipal/Industrial)
- 2 Series code/model code (e.g. Mod. E10)
- 3 Sales Order/position/serial number
- 4 DataMatrix code (contains part/serial number)
- 5 Safety information and warnings
- 6 "Read the operating instructions" symbol

- 7 "Disposal" symbol
Disposal instruction: Device must not be disposed of with household waste!
See Chapter "Dismantling and disposal".
- 8 Manufacturer's address
- 9 CE mark (conformity of the device)
 - UKCA mark (UK Conformity Assessed)
 - CSA mark (Canadian Standards Association)
 - Australian approval
(RCM - Regulatory Compliance Mark)
- 10 Country of origin
- 11 Electrical connection data: Supply voltage and supply output
- 12 Available inputs and outputs: Supply voltage
- 13 Article number

1.11 Important System Information - Recovery Key -

An “Important System Information” label is included in the scope of delivery of the Electronics Module. This is located inside the housing.

The “Important System Information” label contains device-specific data and the access data, such as the App Default for Login User and the Service Default for Login Service-Center, as well as the recovery key for resetting the access data.

The label must be kept in a safe place that is not accessible and protected against unauthorised access.

The access data for the software must be stored securely in accordance with your IT guidelines and must not be handed over to unauthorised persons.

If you lose the recovery key and the user administration access data, please contact your contractual partner.

- **Recovery Key:**
The recovery key is only valid for a specific Electronics Module and cannot be transferred to other Electronics Modules. The recovery key is used to reset the user administration if the access data is lost.

Via the Service-Center menu, you can reset the device to the factory settings and delete the customer-specific passwords.

- **App Default:**
Access data (user/password) for the initial login of the user.
- **Service Default:**
Access data (user/password) for the initial login in the “Service Center” menu.

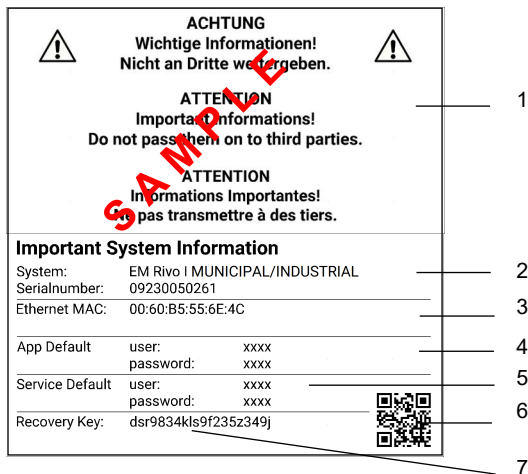


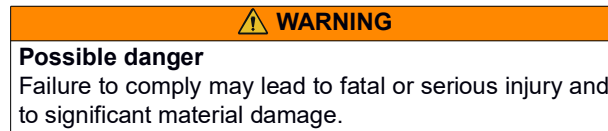
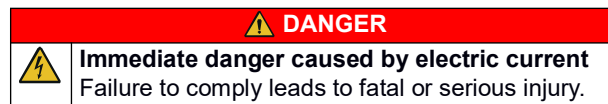
Fig. 2 Example Recovery Key

- 1 Multilingual notice
- 2 System and serial number
- 3 Ethernet MAC
- 4 App Default
- 5 Service Default
- 6 Code for the Important System Information
- 7 Recovery Key (example)

1.12 Warnings and safety instructions

The warnings and safety instructions are classified by means of a signal word and a pictogram. They comprise three parts:

- Nature and source of the danger
- Explanatory notes on nature and source of consequence if the instructions are not complied with
- Where applicable, measure to avoid the danger



 WARNING**Danger caused by toxic substances**

Failure to comply may lead to fatal or serious injury.

 WARNING**Danger caused by fire or explosive material**

Failure to comply may lead to fatal or serious injury.

 ATTENTION**Danger with low risk**

Failure to comply may lead to minor injury.

CAUTION**Danger with the risk of material damage**

Failure to comply may lead to serious material damage and impair functionality.

1.13 Notes and information**NOTICE****Notes and information**

Supplementary information and notes relevant to a specific topic or goal.



Notes and information



Read the instruction manual/installation manual.

1.14 Design features

The following representations are used in these operating instructions:

Instructions for action

- 1 Carry out action
- 2 Consequence of action
- 3 Further consequence of action

=> result/goal of the action

List

- List/list item
 - List/list sub-item

Menu display

e.g. "Operation Mode" or < Tkonst >

2 SAFETY

DANGER



Danger fatal injury caused by electric shock

External voltages may still be connected even if the operating voltage is switched off.

Possible consequence: fatal or serious injury.

- All electrical work must be performed by a qualified electrician.
- The Electronics Module is not equipped with a mains switch and is in operation as soon as the supply voltage is applied. An external switch or circuit breaker with a clearly identifiable "Off" switch position is necessary. This external switch or circuit breaker should be installed directly beside the Electronics Module.
- The Electronics Module may only be operated with the prescribed supply and control voltage (Technical data).
- In the event of a fault in the electrical power supply, switch the device off immediately.
- Do not carry out work on active parts and equipment to which voltage is applied.
- The device operates with liquids. For this reason, DIN EN IEC 62368/60950 must be observed when connecting the devices.

WARNING



Danger caused by uncontrolled dosing and incorrect circulation output

If there is a shortage of sample water or the flow rate is too low, if the circulation is switched off or the circulation output is too low, there is a risk of uncontrolled dosing of chemicals.

Possible consequence: fatal or serious injury.

- Never disable the sample water monitoring - even temporarily, e.g. by bridging the signal input.
- Chemical dosing must switch off if the circulation is switched off or if the circulation output or flow rate is too low. To ensure this, circulation output or flow rate monitoring must be installed in the system and connected to the Electronics Module.



WARNING



Risk of injury due to chemicals

Dosing liquids are caustic and oxidizing.

Possible consequence: fatal or serious injury.

- Observe safety regulations and the prescribed protective clothing for handling chemicals.
- All instructions in the product data sheet for the dosing medium must be complied with.

2.1 Intended use

- The Rivo™ I Electronics Modules (Mod. E10):

- Rivo™ I Municipal/Industrial – Analyser
- Rivo™ I Municipal/Industrial PC –
Analyser & Controller (PC)

must be used exclusively for measuring and controlling the parameters free chlorine, total chlorine, chlorine dioxid, ozone potassium permanganate, pH value, Redox (ORP) voltage, conductivity, fluoride, mA sensors and temperature in water.

- The Electronics Module is part of the Rivo™ I System.
- The Electronics Module Rivo™ I Municipal/Industrial may only be operated in combination with the Flow-through Adapter listed below and only the sensors, output modules, measuring modules and sensor kits that are compatible with the Rivo™ I system. See chapter Delivery - Required components and Chapter Description - Configuration options.

Flow-through Adapters:

- Flow Cell Module DEPOLOX®-R (Mod. D10)
 - Flow Cell Module DEPOLOX Pool®-R (Mod. D10)
 - Flow Cell Module Varia Sens™ (Mod. D10)
 - Flow-through Adapter Sens-R (Mod. D12)
 - Flow-through Adapter Mem-R (Mod. D13)
- This instruction manual is only valid in conjunction with the instruction manuals for the Flow-through Adapter and the relevant sensors.
 - Operational safety can only be guaranteed if the device is used in accordance with its intended purpose.
 - The device may only be used for the purpose defined in the contract and under the installation, operating, and environmental conditions specified in this instruction manual.
 - No substances may be used other than those described in this instruction manual (chemicals and prescribed calibration chemicals).
 - All inspection and maintenance work must be carried out at the specified intervals.
- The system must be protected against access by insufficiently qualified personnel by means of access restriction and the assignment of passwords. Corresponding security concepts must be provided to prevent unauthorized remote access.
 - All inspection and maintenance work must be carried out at the specified intervals. Inspections and control measures must be carried out at the prescribed intervals and documented!
 - Compliance with the intended use also includes reading this instruction manual and observing all the safety information, instructions and notes therein. The owner/operator of the installation bears sole responsibility for consequences of any use that does not conform with the installation's intended use.

2.2 Improper use

- The Rivo™ I Electronics Modules (Mod. E10):

- Rivo™ I Municipal/Industrial – Analyser
- Rivo™ I Municipal/Industrial PC –
Analyser & Controller (PC)

must not be used with other Flow-through Adapters than the Rivo™ Series Flow-through Adapters (Mod. D10/D12 and D13).

- The Rivo™ I System must not be operated with sensors and sensor cables other than those compatible with the Rivo™ I system.
- The Rivo™ I system must not be operated with output modules, measurement modules or sensor kits other than those compatible with the Rivo™ I system.
- Do not use damaged or obsolete sensors or sensor cables.
- Any use above and beyond the intended use.
- Use that deviates from the information in the technical data.

- Modifications to the device or parts of the device.
- Assembly and installation of or work on electrical components must be carried out by a qualified electrician.
- The Rivo™ I System must not be operated with flammable liquids.

2.3 Safety instructions

The manufacturer places great emphasis on safety when working on or with the device. This is already taken into account in the design of the installation and by the integration of safety features.

This instruction manual describes the safe and proper handling of the device. The specified safety notes and instructions, as well as the local accident prevention regulations and general safety regulations applicable to the area of use, must be observed. Additional industry-wide or in-house safety regulations also continue to apply. The operating company is under obligation to provide operating instructions in accordance with local, national and international specifications, regulations and legislation.

Modifications to the device other than those described in this instruction manual are not permissible.

2.4 State-of-the-art technology

The unit has been constructed in accordance with state-of-the-art technology and the accepted rules of safety engineering. However, if the unit is used by persons who have not been adequately instructed, danger to the life and limb of such persons or third parties and damage to the unit itself or to other property cannot be ruled out. Work not described in this instruction manual must be performed only by authorized personnel.

2.5 Personnel qualification

WARNING

Danger from unqualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- The company operating the overall system must ensure that only authorized and qualified personnel are permitted to work with and on the device and within their defined scope of authority.
- Unqualified personnel must be kept away from the device.
- The system must be protected against access by insufficiently qualified personnel by means of the assignment of passwords and access restriction.
- Work on electrical components must be carried out by qualified electricians.

It is a prerequisite that all persons assigned to work on or at the device are familiar with and comply with the work safety and accident prevention regulations.

The operating company must train all persons handling the system, device, components, substances etc. and inform them of possible hazards.

It is the responsibility of the operating company to monitor personnel qualification.

If the personnel do not have the necessary knowledge, they must be trained. The responsibilities for work on and with the device (assembly, installation, installation or de-installation of interfaces, operation, troubleshooting, start-up, shut-down, maintenance, dismantling as well as storage, transport and disposal) must be clearly defined and adhered to so that there is no unclear distribution of competencies from the point of view of safety.

Only persons who can be expected to perform their work reliably may work on and with the device. Refrain from any working method that affects the safety of persons, the environment or the device.

Persons who are under the influence of drugs, alcohol or medication affecting their ability to react must not work on or with the device. When selecting personnel, the age- and occupation-specific regulations applicable at the device's place of use must be observed.

The operator must ensure that unauthorized persons are kept at a safe distance from the device.

Personnel are under obligation to immediately report to the operating company any changes that occur in the device that affect safety.

- **Instructed personnel:**
Instructed personnel are persons who have received instruction and, where necessary, training on the tasks assigned to them and the associated hazards and have been informed of the necessary protective devices and protective measures.
- **Trained user:**
A trained user meets the requirements that apply to an instructed person and in addition, has received system-specific training.

- **Qualified specialist:**
Qualified specialist personnel are persons who meet the requirements that apply to a trained user and who, in addition, on the basis of their technical training, knowledge, experience and knowledge of the relevant standards and regulations, are able to assess the work assigned to them and recognize possible hazards. When assessing specialist training, a period of several years' employment in the respective field may also be taken into consideration.
- **Qualified electrician:**
Qualified electricians are persons who, on the basis of their technical training, knowledge and experience, as well as knowledge of the relevant standards and regulations, are able to assess the work assigned to them and recognize possible hazards. Qualified electricians must comply with the provisions of the applicable accident prevention regulations.

- **IT specialist:**
IT specialists (IT = Information Technology) are persons who, on the basis of their technical training, knowledge and experience, as well as knowledge of the relevant standards and regulations, are able to carry out work on computer systems, networks and network components as well as to independently recognize and avoid possible hazards.

2.6 Spare parts/components

Trouble-free operation of the unit is only guaranteed if original spare parts and components are used in precisely the combination described in this instruction manual. Failure to observe this instruction may lead to malfunctions or damage to the device.

2.7 Extensions and modifications

Never attempt to perform any modifications, extensions or conversions on the device that could impair safety without the written approval of the manufacturer.

2.8 Electrical power

Only qualified electricians or trained personnel supervised by a qualified electrician are permitted to perform any work on electrical components and must do so in accordance with valid electro-technical regulations. During normal operation, the Electronics Module and the flow-through assembly must remain closed. The Electronics Module may only be put into operation when the housing is closed, and must be connected to protective earth. Power cables must be connected in accordance with the wiring diagram.

2.9 IT security

The manufacturer offers IT security mechanisms for its products to support secure system operation. We recommend checking on a regular basis to see what information is available regarding IT security developments for your products. Information on this can be found on the Internet. Moreover, for the safe operation of an installation, it is also necessary to integrate the automation components into a holistic IT security concept which comprises the entire system and is in accordance with the state of the art in IT technology. Integrated products from other manufacturers should also be taken into account.

Unsecure connections via the Internet or WLAN are not permitted.

During commissioning of the device, the factory-configured passwords and user names should be replaced with individual ones and the user administration enabled.

2.10 Safety instructions for specific operating phases

- Never employ any working methods which could affect safety!
- All system components must be correctly installed and meet the requirements.
- Only operate the Electronics Module when the housing is closed.
- The device poses hazards to persons and property. These hazards may arise due to parts carrying voltage or the incorrect dosing of chemicals.
- Only qualified electricians or trained personnel supervised by a qualified electrician are permitted to perform any work on electrical components and must do so in accordance with valid electro-technical regulations.
- Avoid setting up and operating the equipment where there are strong electromagnetic fields. Take appropriate measures to ensure electromagnetic compatibility (EMC) with other devices.
- Inspect the device at least once daily for externally visible damage and faults! Inform the responsible person/authority immediately of any detected changes (including any changes in the operating performance)!

- In the event of malfunctions, switch the device off immediately! Have malfunctions remedied immediately!
- Connect disconnected cables in accordance with the wiring diagram.
- During installation and maintenance work, secure the device against being switched back on!
- If stipulated, disconnect all parts of the device from the power supply before performing any inspection, maintenance or repair work. Then first test the disconnected components to ensure they do not carry any voltage.
- Use only original fuses with the prescribed rating!
- Observe the safety regulations applicable to the device when handling auxiliary materials and chemical substances. Remove leaked auxiliary materials with a suitable binding agent or wipe them up with a cloth. Danger of slipping! Collect auxiliary materials separately and dispose of them appropriately in accordance with the relevant national regulations.
- Never use corrosive cleaning agents (e.g. isopropyl alcohol, spirit, scouring agents) and do not clean using high-pressure steam!

2.11 Warranty conditions

The following must be observed for compliance with warranty conditions. If any of the conditions listed are not met, the warranty is void.

- Assembly, installation, start-up, troubleshooting, maintenance, shut-down and dismantling must be carried out by the manufacturer or qualified specialist personnel, e.g. from contracted companies
- Intended use
- Observation of the operational parameters and settings
- Operation, storage, transport and disposal of the unit must be carried out by qualified specialist personnel or instructed personnel
- Only approved calibration chemicals may be used
- The device must not be exposed to frost or explosive environments.
- The prescribed maintenance work must be carried out
- Use of original spare parts

2.12 Liability for defects

Liability for defects is regulated by the general terms and conditions of supply or by special contractual agreements. To preserve the liability for defects, the operating and environmental conditions, and the operating and maintenance regulations described in this instruction manual must be observed. If they are not observed, the right to claim under liability for defects is rendered invalid.

3 DELIVERY, TRANSPORT AND STORAGE

3.1 Scope of delivery

Article number	Designation
W3T570783	Rivo™ I Municipal/Industrial – Analyser Electronics Module (Mod. E10)
or	
W3T586961	Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC) Electronics Module (Mod. E10)
W3T570786	Accessory set EM E10
W3T173182	Assembly accessories
W3T613933	Instruction Manual, English
--	Label "Important Safety Information" (Recovery Key)

3.2 Required components



The required components depend on the measurement and control.

Please contact our customer service or visit our online store if you need any spare parts.

3.2.1 Flow-through adapters

Article number	Designation
W3T565860	DEPOLOX®-R Flow Cell Module (Mod. D10) non-pressurised version (3-electrode measuring cell integrated)
W3T566011	DEPOLOX®-R Flow Cell Module (Mod. D10) pressurised version (3-electrode measuring cell integrated)
W3T565858	DEPOLOX® Pool-R Flow Cell Module (Mod. D10) non-pressurised version
W3T565859	DEPOLOX® Pool-R Flow Cell Module (Mod. D10) pressurised version

W3T566012	Varia Sens™-R Flow Cell Module (Mod. D10) non-pressurised version
W3T566013	Varia Sens™-R Flow Cell Module (Mod. D10) pressurised version
W3T159950	Flow Sens-R pH/Redox Y-style Flow-through Adapter (Mod. D12) pressurised version
W3T167442	Flow Sens-R pH/Redox/Fluoride Y-style Flow-through Adapter (Mod. D12) non-pressurised version
W3T158503	Flow Sens-R Conductivity Y-style Flow-through Adapter (Mod. D12) pressurised version
W3T170361	Flow Mem-R Y-style Flow-through Adapter (Mod. D13) non-pressurised version

3.2.2 Sensors

Article number	Designation
W3T160652	3-Electrode single-rod measuring sensor Chlorine (rod electrode - platinum version) for DEPOLOX® Pool-R
W3T160991	3-Electrode single-rod measuring sensor Chlorine (rod electrode - gold version) for DEPOLOX® Pool-R
W3T169297	pH sensor
W3T169298	Redox single-rod measuring sensors (platinum version)
W3T172356	Redox single-rod measuring sensors (gold version)
W3T172052	Conductivity sensor 60 mS or 600 µS
W2T840142	Fluoride sensor
W3T570399	Membrane sensor FC2 M12 (free chlorine)
W3T570400	Membrane sensor CD10.1 (chlorine dioxide)
W3T570451	Membrane sensor OZ10.1 (ozone)
W3T570398	Membrane sensor TC3 M12 (total chlorine)

3.2.3 Measuring Modules

Article number	Designation
W3T557878	Rivo™ Flex Mod Dis
W3T557901	Rivo™ Flex Mod mV
W3T557902	Rivo™ Flex Mod pH
W3T557903	Rivo™ Flex Mod Fluoride
W3T557907	Rivo™ Flex Mod Con
W3T557906	Rivo™ Flex Mod 2Al

3.2.4 Modules and Sensor Kits

Article number	Designation
W3T585524	Rivo™ Flex Sens pH Kit
W3T585526	Rivo™ Flex Sens Redox Kit
W3T585527	Rivo™ Flex Sens Redox G Kit
W3T585529	Rivo™ Flex Sens Fluorid Kit
W3T585531	Rivo™ Flex Sens Con Muni Kit
W3T585290	Rivo™ Flex Mem TC Kit
W3T585521	Rivo™ Flex Mem FC Kit
W3T585522	Rivo™ Flex Mem CD Kit
W3T585523	Rivo™ Flex Mem OZ Kit
W3T586499	Rivo™ Flex Sens Dis-3E Pt Kit
W3T586500	Rivo™ Flex Sens Dis-3E Au Kit

3.2.5 Output Modules for installation in the module slot

Article number	Designation
W3T557912	Rivo™ Flex Mod 2AO-mA mA signal output module, 2-channel
W3T557914	Rivo™ Flex Mod 2Rel-2DO Relay module for activation of dosing outputs and alarms

3.2.6 Expansion board for installation on the HMI

Article number	Designation
W3T639691	Rivo™ COM-Board USB 485

3.2.7 Impedance converter

Article number	Designation
W3T165563	Impedance converter

3.3 Checking incoming goods

- 1 Check transport packaging. Please notify the transport company immediately in the event of damage, as your rights to compensation will otherwise be lost.
- 2 Check that the consignment is complete and undamaged. Pay attention to small parts. If a component is damaged, please contact your contractual partner immediately.

3.4 Packaging

Packaging is reusable waste which must not be disposed of with household waste, but must be collected and disposed of separately, e.g. at public collection points.

If necessary, contact your regional or local authorities for details of collection points and options for separating and collecting waste.

3.5 Transport

ATTENTION

Danger due to impact or breakage

Possible consequence: Injury or material damage.

- Follow the instructions and warnings on the packaging.
- Protect the device against impact during transport and transport it in the original packaging. Keep the packaging until the system has been commissioned and put into operation.
- Observe instructions on the packaging for the correct positioning of the device.
- Do not expose the device to shocks, moisture, rain, frost, heat or direct sunlight.
- Observe the specified temperatures for transport and storage (see Technical Data).

3.6 Storage

ATTENTION

Danger caused by incorrect storage

Incorrect storage can impair the functionality of the device.

Possible consequence: Injury or material damage.

- Store the device in dry condition in a dust-free environment and protected against moisture.
- Do not store the device outdoors or expose it to aggressive media, and protect it against direct sunlight and mechanical damage.
- Observe the specified temperatures for storage (see Technical Data).
- Regularly check the general condition of the device and the packaging.

4 TECHNICAL DATA

4.1 Electronics Module

Rivo™ Electronics Module (Mod. E10)		
Article number	W3T570783 Rivo™ I Municipal/Industrial – Analyser W3T586961 Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)	
Area of application	Drinking water, process water, waste water, swimming pool water	
Housing	Dimensions (WxHxD)	220 x 305 x 153 mm
	Weight	approx. 3.7 kg
	Protection rating	IP66
	Mains connection	100 ... 240 V AC $\pm$ 10% 50 ... 60 Hz or 24 V DC -15 ... +20 %, 15 W
Display	4.3" graphic color display with backlit LED and touchscreen	
Insulation	Overvoltage category	2
	Contamination level	2
	Protection category	1
Approvals	CE, CSA, UKCA, RCM	

Operating conditions	Ambient temperature	0 ... 50 °C (32 ... 122 °F)
	Relative humidity	< 80 %, non-condensing, moist environment
	Environment	No direct sunlight, use indoors
	Atmospheric pressure	75 ... 106 kPa
	Max. working height (altitude)	2000 m
	Ambient noise	<45 dB
Transport and storage temperature	-20 ... +70 °C (-4 ... 158 °F) Store the device in dry condition in a dust-free environment and protected against moisture. Do not store the device outdoors or expose it to aggressive media, and protect it against direct sunlight and mechanical damage.	
Digital inputs (Rivo™ Backboard 4)	• 2x for voltage-free contact (internal 24 V DC power supply) • Freely selectable function in menu • When input open: DI active • When input closed: DI inactive	
Measurement inputs (Rivo™ Backboard 4)	• 1x temperature input PT 1000 (0 ... 100 °C/32 ...212 °F)	
	• 1x positioner position feedback • Positioner position feedback • Potentiometer 1kOhm (adjustable via the menu)	
	• 1x mA input for flow rate 0 ... 20 mA/4 ... 20 mA (electrically isolated)	
	• 1x mA input for external setpoint or dosing factor (electrically isolated)	
	0 ... 20 mA/4 ... 20 mA	
Module slots	• 4x module slot for “Rivo™ Flex Mod“ Modules	

Relay outputs (Rivo™ Backboard 4)	Version	• 2x changeover contact with integrated fuse, replaceable • Type TR5 3,15 A T
	Nominal breaking capacity	• 3A 250V AC, 1250VA max. (resistive load) • 1A 250V AC, 250VA max. ($\cos \phi = 0.4$) • 3A 30V DC, 150W max. (resistive load)
	Max. switching voltage	• 250V AC / 30V DC
	UL/CSA rating	• 3A, 125/250V AC (general use) • 3A 30V DC (resistive)
 When connecting inductive or capacitive loads (e.g. pump with integrated switching power supply), an additional power relay with suitable specification must be provided. Each relay output has an integrated 3.15 A fuse as over-current protection. Typical use of the relay: Enabling contact for external alarm or activation of the dosing devices or dosing pumps. If the relay is used to switch inductive loads with direct voltage, the load must be equipped with a suppressor circuit against overvoltage (free-wheeling diode etc.).		
Interface (only if Rivo™ COM-Board USB 485 is used)	• RS485 interface with Wallace & Tiernan protocol for connection to OPC server or control system for data visualization	

4.2 Output Modules

Rivo™ Flex Mod 2AO-mA	
Article number	W3T557912 (Modul part number W3T557869)
Description	mA signal output module, 2-channel
Analog outputs (only if Rivo™ Flex Mod 2AO-mA is used)	• 2-way mA output module 0/4 to 20 mA • Freely configurable signal assignment via menu • Load max. 500 ohm, accuracy < 0.05 % FS • Integrated load monitoring • Galv. isolated up to 50 V relative to earth

Rivo™ Flex Mod 2 Rel-2DO		
Article number	W3T557914 (Modul part number W3T557870)	
Description	Relay module for activation of dosing outputs and alarms	
Relay outputs (only if Rivo™ Flex Mod 2 Rel-2DO is used)	Version	• 2x changeover contact with integrated fuse (5 A, not replaceable)
	Nominal breaking capacity	• 3A 250V AC, 1250VA max. (resistive load) • 1A 250V AC, 250VA max. (cosine of $\phi = 0.4$) • 3A 30V DC, 150W max. (resistive load)
	Max. switching voltage	• 250V AC / 30V DC
	UL/CSA rating	• 3A, 125/250V AC (general use) • 3A 30V DC (resistive)
 When connecting inductive or capacitive loads (e.g. pump with integrated switching power supply), an additional power relay with suitable specification must be provided. Each relay output has an integrated 5 A fuse as overcurrent protection. Typical use of the relay: Enabling contact for external alarm or activation of the dosing devices or dosing pumps.		
Digital outputs (only if Rivo™ Flex Mod 2Rel-2DO is used)	• Optocoupler output for connection of enabling inputs to dosing systems, dosing pumps, electrolysis systems • Max. ext. power supply 24 V DC • max. current 20 mA	

4.3 Measuring Modules (optional)

Rivo™ Flex Mod Dis	
Article number	W3T557878 (Modul part number W3T557862)
Description	Measuring module to measure disinfectants with DEPOLOX®-R, DEPOLOX® Pool-R and membrane sensors
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input	
Sensor type	• 3-electrode sensor • Membrane covered sensors
Measuring principle	Potentiostatic amperometry
Temperature drift	< 0.5 % / 10 k
Linearity error	< 0.1 % FS
Calibration	Pre-calibrated
Cell voltage U _{pot} 3-electrode sensor	-2000 ... +2000 mV
Cell voltage U _{pot} Membrane covered sensors	0 ... 10 V
Input signal	-10 µA +1000 µA
Measuring ranges	10 µA / 100 µA / 1000 µA

Rivo™ Flex Mod mV	
Article number	W3T557901 (Modul part number W3T559953)
Description	Measuring module to measure Redox value
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input	
Sensor type	Redox single-rod measuring electrode
Measuring principle	mV voltage measurement
Temperature drift	< 0.1 % / 10 k
Calibration	Pre-calibrated
Input signal	-1500 mV ... +1500 mV
Measuring ranges	-1500 ... +1500 mV
Input impedance	>10 ¹² ohms

Rivo™ Flex Mod pH	
Article number	W3T557902 (Modul part numer W3T559954)
Description	Measuring module to measure pH value
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input	
Sensor type	pH single-rod measuring electrode
Measuring principle	pH voltage measurement
Temperature drift	< 0.1% / 10 k
Calibration	Pre-calibrated
Input signal	-900 ... +900 mV
Measuring ranges	pH 0.00 ... pH 14.00
Input impedance	>10 ¹² Ohm

Rivo™ Flex Mod Fluoride	
Article number	W3T557903 (Modul part number W3T559955)
Description	Measuring module to measure fluoride value
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input	
Sensor type	Fluoride electrode
Measuring principle	mV voltage measurement
Temperature drift	< 0.1 % / 10 k
Calibration	Pre-calibrated
Input signal	-200 ... +200 mV
Measuring ranges	0.2 ... 20 mg/l
Input impedance	>10 ¹² Ohm

Rivo™ Flex Mod Con	
Article number	W3T557907 (Modul part number W3T584168)
Description	Measuring module to measure conductivity
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input	
Sensor type	LF325
Measuring principle	Conductive, 4 electrodes
Temperature measurement	NTC
Temperature measuring range	0 ... 100 °C/32 ... 212 °F
Temperature drift	< 0.5 % / 10 k
Calibration	Pre-calibrated
Cell voltage	0 ... 5V AC RMS
Cell current	0 ... 20 mA AC RMS
Measuring range	10 µS/cm ... 300 mS/cm

Rivo™ Flex Mod 2AI	
Article number	W3T557906 (Modul part number W3T557867)
Description	Measuring module for measuring two sensors or input signals with mA or V measuring signal
Dimensions	65 x 23 x 71 mm (LxWxD)
Ambient temperature	0 ... + 70 °C (32 ... 158 °F)
Storage temperature	-20 ... +70 °C (-4 ... 158 °F)
Measuring input 1/2	
Sensor type	0/4 ... 20 mA active 4 ... 20 mA passive 0 ... 10 V active
Measuring principle	mA current measurement voltage measurement
Temperature drift	< 0.25 % / 10 k
Calibration	Pre-calibrated
Input signal	0/4 ... 20 mA scalable or 0 ... 10 V
DC output	24 V / 25 mA max.
Input resistance	mA: <100 Ohm V: >1 MOhm

4.4 Expansion board (optional)

Rivo™ COM-Board USB 485	
Article number	W3T639691 (PCB part number W3T632875)
Interface	RS485 interface with Wallace & Tiernan protocol for connection to OPC server or control system for data visualization

5 DESIGN

5.1 General



Fig. 3 Rivo™ I Municipal/Industrial

- 1 Status LED on the device
- 2 Touchscreen

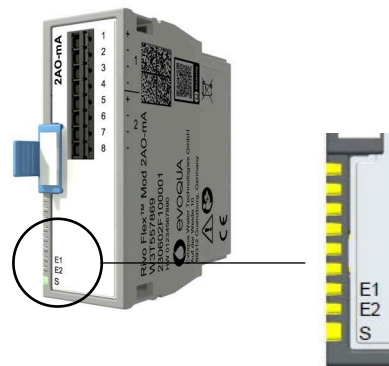


Fig. 4 Example "Rivo™ Flex Mod" Module with cut-out status LEDs and designation



For further details of the meaning of the various states of the status LED, see chapter Function - Status LED states.

5.2 Rivo™ Backboard 4 (Basic housing)

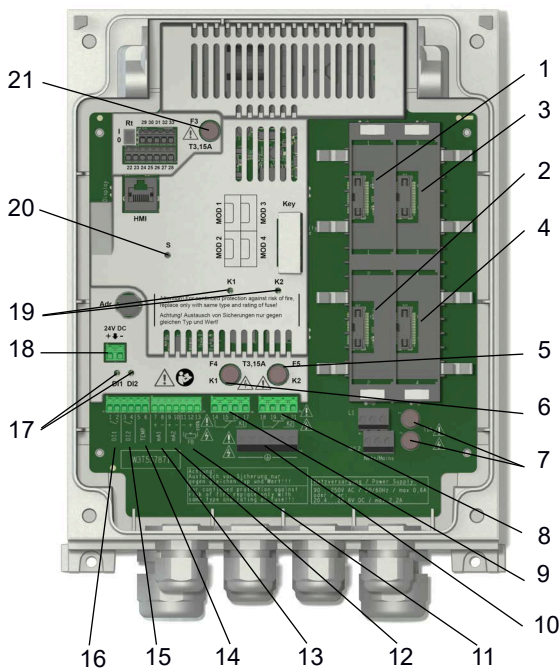


Fig. 5 Rivo™ Backboard 4 (Basic housing)



Module configuration see chapter Description - Electronics Module with "Rivo™ Flex Mod" Modules. Observe the order of module slots during allocation.

- 1 Module slot for "Rivo™ Flex Mod" Module - MOD 1
- 2 Module slot for "Rivo™ Flex Mod" Module - MOD 2
- 3 Module slot for "Rivo™ Flex Mod" Module - MOD 3
- 4 Module slot for "Rivo™ Flex Mod" Module - MOD 4
- 5 Fuse for relay 2
- 6 Fuse for relays 1
- 7 Mains fuses
- 8 Terminals for relay 2
- 9 Terminals for relay 1
- 10 PE connection terminals
- 11 Feedback input for actuator
- 12 mA input 2
- 13 mA input 1
- 14 Temperature input
- 15 Digital input 2
- 16 Digital input 1
- 17 Status LEDs of the digital inputs
- 18 24V DC connector
- 19 Status LED of relays K1/K2
- 20 Status LED
- 21 24V DC internal fuse

5.3 HMI

The HMI is installed in the housing cover.

The optional „Rivo™ COM-Board USB 485“ expansion board is installed under the protective cover of the HMI.

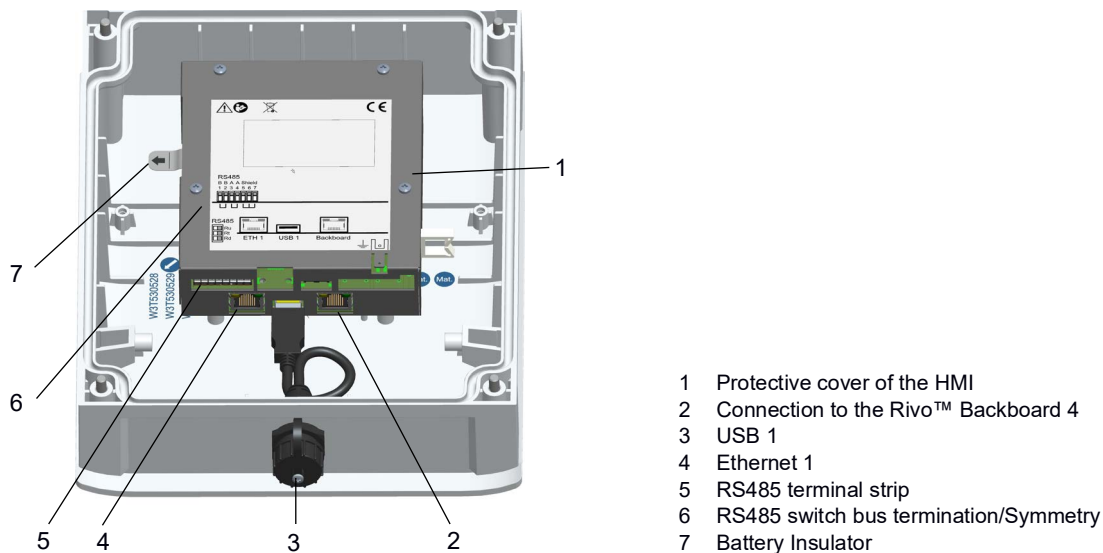


Fig. 6 HMI (housing cover)

6 DESCRIPTION

6.1 General

The Electronics Module measures and regulates chemical substances such as chlorine, chlorine dioxide, ozone, potassium permanganate, pH, redox, conductivity or fluoride, depending on which measuring modules and sensors are fitted.

Depending on the measuring modules installed, the Electronics Module is equipped with up to two measuring inputs at module slots 1 and 2. It also has two additional I/O modules for mA outputs or additional switching outputs.

The Electronics Module is available in two versions. They differ in the controller function provided. Both versions are available as wall-mounted devices.

Article number	Designation
W3T570783	Rivo™ Electronics Module (Mod. E10) Rivo™ I Municipal/Industrial – Analyser
or	
W3T586961	Rivo™ Electronics Module (Mod. E10) Rivo™ I Municipal/Industrial PC Analyser & Controller (PC) - Analyser with control function -

6.2 Configuration options

6.2.1 Electronics Module and Flow-through Adapter

Flow-through Adapters	Rivo™ Electronics Module (Mod. E10) Rivo™ I Municipal/Industrial – Analyser Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC)
Flow Cell Module DEPOLOX®-R (Mod. D10) non-pressurised version, article number W3T565860	✓
Flow Cell Module DEPOLOX®-R (Mod. D10) pressurised version, article number W3T566011	✓
Flow Cell Module DEPOLOX® Pool-R (Mod. D10) non-pressurised version, article number W3T565858	✓
Flow Cell Module DEPOLOX® Pool-R (Mod. D10) pressurised version, article number W3T565859	✓
Flow Cell Module Varia Sens™-R (Mod. D10) non-pressurised version, article number W3T566012	✓
Flow Cell Module Varia Sens™-R (Mod. D10) pressurised version, article number W3T566013	✓
Flow-through Adapter Flow Sens-R (Mod. D12) non-pressurised version, article number W3T159950/W3T167442/W3T158503/W3T170361	✓
Flow-through Adapter Flow Mem-R (Mod. D13) pressurised version, article number W3T566013	✓

6.2.2 Electronics Module with “Rivo™ Flex Mod“ Modules

The configuration of the Electronics Module is variable and can be retrofitted or upgraded at any time. Various functions are available depending on the configuration



A maximum of two measuring modules are supported:

- The Electronics Module supports a maximum of two “Rivo™ Flex Mod 2Rel-2DO“ Modules installation.
- A maximum of two “Rivo™ Flex Mod 2AO-mA“ Modules can be fitted.

If a controller is used for measuring channel 2, a “Rivo™ Flex Mod“ Module can also be used for the controller outputs or alternatively a “Rivo™ Flex Mod 2AO“ Module with control via mA signal.

If the sample water inlet disinfection function is used, a “Rivo™ Flex Mod 2Rel-2DO“ Module must be installed.

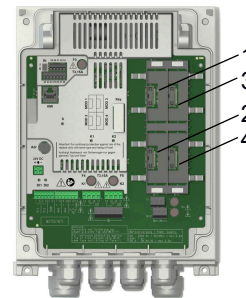


Fig. 7 Inside of module slot

- 1 Module slot 1
- 2 Module slot 2
- 3 Module slot 3
- 4 Module slot 4



We recommend assigning the module slots as follows:

Module slot 1	Module slot 2	Module slot 3	Module slot 4
Rivo™ Flex Mod Dis	Rivo™ Flex Mod Dis	Rivo™ Flex Mod 2Rel-2DO	Rivo™ Flex Mod 2Rel-2DO
Rivo™ Flex Mod mV	Rivo™ Flex Mod mV	Rivo™ Flex Mod 2AO-mA	Rivo™ Flex Mod 2AO-mA
Rivo™ Flex Mod pH	Rivo™ Flex Mod pH		
Rivo™ Flex Mod Fluoride	Rivo™ Flex Mod Fluoride		
Rivo™ Flex Mod Con	Rivo™ Flex Mod Con		
Rivo™ Flex Mod 2AI	Rivo™ Flex Mod 2AI		
Rivo™ Flex Mod 2AO-mA	Rivo™ Flex Mod 2AO-mA		

7 FUNCTION

7.1 General function

The Electronics Module is used for the measurement and regulation of the following parameters:

- Free chlorine, chlorine dioxide, ozone or potassium permanganate with 3-electrode measuring cell (temperature-compensated)
- Free chlorine, total chlorine and combined chlorine, chlorine dioxide, ozone with membrane sensor (temperature-compensated)
- Conductivity - This measurement is automatically temperature-compensated.
- pH value (temperature-compensated)
- Redox voltage
- Temperature measurement

7.2 Areas of application and examples

Areas of application:

- Drinking water
- Process water
- Waste water
- Swimming pool water

Application examples:

- Measurement and regulation of chlorine, pH, redox, conductivity, fluoride, total chlorine, chlorine dioxide and ozone
- Measurement and monitoring of water parameters
- Flow-controlled chlorination of drinking water (compound loop) - only with Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961
- Flow-controlled fluoride dosing (compound loop) - only with Rivo™ Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961
- Measurement and regulation of pH-value
- Quantity-proportional dosing of disinfectants (Proportional)
- Measurement and quantity-proportional dosing of chlorine with linearization of the actuator (with positioner)

- Monitoring and raising of alarm if limit values exceeded
- Data visualization
- Data transfer to higher-level systems
- Optionally, two additional control signal inputs for flow measurement and external setpoint setting can be connected with compound loop or proportional.

NOTICE

To record process measurements (Cl₂, pH, ...) and for flow-controlled dosing of chemicals (proportional, compound loop), the Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961 must be used.

7.3 Measurement inputs

NOTICE

When the Electronics Module is switched on, the “Rivo™ Flex Mod” Measuring Modules with which it is fitted must be initialized in the Application bar. Equipment fitted on the Measuring Module must always be initialized via the Application bar.

The following “Rivo™ Flex Mod” Measuring Modules can be installed at the module slots:

Designation/ Article Number	Measuring module applications
Rivo™ Flex Mod Dis W3T557878	Measurement of disinfectants with DEPOLOX®-R, DEPOLOX® Pool-R and membrane sensors FC2 (free chlorine), CD10.1 (chlorine dioxide), OZ10.1 (ozone), TC3 (total chlorine)
Rivo™ Flex Mod mV W3T557901	Measurement of redox value
Rivo™ Flex Mod pH W3T557902	Measurement of pH value
Rivo™ Flex Mod Fluoride W3T557903	Measurement of fluoride value
Rivo™ Flex Mod 2AI W3T557906	Measurement of sensors with mA or V measuring signal
Rivo™ Flex Mod Con W3T557907	Measurement of conductivity

7.3.1 Measurement of disinfectants

Various Flow Cell Modules and sensors can be connected to the Electronics Module for measuring disinfectants.

- 3-electrode measuring cell – DEPOLOX®-R
- 3-electrode single-rod measuring cell – DEPOLOX® Pool-R
- Membrane sensors

3-electrode measuring cell – DEPOLOX®-R:

Drinking water, service and process water as well as the water in swimming pools is disinfected by adding disinfectants such as chlorine, chlorine dioxide, ozone or potassium permanganate.

The disinfectant content can be measured using the DEPOLOX®-R with integrated 3-electrode measuring cell. The DEPOLOX®-R can be fitted with further sensors such as pH, redox, fluoride, conductivity sensors or membrane sensors, for example FC2 (free chlorine), CD10.1 (chlorine dioxide), OZ10.1 (ozone) and TC3 (total chlorine).

A Rivo™ Flex Mod Dis Measuring Module is installed for connection of the DEPOLOX®-R to the Electronics Module. Various controller functions are available, depending on the application selected.

Operating principle of the 3-electrode measuring cell - DEPOLOX®-R:

The measuring cell in the DEPOLOX®-R is a 3-electrode measuring cell with external potentiostatic control loop. Working and counter electrode are designed as semi-annular electrodes and made from a special platinum alloy.

A silver-silver chloride electrode connected to the sample water via two diaphragms (membranes) serves as the reference electrode. The reference electrode with PVC mounting is dipped into an electrolyte solution. If necessary, the electrolyte solution can be replenished during operation.

For connection to the Electronics Module, the Rivo™ Flex Mod Dis Measuring Module must be installed in module slot 1 or 2 in the Electronics Module.

Measurement with the 3-electrode measuring cell is pH-value dependent and follows the HClO characteristic curve.

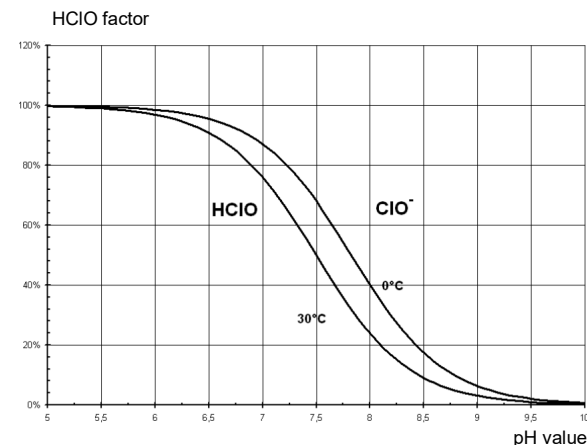


Fig. 8 HClO characteristic curve

Cl₂++ measurement

If a free chlorine measurement is equipped with a DEPOLOX® R measuring cell and a pH measurement, it is possible to select this measured value display as a Cl₂++ measurement in the “Sensor type” menu.

pH compensation is possible in the range from pH 6.00 to pH 8.75 by selecting Cl++ in the sensor type menu. The prerequisite is an installed pH measurement in the Electronics Module in the same sample water as the 3-electrode measuring cell. This function is only guaranteed up to max. 10 mg/l free chlorine.

See Chapter 12.12 System Setup.

An adjustable cell voltage U_{pot} is output via the potentiostatic control loop between working electrode (red) and reference electrode (white) by connecting the 3-electrode measuring cell to the electronic device (Rivo™ Flex Mod Dis Measuring Module). A cell current (μA signal) proportional to the concentration of disinfectant in the sample water is produced and is then evaluated with the Electronics Module.

A special electrode cleaning sand is poured into the Flow Cell Module. It circulates with the sample water flow and continually cleans the platinum electrodes.

There is a multi-sensor integrated in the DEPOLOX®-R for temperature measurement and monitoring of the flow rate. The multi-sensor must be connected to the Electronics Module.

3-electrode single-rod chlorine measuring cell - DEPOLOX® Pool-R:

The water in swimming pools is almost exclusively disinfected by adding chlorine.

The free chlorine content can be measured using the DEPOLOX® Pool-R and the 3-electrode single-rod chlorine measuring cell.

The 3-electrode single-rod chlorine measuring cell can only be installed in the DEPOLOX® Pool-R. Its installation guarantees a stable measuring signal.

For connection to the Electronics Module, the Rivo™ Flex Mod Dis Measuring Module must be installed in module slot 1 or 2 in the Electronics Module.

Operating principle of the 3-electrode single-rod chlorine measuring cell - DEPOLOX® Pool-R:

The 3-electrode single-rod chlorine measuring cell is maintenance-free and has a service life of approx. two years. A special electrode cleaning sand is poured into the DEPOLOX® Pool-R and is swirled around the glass electrodes, thus continually cleaning them. The electrode cleaning sand must be replaced regularly. The interval for replacement depends on the sample water (contamination level).

Measurement with the 3-electrode single-rod chlorine measuring cell is pH-value dependent and follows the HClO characteristic curve.

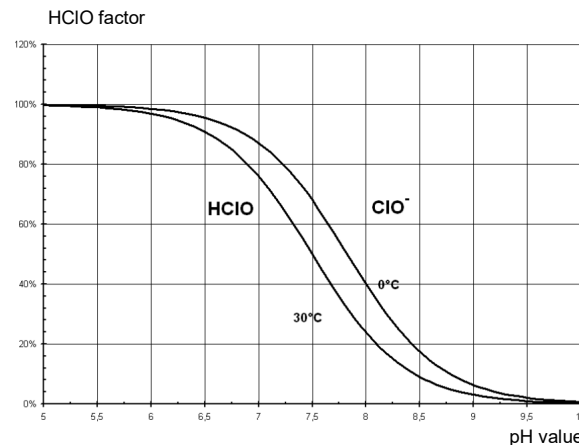


Fig. 9 HClO characteristic curve

There is a multi-sensor integrated in the DEPOLOX® Pool-R for temperature measurement and monitoring of the flow rate. The multi-sensor must be connected to the Electronics Module.

Membrane sensors

Membrane sensors can also be used to measure disinfectants in the water. These membrane sensors are available in different versions for the measurement of free chlorine, chlorine dioxide, ozone or total chlorine. The membrane sensors are installed in the Flow Cell Modules, for example, the DEPOLOX®-R or Varia Sens™-R.

For connection to the Electronics Module, the Rivo™ Flex Mod Dis Measuring Module must be installed in module slot 1 or 2 in the Electronics Module.

Adjustment of the measuring signal input:

The μA signal input of the Rivo™ Flex Mod Dis Measuring Module is adjusted on the Measuring Module as follows:

The cell current of the 3-electrode measuring cell, the 3-electrode chlorine measuring cell or the membrane sensors (μA current signal) is directly proportional to the concentration of disinfectant in the sample water. Depending on the application, as an option, the μA measuring range at the sensor input can be adjusted to suit the specific conditions. This will normally not be necessary, due to the preset Auto Range function.

NOTICE

The setting for the μA measuring range depends on the cell, the disinfectant concentration and the type of disinfectant.

Guideline for setting:

The Rivo™ Flex Dis Measuring Module has three measuring ranges for the sensor current. These can either be selected manually or adjust themselves automatically to the measured signal via the Auto setting (Auto Range).

- 0 ... 10 μA
- 0 ... 100 μA
- 0 ... 1000 μA
- Auto

NOTICE

If the disinfectant concentration is high, select a higher μA measuring range. The parameter μA measuring range can be changed in the sensor settings menu of the corresponding Measuring Module.

This will normally not be necessary, due to the preset Auto Range function.

With the DEPOLOX®-R, a μA value of approx. 30 μA per 1 mg/l chlorine can be assumed as a reference value.

With the 3-electrode single-or chlorine measuring cell, a reference value of approx. 8 μA per 1 mg/l chlorine can be assumed.

With membrane sensors, a typical μA signal of approx. 10 μA per 1 mg/l chlorine can be assumed.

Setting the potential voltage Upot - only with the 3-electrode measuring cell:

An adjustable potential voltage is output between working electrode and reference electrode. The potential voltage must be adjusted if disinfectants other than chlorine are measured:

- Chlorine: 250 mV (factory setting)
- Chlorine dioxide, ozone, potassium permanganate: 300 mV

The parameter "Upot" can be set in the menu "Measuring range" of the corresponding Measuring Module.

Ambient conditions:

The following points must be observed when installing disinfection measurement:

- The sample water extraction point must be selected in such a way that proper mixing in of the disinfectant and a bubble-free sample water flow are guaranteed.
- The extraction line must be as short as possible. No water pipes made of copper may be fitted in the installation. They would falsify the measurement.

- If the Flow Cell Module is not installed directly next to the Electronics Module, the measuring cell cable can be extended with a 3-core shielded cable with a maximum length of 30 m.
- As the multi-sensor for temperature measurement and flow monitoring is also integrated in the DEPOLOX®-R, the latter must also be installed with a corresponding extension cable. Cables are available in graduated lengths of up to 30 m.
- The terminals must be used with connection direction right in the Electronics Module. For details of how to connect the sensor to the Measuring Module, see the Chapter "Wiring diagrams".
- Initial calibration of the sensor can be carried out after approx. two to three hours running-in time.



The calibration must be checked after one day.

7.3.2 pH measurement

The pH value is a measurand in the field of water treatment. It is used as a measure of the acidic or alkaline effect of water. A pH single-rod measuring cell is used as a sensor.

For connection to the Electronics Module, the Rivo™ Flex Mod pH Measuring Module must be installed in module slot 1 or 2 in the Electronics Module.

Various controller functions are available, depending on the application selected.

The pH sensor can be installed in the Flow Cell Modules DEPOLOX®-R 5, DEPOLOX® Pool-R, Varia Sens™-R or in a separate Flow-through Adapter.

The following points must be observed when installing pH measurement:

- The ambient conditions.
- The sample water extraction point must be selected in such a way that proper mixing in of the correcting agent and a bubble-free sample water flow are guaranteed.
- There is no prescribed flow rate here.
- The sensor must be dipped at least 2 cm into the sample water.

- Extension cables with connectors are available if the sensor or the Flow Cell Module or Flow-through Adapter is not installed directly next to the Electronics Module.
- If extension cables (max. 30 m) are used, an impedance converter must also be fitted to the sensor to ensure a stable measuring signal.
- Initial calibration of the sensor can be carried out after approx. two to three hours running-in time.



The calibration must be checked after one day.

7.3.3 Redox measurement

The redox voltage is a measurand in the field of water treatment. The electrical potential present during a redox reaction is called the redox voltage and is used as a measure of the oxidation power of a system. The redox single-rod measuring cell is an extremely robust and low-maintenance single-rod electrode with a silver/silver chloride reference system.

For connection to the Electronics Module, the Rivo™ Flex Mod mV Measuring Module must be installed in module slot 1 or 2 in the Electronics Module.

Various controller functions are available, depending on the application selected.

The redox single-rod measuring cell can be installed in the Flow Cell Modules DEPOLOX®-R 5, DEPOLOX® Pool-R, Varia Sens™-R or in a separate Flow-through Adapter.

The following points must be observed when installing redox measurement:

- The ambient conditions.
- The sample water extraction point must be selected in such a way that proper mixing in of the disinfectant and a bubble-free sample water flow are guaranteed.
- There is no prescribed flow rate here.
- The redox single-rod measuring cell must be dipped at least 2 cm into the sample water.
- Extension cables with connectors are available if the redox single-rod measuring cell is not installed directly next to the Electronics Module.
- If extension cables (max. 30 m) are used, an impedance converter must also be fitted to the redox single-rod measuring cell to ensure a stable measuring signal.
- Initial calibration of the sensor can be carried out after approx. two to three hours running-in time.



The calibration must be checked after one day.

7.3.4 Fluoride measurement

Fluoride measurement using a fluoride-ion-sensitive sensor is used for continuous identification of fluorides in solutions. Measurement of the fluoride-ion concentration is selective. In order to ensure a correct measurement reading, the pH value of the medium must lie within a range of pH 5 to pH 8.

NOTICE

Rapid, repeated changes in temperature result in a constant change in the potential. This can cause functional failure of the sensor.

The fluoride electrode W2T840142 is filled with electrolyte. Electrolyte cannot be replenished.

For connection to the Electronics Module, the Rivo™ Flex Mod Fluoride Measuring Module must be installed in module slot 1 or 2 in the Electronics Module. Various controller functions are available, depending on the application selected.

The fluoride sensor can be installed in the Flow Cell Modules DEPOLOX®-R, DEPOLOX® Pool-R, Varia Sens™-R or in a separate Flow-through Adapter.

The following points must be observed when installing fluoride measurement:

- The ambient conditions.
- The sample water extraction point must be selected in such a way that proper mixing in of the disinfectant and a bubble-free sample water flow are guaranteed.
- There is no prescribed flow rate here.
- The fluoride sensor must be dipped at least 2 cm into the sample water.
- Extension cables with connectors are available if the sensor is not installed directly next to the Electronics Module.
- If extension cables (max. 30 m) are used, an impedance converter must also be fitted to the fluoride sensor to ensure a stable measuring signal.
- Initial calibration of the sensor can be carried out after approx. two to three hours running-in time.



The calibration must be checked after one day.

NOTICE

The fluoride-sensitive membrane of the fluoride sensor is protected by a rubber cap. The rubber cap must be removed before the fluoride sensor is dipped into the sample water.

To prevent damage, avoid touching the membrane.

Before use, the fluoride sensor should be placed in a 100 mg/l fluoride solution at pH 7 (e.g. calibration solution) for approximately 24 hours.

7.3.5 Conductivity measurement

Conductivity is a sum parameter that measures the total mineralization of water. As this measurement is extremely temperature-dependent, the conductivity sensor has an integrated temperature sensor. The measurement is always given relative to a specific temperature value. The international reference temperature is 20°C or 25°C.

The conductivity sensor comprises a 4-electrode system with integrated temperature sensor. Conductivity sensors are made of graphite and are therefore extremely robust and abrasion-resistant. The cell constant is 0.48 cm⁻¹. The Rivo™ Flex Mod Con Measuring Module must be installed at the module slot of the Electronics Module. Various controller functions are available, depending on the application.

The sensor can be installed in the Flow Cell Modules DEPOLOX®-R 5, DEPOLOX® Pool-R, Varia Sens™-R or in a separate Flow-through Adapter.

The following points must be observed when installing conductivity measurement:

- The ambient conditions.
- The sample water extraction point must be selected in such a way that proper mixing in of the disinfectant and a bubble-free sample water flow are guaranteed.
- There is no prescribed flow rate here.
- The conductivity sensor must be dipped at least 4 cm into the sample water.
- If the conductivity sensor is not installed directly next to the Electronics Module, the measuring cell cable can be extended with a connection socket and a 6-core shielded cable with a maximum
- length of 30 m.
- The terminals must be used with connection direction right. For details of how to connect the sensor to the Rivo™ Flex Mod Con Measuring Module, see the Chapter Wiring Diagram.

7.4 Controller modes (for W3T586961 only)

NOTICE

Only for the Rivo™ Electronics Module (Mod. E10)
Rivo™ I Municipal/Industrial PC – Analyser & Controller
(PC), article number W3T586961.

The Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961 offers various controller functions. Various controller modes such as proportional, single feedback control or compound loop can be selected. Each controller is available for measurement channel 1 and 2. A total flow measurement for both measurement channels is available for flow-dependent controllers.

To configure or activate the measurements and controllers for the first time, they must be configured via the application menu.

See menu “Application settings” => “Application settings”
=> “Channel 1” or “Channel 2”.

7.4.1 Proportional without process measurement



This function is only available in the Control SC application.

To switch the application, see Service Centre - Device configuration.

In this controller mode, the Electronics Module works exclusively as a proportional.

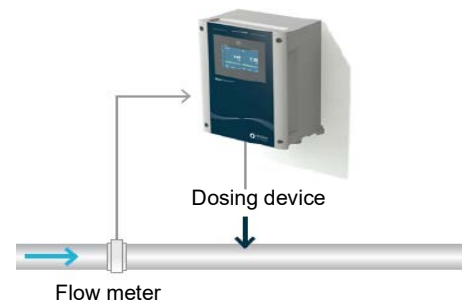


Fig. 10 Proportional without process measurement

The dosing rate of the connected device is controlled automatically in dependency on a measuring signal (external flow control signal) and an adjustable dosing factor. In the case of actuators with feedback, it is possible to compensate for the non-linearity via a maximum of 11 calibration points.

Necessary module equipment:

- No sensor for recording measured values for, for example, chlorine, pH etc. is supported or evaluated.

Input signals:

- Flow measurement (0/4 ... 20mA), scalable measuring range with unit

The following dosing outputs are possible:

- Dosing pump
- Pulse pump
- Positioner with feedback 1kOhm
- Analog mA output

Operating principle of the proportional:

Using the flow sensor with linear mA output signal, the flow rate is measured and the dosing rate adjusted proportional to the flow. Settings for the flow signal are made via the "Application Bar".



If the measuring range end value of the flow meter is not equal to the actual, maximum flow, the flow signal must be adjusted. To do this, an upper calibration point input is entered as an mA value corresponding to the mA signal at maximum flow. A further value, to be displayed as max. display value for the flow rate, must be entered as upper calibration point output.

Example:

Measurement range flow meter = 5000 l/h

Actual maximum flow rate = 2500 l/h of the controlled system (corresponds to 50 % of the measuring range of the flow meter)

Input signal = 4 ... 20 mA (output, flow measurement)

Upper calibration point input signal = 12 mA (corresponds mathematically to 50% of the mA signal range)

Upper calibration point output signal = 2500 l/h

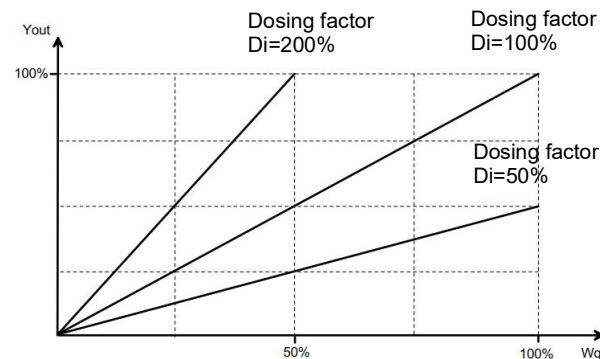
The ratio between control variable and dosing output is defined via the internal dosing factor.

If a positioner with feedback signal is used as a dosing output, it can be linearized with several data points. At least two points are necessary (0/100%). Up to 11 data points with firmly defined increments are possible.

In this operation mode, the controller output is calculated as follows:

$Y_{out} = Wq \times DF$	
Wq	Control variable 1 flow rate in %
DF	Set dosing factor in %

The graph below shows the output dosing quantity based on the flow rate Wq and the set dosing factor.



7.4.2 Proportional with process measurement

In this operation mode, the quantity-proportional dosing of disinfectants is controlled. Proportional with process measurement is only supported with the Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961.

A typical application is the simple, flow-controlled chlorination of drinking water. Controllers are available for each of the two measurement channels Mod1 and Mod2. The flow signal used is the same for both controllers.

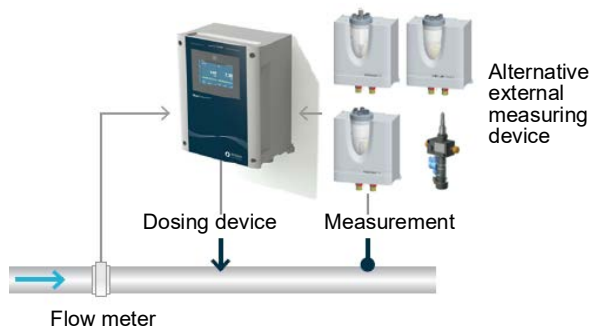


Fig. 11 Proportional with process measurement

Necessary module equipment:

- „Rivo™ Flex Mod“ Measuring module for recording measured values in module slot 1 or 2

! Alternatively, the measured value can also be transferred to the Electronics Module via the interface instead of a measuring module.

Input signals:

- Recording of measured values MOD 1 or MOD 2
- Flow measurement (0/4 ... 20mA), scalable
- Second control variable possible via sensor Measuring Module
- Internal or external dosing factor (0/4 ... 20mA)

The following controller outputs are possible:

- Dosing pump
- Pulse pump
- Positioner with feedback 1kOhm
- Analog mA output

Operating principle of the proportional:

Using the flow sensor with linear mA/V output signal, the flow rate is measured and the dosing rate adjusted proportional to the flow.

Settings for the flow signal are made via the “Application Bar”.



If the measuring range end value of the flow meter is not equal to the actual, maximum flow, the flow signal must be adjusted. To do this, an upper calibration point input is entered as an mA value corresponding to the mA signal at maximum flow. A further value, to be displayed as max. display value for the flow rate, must be entered as upper calibration point output.

Example:

Measurement range flow meter = 5000 l/h

Actual maximum flow rate = 2500 l/h of the controlled system (corresponds to 50 % of the measuring range of the flow meter)

Input signal = 4 ... 20 mA (output, flow measurement)

Upper calibration point input signal = 12 mA (corresponds mathematically to 50% of the mA signal range)

Upper calibration point output signal = 2500 l/h

The ratio between control variable and dosing output is defined via the internal dosing factor or can be specified via an external mA/V input signal.

It is possible to switch between internal and external dosing factor via the digital input. Alternatively, an external dosing factor can be specified via the optional interfaces. It is possible to include the measured value directly or indirectly proportionally in the controller output. To do this, set the Process agent factor parameter = ON . The extent to which the measured value is included in the calculation is defined via the process agent factor.

The typical application of proportional with two control variables is in dechlorination.

The controller output is calculated as follows in this operating mode:

Yout = Wq x DF x (X-Measured value x X-Factor)	
Wq	Control variable 1 Flow rate in %
DF	Set dosing factor in %
X-Measured value	Control variable 2 Measuring channel in %
Yout	Determined controller output value in %
X-Factor	Prozess agent factor

7.4.3 Single feedback control with process measurement

In this operation mode, the desired measurand is controlled in accordance with a prescribed setpoint. The following image shows a typical application for a Cl₂ single feedback control with a constant flow rate.

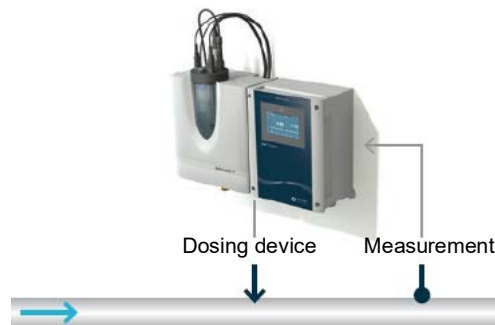


Fig. 12 Single feedback control with process measurement

Necessary module equipment:

- "Rivo™ Flex Mod" Measuring module for recording measured values at module slot 1 and 2



Alternatively, the measured value can also be transferred to the Electronics Module via the interface instead of a measuring module.

Input signals:

- Measured value recording module
- Internal or external setpoint

The following controller outputs are possible:

- Dosing pump
- Pulse pump
- Positioners with/without feedback (1kOhm)
- Analog

Operating principle of the single feedback control:

A PI controller is used to control the measurand from the sensor Measuring Module to the desired setpoint constantly and without deviation. It continuously determines the required dosing output.

The setpoint can be set within the measuring range ("Setpoint source" = internal).

Xp and Tn serve as control parameters to be set. They can also be determined automatically via the integrated Auto tune function during chlorine regulation.

An external setpoint from 0 – 100% can be preset via the mA/V input signal. It is possible to switch between internal and external setpoint via the digital input. Alternatively, the setpoint can be specified via the optional interfaces.

The control direction of the controller can be selected with the parameter "Control direction" = direct or inverse (e.g. direct = chlorination, inverse = dechlorination).

In this operation mode, the controller output is calculated as follows:

$Y_{out} = Y_{pi} = e_k \times K_p \times (1 + t/t_n)$	
t	Controller sampling time
t _n	Integral action time
K _p	Proportional factor 100 / X _p
e _k	Deviation setpoint-actual value
Y _{pi}	PI controller output value
Y _{out}	Determined controller output value in %

7.4.4 Compound loop with process measurement

The compound loop is a combination of proportional with additional single feedback control for the correction of control deviations. With the advantages of both operation modes, compound loop ensures that the measured values are regulated to the setpoints as quickly as possible if there are changes in the flow.

The image below shows a typical chlorine compound loop as realized in the treatment of drinking water.

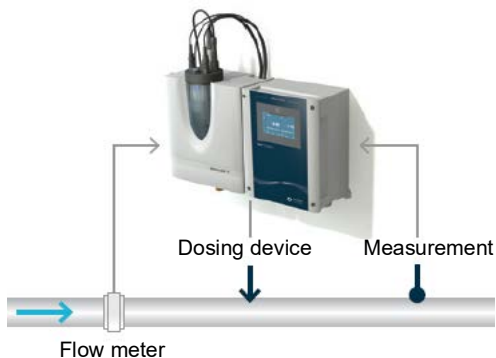


Fig. 13 Compound loop with process measurement

Necessary module equipment:

- “Rivo™ Flex Mod” Measuring module for recording measured values at module slot 1 and 2



Alternatively, the measured value can also be transferred to the Electronics Module via the interface instead of a measuring module.

Input signals:

- Flow measurement (0/4 ... 20mA), scalable
- Measured value recording module
- Internal or external setpoint

Output parameters:

- Dosing pump
- Pulse pump
- Positioners with feedback (1kOhm)
- Analog

Operating principle of the compound loop:

With compound loop, a dosing rate is output proportional to the flow. This dosing rate does not have a fixed dosing factor proportional to the flow, as with proportional, but instead, varies as needed.

Control deviations are detected via recording of the control value with Sensor Measuring Module and the specification of a setpoint. They are then compensated for by the integrated single feedback control.

The setpoint can be set within the measuring range. An external setpoint value of 0 - 100 % can be specified via the mA input signal "mA input 2". It is possible to switch between internal and external setpoint via digital input.

Alternatively, the setpoint can be specified via the optional interfaces.

Control parameters X_p and T_n of this superimposed single feedback control are determined with the integrated logic, while the process times T_{const} and T_{var} , to be entered at 100% flow, are determined automatically. As process time T_{var} changes dependent on the flow, T_{var} and X_p as well as T_n are continually updated via the integrated fuzzy logic.

The Electronics Module operates internally with a dosing factor table for 0 ... 105% flow. During operation, the device automatically determines the required dosing factors based on the corresponding flow, in 5% increments. The corrections made by the single feedback control are entered in the dosing factor table.

In this way, non-linearities of the control loop are learned. In the event of changes in the flow, this means rapid regulation of the setpoint.

The dosing factor table can be checked in the menu. It is possible to delete the entire dosing factor table.

Factory setting: 50%

To prevent the dosing capacity from being excessive during commissioning, it is possible to specify a manual dosing rate that corresponds to the setpoint value in manual mode. Using the bumpless transfer option, the current dosing output is transferred when the operating mode is switched to automatic mode. This eliminates a long start-up time for the controller.

It is possible to switch to controller operation mode proportional or single feedback control via digital input.

The control direction of the controller can be selected with the parameter "Control direction" = direct or inverse (e.g. direct = chlorination, inverse = dechlorination).

Behavior during operation - operation after a change in flow rate:

The single feedback control remains switched off (Ypi stop function) for the duration of the disturbance variable (change in flow rate, positioner runtime, dead time due to line length). This holds the control stable, i.e. the controller operates

with the dosing factor valid for the new flow from the dosing factor table. The switch-off time for the single feedback control is determined via the fuzzy module and is therefore variable (display "PI" in seconds).

The "Flow jump threshold" parameter can be used to define the influence of the disturbance variable or the size of the flow change that freezes the PI controller for a certain time.

A major change in setpoint value deletes all learning counters to re-initialize the dosing factor characteristic curve when the setpoint is reached.

For the moment, however, the learned flow values remain unchanged. A dosing factor is automatically preset for non-regulated flow values. The single feedback control is always active.

At constant flow, any control deviations that occur are quickly compensated for by the PI single feedback control. In the case of a positive jump in the flow rate, the setpoint is briefly undershot due to the running time of the positioner and the dosing delay. For this reason, the PI controller is frozen for a short time.

In the case of a negative jump in the flow rate, the setpoint is briefly exceeded due to the running time of the positioner and the dosing delay. For this reason, the PI controller is frozen for a short time.

The PI controller is not deactivated where the dosing rate can keep pace with a continually rising or falling flow rate. This applies in the case of fast positioner running times and control loops without dosing delay.

Special functions:

- The control direction of the controller is reversible.
- Automatic determination of the control parameters using integrated logic.
- System determines the internal control parameters based on the entered process times T_{const} and T_{var} .
- Setpoint can be switched between internal and external.
- PI stop function with change in control variable.
- Control variable flow rate can be selected directly or indirectly proportional and measuring range adjustments are possible.

- Bumpless transfer from compound loop to proportional or single feedback control is possible via digital input.

Yout = $Wq \times (DFWq + ek \times Kp \times (1 + t/tn))$ Ratio single feedback control	
t	Internal controller sampling time
tn	Integral action time
Kp	Proportional factor 100 / Xp
ek	Deviation setpoint-actual value
DFWq	Learned dosing factor for the current flow rate
Wq	Flow signal in %
Yout	Determined controller output value in %

Determining process times of the compound loop:

For controller adjustment with the compound loop, the process times Tconst and Tvar must be entered in the parameter menu path. These times are control loop dead times that on one hand are independent of the control variable and on the other are proportional to the control variable.

The constant dead time < Tconst > (independent of control variable) consists of the dead time of control variable measurement (measuring dead time) and any dosing delays.

The variable dead time < Tvar > depends on the current control variable and is given in the menu with a control variable of 100%.

The following sample calculations apply to the use of the Electronics Module for flow-controlled chlorine dosing with excess chlorine correction (drinking water control loop).

Determining the control-variable-independent dead time T_{const} :

The control-variable-independent dead time T_{const} consists of the measuring dead time and the dosing dead time.

Calculation 1 of the measuring dead time:

The sample water is extracted directly after the mixing loop and routed to the measuring cell.

The sample water dead time depends on the nominal diameter of the sample water line and the rate of flow to the measuring cell. For the DEPOLOX®-R, a flow value of 36 l/h is assumed.

For the DEPOLOX®-R:

$$t_{\text{sw}} (\text{DEPOLOX}^{\text{®}}\text{-R}) = (d_{\text{sw}} \times d_{\text{sw}} \times l_{\text{sw}}) / 7.65$$

(result in min)

The following applies in general:

$$t_{\text{sw}} = (4.71 \times d_{\text{sw}} \times d_{\text{sw}} \times l_{\text{sw}}) / Q_{\text{sw}} \text{ (result in min)}$$

d_{sw}	Internal diameter of the sample water line in cm
l_{sw}	Length of the sample water line in meters
Q_{sw}	Rate of flow to the measuring cell in l/h

Example:

The sample water line is a DN6 line with a length of 10 meters and is connected to the 3-electrode measuring cell (DEPOLOX®-R).

$$t_{\text{sw}} = (0.6 \times 0.6 \times 10) / 7.65 \text{ min} = 0.47 \text{ min, i.e. approx. 28 sec.}$$

Calculation 2 of the measuring dead time:

The sample water extraction is equipped with an additional sample water pump (bypass line).

The sample water dead time depends on the flow capacity of the sample water pump, on the nominal diameter of the bypass line and the length up to the sample water branch-off to the measuring cell.

$T_{by} = (4.71 \times d_{by} \times d_{by} \times l_{by}) / Q_{by}$	
d_{by}	dby Internal diameter of the bypass line in cm
l_{by}	Length of the bypass line from the sample water extraction to the sample water branch-off to the cell in meters
Q_{by}	Flow capacity of the bypass pump in l/h (result in min)

Check whether the length of the sample water line to the measuring cell can be neglected. If necessary, calculate the sum of calculation 1 and 2.

Calculation 3 of the measuring dead time:

The sample water extraction is designed as in calculation 1 and/or 2. In addition, for a longer exposure time, the water is routed through a delay tank.

The exposure time in the delay tank must be added to the calculated time.

Determining the dosing dead time (dosing delay):

Dosing dead times are caused by long dosing lines and positioner running times.

Determining the dosing dead time - calculation 1:

Determination of the dead time caused by dosing line lengths.

The dosing dead time can be determined as follows:

$t_{dos} = (4.71 \times d_{dos} \times d_{dos} \times l_{dos}) / Q_{dos} \text{ (result in min)}$	
d_{dos}	Internal diameter of the dosing line in cm
l_{dos}	Length of the dosing line in meters
Q_{dos}	Flow capacity of the dosing line in l/h

Determining the dosing dead time - calculation 2:

If rapid changes in control variable with which the actuators cannot keep pace are expected in the system (e.g. positioner running times, cycle time of dosing pumps), the dosing delay time must be assumed to be half the running time of the positioner (T_y) and cycle time (T_p).

With a positioner running time of 80 seconds, a value of approx. 40 s must be calculated as constant dosing delay. The sum of the measuring dead time and dosing delay is entered in minutes in the menu < Tconst >.

Determining the control-variable-dependent dead time T_{var} :

The control-variable-dependent dead time T_{var} is dependent on the nominal flow rate, the internal diameter of the pipe and the distance between chlorine addition point and sample water extraction.

$t_{var} = (d_{pipe} \times d_{pipe} \times l_{pipe}) / (212.3 \times Q_{nom}) \text{ (result in min)}$	
d_{pipe}	Internal diameter of the pipeline in cm
l_{pipe}	Distance between chlorine addition point and sample water extraction in meters
Q_{nom}	Nominal flow rate in m³/h (corresponds to the flow rate specified as 100% flow signal for the controller)

If there are special reaction tanks in the system, these tanks must be considered separately.

7.5 Dosing contact

A dosing contact can be used to control electrolysis systems for chlorine dosing. To control these systems, a special controller is required that avoids switching on and off too frequently (reason: start-up times of electrolysis systems).

The contact is enabled or disabled within the set control parameters.

If the value falls below the entered setpoint minus hysteresis (e.g. 0.20 mg/l), the controller output switches on for at least the minimum switch-on time. The controller output remains switched on as long as the value falls below the setpoint.

If the setpoint is exceeded, the controller output switches off immediately (provided that the minimum switch-on time has elapsed).

Switching on again when the setpoint hysteresis is undershot is only possible after the minimum switch-off time has elapsed.



In manual mode, the minimum switch-on time and the minimum switch-off time are not observed!
The maximum dosing time is not monitored with dosing contact.

7.6 Control parameters

Control parameters are input variables that determine the control functions of a controller. Different parameters apply to each type of controller.

Flow rate direction

This parameter determines the direction of the flow rate signal directly proportional to the actuator output:

direct = Flow rate input signal directly proportional to the positioner output (factory setting)

inverse = 1 flow rate input signal

Example:

0 ... 100 % flow rate = 0 ... 20 mA (direct)

0 ... 100 % flow rate = 20 ... 0 mA (inverse)

Max. pulses/min

Meaning: Maximum number of pulses

Explanation: The pulses max./min parameter only applies to pulse pumps.

This parameter is used to set the maximum number of pulses per minute in accordance with the employed pump.

Setting range: The parameter max. pulses/min. can be set to 100, 120, 140, 160 or 180 pulses.

Max.lin.Correction

This parameter monitors changes to already learned dosing factors.

If new dosing factor changes are learned, which are larger than the max. linearity correction, this dosing factor is used for all values in the dosing curve => initialization of the curve.

Special case:

Max.lin.Corr. = 0:

The curve function is turned off, only one dosing factor is valid for all flow rates and the higher-level single feedback closed loop control remains active.

Example:

Max.lin.Corr. = 50 % (based on dosing factor):

Previous dosing factor: 30 %

Newly learned dosing factor: 48 %

max. permissible correction range: $30 \pm (50 \% \text{ of } 30 \%) = 30 \% \pm 15 \%$

Change in this case: $48 \% - 30 \% = +18 \%$

=> The new dosing factor is assumed for the entire curve, because the new dosing factor (+48%) is greater than the max.lin.Correction (+18%).

Control factor

Setting the ratio of control range and measuring range, in order to adjust the control amplification Xp to the process.

$$\text{Control factor} = (\text{End of measuring range} - \text{start of measuring range}) / \text{Control range}$$

Example:

Start of measuring range: pH 4

End of measuring range: pH 9

Max. process control range:

$\pm 1 \text{ pH} (= 2 \text{ pH increments})$

=> Control factor = $(9 - 4) / 2 = 2.5$

PI shutdown

Defines a range for flow rate changes triggered by the YPI stop function when the limit is exceeded. Factory setting = 5%, i.e. if the change in flow rate is greater than 5% the PI controller is frozen for a specific length of time. Adjustment range 5 to 100 %.

Control direction

Meaning: Direction of the control

Display: Direct/inverse (e.g. for pH)

Explanation: Defines which medium is used to perform the correction.

Example:

pH: Control direction "inverse": Lowering pH value by adding acid

pH: Control direction "direct": Adding alkaline to raise the pH value

Setpoint

Specified value at which the control variable can be maintained by the controller. The setting range corresponds to the respective measuring range.

Bumpless-Transfer

This parameter enables the current dosing capacity to be transferred to the following operating mode or controller mode when the operating mode and controller mode are changed. This keeps the dosing and therefore the current measurement stable. The function can be activated or deactivated once or permanently.

Dosing delay time

The dosing delay time delays the start of dosing after switching on the appliance and after changing the operating mode.

Safety MAN. Mode

If this parameter is set to ON, dosing also stops in manual mode if the sample water flow is too low or if an external stop occurs.

Source dosing factor

This parameter defines the source of the dosing factor active for the control. This can either be the internally set dosing factor of the menu setting or the dosing factor as an external mA signal input or interface interface.

Setpoint source

This parameter defines the source of the setpoint active for the control. This can either be the internally set setpoint value of the menu setting or the setpoint value as external mA signal input 2 or interface interface.

Switch-off threshold

Defines a switching threshold in compound loop mode above which changes in the flow rate freeze the PI control for a certain period of time (depending on the process times and the flow rate value).

Tn

Meaning: Integral action time (I-element)

Display: Minutes (min)

Explanation: On the basis of the integral action time Tn, the dosing capacity changes constantly until the setpoint is reached. The higher the value of Tn, the longer it takes until the controller increases the dosing rate.

Tn higher: Control response becomes slower

Tn lower: Control response is faster

Setting range: The parameter Tn can be set from 0 – 100 min (Tn = 0 means that the "I-element" is deactivated, i.e. a pure P-control response applies). It may not be possible to reach the setpoint value.

Tp

Meaning: Cycle period

Display: Seconds (s)

Explanation: The parameter Tp only applies to dosing pumps.

The cycle period Tp defines a switching period, which must be coordinated with the respective pump type.

Setting range: The parameter Tp can be set from 10 to 180 s.

Example:

Fast dosing pumps correspond to a low Tp;
slow dosing pumps correspond to a high Tp.

The control parameter Tp must always be adjusted to suit the pump employed:

Dosing pump strokes/ min	Tp value
up to 20	120
20 to 40	100
40 to 80	60
80 to 125	30
125 to 200	15

Ts

Meaning: Loop rise time

Display: Minutes (min)

Explanation: Time required to reach the measuring range end value with 100% dosing chemical supply.

Setting range: The parameter Ts can be set from 1 s to 8 h.

NOTICE

If the values Tu and Ts are manually modified, the control parameters Xp and Tn are re-calculated.

Tu

Meaning: Loop dead time

Display: Seconds (s)

Explanation: Time required between dosing start and clear recognition of the rise in the control variable

Setting range: The parameter Tu can be set from 1 s to 59 min 59s.

NOTICE

If the values Tu and Ts are manually modified, the control parameters Xp and Tn are re-calculated.

Ty/Reference Run

Meaning: Running time of the positioner

Display: Hours : Minutes : Seconds

Explanation: The parameter Ty only applies to positioners.

Ty is the time which the positioner requires to adjust from 0 % to 100 %.

Setting range: The parameter Ty can be set between 10 and 180 seconds or automatically determined by pressing the "Reference run" button. The system calculates the actuator runtime automatically by moving to the end positions".

Xp

Meaning: Proportional factor

Display: Percentage (%) with factor

Explanation: The control amplification is determined with the proportional factor.

The lower the proportional factor Xp is selected in % , the greater the deviation from the setpoint is amplified, and the more quickly the controller attempts to control the deviation from the setpoint.

The control amplification factor is calculated using the following equation:

$$\text{Factor} = (1/X_p) \times 100 \%$$

Setting range: The parameter XP can be set from 1 % (factor 100) – 1000 % (factor 0.1).

Xsh

Meaning: Neutral zone

Display: Percentage (%)

Explanation:

The parameter Xsh only applies to 3-point controllers.

No control output occurs in the neutral zone.

Setting range: The parameter Xsh can be set from 1 to 5 % (depending on the measuring range).

The neutral zone is the defined range of setpoint + X_{sh} to setpoint X_{sh}.

Auto positioner calibration

This parameter is only possible for dosing output positioner with feedback.

Adjustment of the positioner feedback signal to 0 % and 100 % dosing capacity. When automatic Ym calibration is started, the positioner moves to positions 0 % and 100 % and calibrates both positions with the Electronics Module. To start the calibration, press the "Start" button.

With manual calibration of the up-to-11 positions, all positions must be shifted to manually and the dosing capacities are entered manually.

For the procedure, see chapter Function - Manual positioner calibration.

Feedback Threshold

This parameter defines the accuracy of the positioning of the servomotor with feedback.

The setting is made in %.

The setting should not be too small, otherwise there is a risk that the positioner will be permanently positioned or activated.

Switching to proportional

If this function is activated, the controller mode switches from compound loop to proportional when the flow rate falls below the defined threshold value. This can be helpful if low flow rates cause long process times and unstable control results. The last dosing factor output is used as the dosing factor in order to keep the measurement results stable or constant.

Enable relay

This parameter enables the additional use of an enable relay for the dosing device when controlling the dosing output via mA signal (continuous actuators). If unused, free relays are available, these can be selected or assigned.



Documentation required by the operator.

Assignment

This parameter enables a customer-specific change or assignment of a dosing output to a free relay if the factory setting is to be changed.



Documentation required by the operator.

Ymax

Meaning: Dosing rate limitation (single feedback control only)

Display: Percentage (%)

Explanation: The parameter Ymax only applies to:

- Positioner with feedback
- Dosing pumps
- Solenoid pump
- Controller with mA output

Ymax defines the maximum control output to the actuator
The control parameter corresponds to electronic dosing limitation of the actuator.

Setting range:

The parameter Ymax can be set from 0 to 100 %.

Ymin

Meaning: Dosing rate basic load (single feedback control only)

Display: Percentage (%)

Explanation: The parameter Yminonly applies to:

- Positioner with feedback
- Dosing pumps 2p
- Solenoid pumps 2p
- Controllers with mA output 2p

A basic dosing rate is output to the actuators
with Ymin.

Setting range: The parameter Ymincan be set from 0 to 100 %.

NOTICE

Ymin and Ymax is only available for the single feedback control.

The control range is limited by the parameters Ymax and Ymin.

Do not select a Ymax value lower than Ymin.

At Ymin> 0 overdosing can occur.

7.7 Display of dosing quantity

The Electronics Module allows a freely configurable dosing quantity display (Yout). In the menu, see device, the dosing quantity can be left as a value 0 to 100% or freely configured as a dosing quantity, e.g. 0 to 10.0 l/h, 0 to 4.0 g/h, etc. Format and unit are freely selectable - see menu on the device.

7.8 Control connections 1 and 2

CAUTION

Danger caused by external voltages at the digital inputs

Possible consequence: Serious material damage.

- Do not apply external voltages at the digital inputs.

There are two integrated digital inputs on the Rivo™ Backboard 4. They are provided for connection of voltage-free contacts (< 100 Ohm) and are supplied internally with 24 V.

The functions of the digital inputs can be configured for the specific customer application in the menu on the device.

It is possible to influence the controller or trigger alarms. Various functions can be assigned to the digital inputs. With the help of a voltage-free enabling contact, e.g. external stop, it is possible to realize the various functions:

- Alarm (freely configurable)
- Controller Stop: Dosing is switched off.
The positioner moves to 0 %.
- Max. Dosing: Controller output 100%
- Freeze control: Controller output remains constant
- 2x Yout: doubles controller output
- Ignore external setpoint/dosing factor: Switch to internal setpoint/dosing factor
- Switch to proportional (only for compound loop)
- Freeze application: all measurements, controller outputs are kept constant
- Application in standby: Measured values are hidden
- Empty signal contact of the chemical tank(s).
The dosing pump is switched off.
The positioner moves to 0 %.

- Switchover between internal and external dosing factor.
- Switching between controller modes from compound loop to proportional.
- A customised name (label) can be assigned with each digital input and the switching direction can be selected between Direct (Normally Open) and Inverse (Normally Closed).
- The entry of a debounce time is possible

NOTICE

The restart of the controller can be delayed due to the dosing delay time. In as-delivered status, the digital inputs are disabled. To activate the function, configure the digital input in the menu. The digital inputs can also be assigned as alarms.

The digital inputs can be configured as direct or inverse so that they switch to active state as NC or NO contacts.

7.9 Sample water monitoring

WARNING



Danger caused by uncontrolled dosing and incorrect circulation output

If there is a shortage of sample water or the flow rate is too low, if the circulation is switched off or the circulation output is too low, there is a risk of uncontrolled dosing of chemicals.

Possible consequence: fatal or serious injury.

- Never disable the sample water monitoring - even temporarily, e.g. by bridging the signal input.
- Chemical dosing must switch off if the circulation is switched off or if the circulation output or flow rate is too low. To ensure this, circulation output or flow rate monitoring must be installed in the system and connected to the Electronics Module.

7.10 mA inputs, Rivo™ Backboard 4

There are two integrated mA inputs on the Rivo™ Backboard 4. mA input 1 is used to record the flow signal as a 0 to 20 mA or 4 to 20 mA signal. The input signal can be freely configured in the menu (see menu Input/Output). Format, range and unit are freely selectable. Optionally, mA Input 2 can be used for an external dosing factor, this signal must be 0 to 20 mA or 4 to 20 mA. The mA signal corresponds to a dosing factor of 0 to a maximum of 400% or an external setpoint within the selected measuring range.

7.11 Connections to visualization systems

The following options are available for connecting the Electronics Module to a higher-level visualization or control system:

- Ethernet interface with Modbus TCP and HTTP protocol (standard)
- Optional 2-way mA signal output module “Rivo™ Flex Mod 2AO-mA”
- Optional “Rivo™ COM-Board USB 485” expansion board with RS485 interface (Wallace & Tiernan protocol). See Chapter Interfaces.

7.12 Controller outputs

The Electronics Module supports the activation of various dosing systems via relay or mA-signal outputs. Module slots are provided for optional expansion with further relays.

The following dosing outputs can be activated:

Controller for	Type	Parameter designation	Action
Positioner with feedback signal	3-point	Positioner with Ym	Dosing ↑ or ↓
Motor dosing pump (pulse-duration controller)	2-point	Dosing pump 2P	
Solenoid pump (pulse-frequency controller)	2-point	Solenoid pump 2P	
Dosing pump with mA input	2-point	Analog output 2P	

7.12.1 Positioner (with feedback)

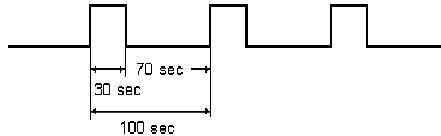
With the selection of the positioner, for example, it is possible to use chlorine gas dosing in combination with a positioner as an actuator of a chlorine gas dosing system. If actuator feedback is present, it must be calibrated during startup.

Potentiometers 1 kOhm/5 kOhm can be connected as actuator feedback (see Chapter Function - Positioner feedback).

Linearization of the actuator via several calibration points is possible here.

7.12.2 2-point or 3-point pulse-duration controller for dosing pumps

The dosing pump is switched on for the calculated time within an adjustable cycle period T_p (relay contact). The cycle period T_p is mainly determined by the reaction time of the connected system and entered as the cycle period T_p .



Example:

Cycle period $T_p = 100$ s Output value $Y_{out} = 30\%$
 Duty cycle 30 s Off time 70 s

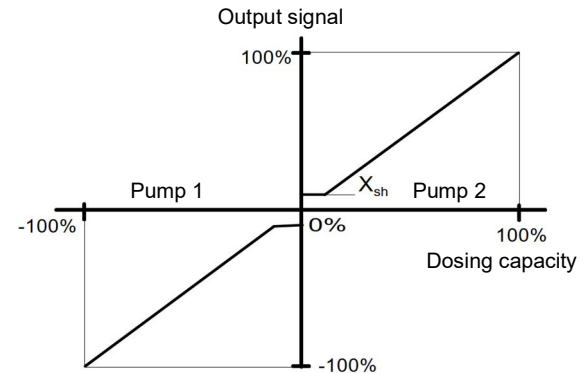


Fig. 14 3-point pulse length controller

7.12.3 2-point or 3-point pulse-frequency controller for solenoid pumps

Solenoid pumps are controlled with 0 to a maximum of 180 pulses per minute, depending on the specification of the connected pump. The Electronics Module supports pumps with 100, 110, 120, 130, 140, 150, 160, 170 and 180 pulses per minute.

The pulse time is fixed at 250 ms. The number of pulses per minute depends on the dosing capacity.

7.12.4 Analog 2-point output/Analog 3-point output

As an option, the Electronics Module can be retrofitted with a 2-way mA output module (Rivo™ Flex Mod 2AO mA). These mA outputs can be configured as registration or control outputs.

In the selection “Dosing => Actuator = Analog output 2P” the mA output is firmly assigned as a control output. With a control output of 0%, the output current is 0 or 4 mA, while with a greater Yout, the output current reaches up to 20 mA.

In the selection “Dosing => Actuator = Analog output 3P (single)” an mA output is assigned as a control output.

Depending on the controller output if it is positive or negative, a mA output greater or less than 10 or 12 mA is valued. With a control output of 0%, the output current is 10 or 12 mA.

Dosing pumps with mA control input, control valves with mA signal input, for example, can be used as actuators.

The analogue output must be configured accordingly in the “Settings actuator” menu (Analog output Selection, measuring range 0/4 to 20mA).

If “Dosing => Analog output 3P (dual)” is selected, two separate mA outputs are assigned as control outputs. Depending on the dosing capacity, one mA output is activated for lifting from 0 to 100% and one mA output is activated for lowering from 0 to -100%.

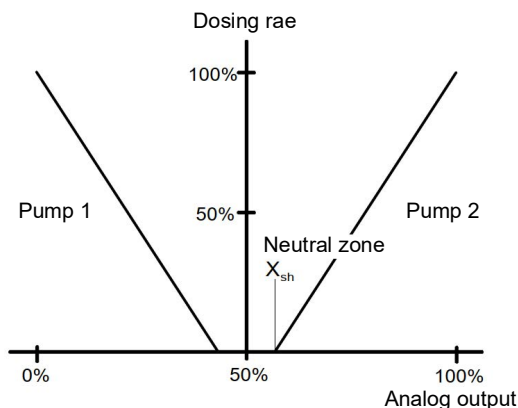


Fig. 15 Analog output controller

If the mA outputs are used to control actuators or dosing pumps, it is possible to configure an enabling relay for each dosing device.

The assignment of an enabling relay enables additional safe enabling or switching off of the respective dosing. The selection or assignment of a relay is possible on a customer-specific basis if free relays are available. Customer-specific relay assignments must be documented accordingly to ensure traceability.

7.13 mA outputs

As an option, the Electronics Module can be equipped with a "Rivo™ Flex Mod 2AO-mA" 2-channel output module. Both mA outputs are electrically isolated and can be freely assigned for the transmission of measured values or controller outputs. The output signals can be configured as 0 to 20 mA and 4 to 20 mA.

If an mA value of 3.4 mA is not reached in the setting 4 to 20 mA, this is detected as a line break and an error is generated.

7.14 Positioner feedback

When a positioner with feedback (positioner with Ym) is used as dosing output, the actual position of the positioner/dosing rate is transferred to the control device via selectable input signals in order to achieve the best possible control result. Various feedback options are available:

- Potentiometer 1 kOhm

The feedback signal used can be set in the menu. For an optimum control result, the position feedback must be aligned (calibrated) with the controller.

The positioner feedback end points 0% and 100% must always be calibrated.

The position feedback can be calibrated manually or automatically. With automatic calibration, the controller automatically moves to the 100% and 0% position and saves the corresponding measured values of the feedback signal internally.

The running time of the positioner (Ty) is automatically determined during the calibration process. During calibration, the positioner must not be unlocked for manual operation.

If the dosing rates between 0% and 100% are not linear to the position feedback, these non-linearities can be compensated for or linearized via correction values between 0 and 100% for the proportional ratio control or compound loop combination control. Up to 11 further positions can be corrected to compensate for non-linearities in the dosing. See chapter Function - Linearisation dosing (only for W3T586961).

7.14.1 Automatic Calibration (2-Point)

The automatic calibration runs between the limits set by the positioner microswitches and calculates key parameters about the positioner response.

Start the automatic calibration as follows:

- 1 Login with user/password.
- 2 Click Measurement channel menu field.
- 3 Click  icon (Settings).
- 4 Click "Dosing" menu.
- 5 Click "Settings actuator" menu.
- 6 Click "Start" button for the positioner calibration.
=> positioner will drive up to 100% and then down to 0%, calibrating the 2 end points.
- 7 Press information button to display measurements made during calibration.



After running Automatic Calibration, the controller will calculate the output by interpolating between the 0% and 100% points.

7.14.2 Manual Calibration (2-Point)

The manual calibration runs place between the minimum and maximum position of the actuator.

Start the manual calibration as follows:

- 1 Select "Manual mode" operation mode or "Manual" and engage the positioner.
- 2 Login with user/password.
- 3 Click Measurement channel menu field.
- 4 Set "Manual mode" operating mode.
- 5 Click  icon (Settings).
- 6 Click "Dosing" menu..
- 7 Click "Settings actuator" menu.
- 8 Click on the "Manual positioner calibration" menu.
- 9 Click on the "Cal 0%" button.
- 10 Select the step time (400ms / 1s / 5s) to define the running time when the "open/close" button is pressed. Each time the "open/close" button is pressed, the actuator opens or closes for the set time. Press the "close" button (down) repeatedly until the value Ym has reached the lowest value (Pos. 0%). Then click on the "Accept" button to save the 0% position.

- 11 Then click on the "100%" button and then press the "open" button (up) repeatedly until the value Ym has reached the highest value (item 100%). Then click on the "Accept" button to save the 100% position.
- 12 The running time Ty of the positioner can either be entered manually or determined automatically by pressing the "Reference run" button.

 After performing the manual calibration, select the desired operating mode.

7.15 Dosing Linearization (only for W3T586961)

 Only for the Rivo™ Electronics Module I (Mod. E10) Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961.

The Rivo™ I Municipal/Industrial PC – Analyser & Controller (PC), article number W3T586961 features linearization of all actuator types, although this is mainly used when a Positioner with Feedback is selected. Up to 11 points can be used to form a piecewise linear function.

This description assumes that the positioner end stops correspond to 0% and 100% gas flow.

Linearization Table

Start Linearization Table:

- 1 Login with user/password.
- 2 Click Measurement channel menu field.
- 3 Click  icon (Settings).
- 4 Click "Dosing" menu.
- 5 Click "Linearization" menu.

The Controller output is divided into 10% steps corresponding to a maximum of 11 points. Where fields are left blank, linear interpolation takes place between populated field.

There are two buttons to the right of the data entry fields on the Linearization screen:

	Delete linearization point
	Accept the current dosing value for the selected dosing rate.

3-Point Calibration

A further calibration point can be added to produce 2 linear intervals.

E.g. the 'Linearization point 50%' could be set to 60%; so, when the control dosing output is 50% the positioner will drive to 60%. This can be set up as follows:

- 1 Login with user/password.
- 2 Set controller = Manual.
- 3 Click Measurement channel menu field.
- 4 Click  icon (Settings).
- 5 Click "Dosing" menu.
- 6 Click "Linearization" menu.
- 7 In the "Linearization point 50%" field enter the value 60.
=> Linear interpolation now occurs between 0% to 50% (Dosing position 0% to 60%) and 50% to 100% (Dosing position 60% to 100%).

Multi-point Calibration

The positioner always requires at least 2 calibration points, but this can be extended up to 11 points using the linearization table.

In the following example a six-point (5 interval) linearization is produced after Automatic calibration of the end points

Procedure:

- 1 Login with user/password.
- 2 Set controller = Manual.
- 3 Click Measurement channel menu field.
- 4 Click  icon (Settings).
- 5 Click "Dosing" menu.
- 6 Click "Linearization" menu.
- 7 In the "Linearization point 20%" field enter the value 10.
- 8 In the "Linearization point 40%" field enter the value 30.
- 9 In the "Linearization point 60%" field enter the value 70.

- 10 In the "Linearization point 80%" field enter the value 90.

=> The relationship between controller dosing output and V10K Vacuum Gas Feeder position is now show in the following graph:

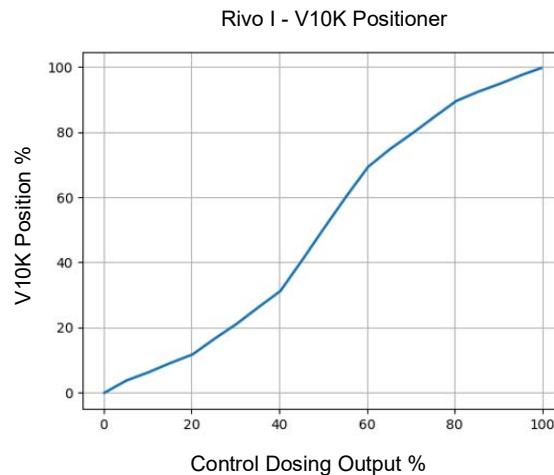


Fig. 16 Diagram V10K Vacuum Gas Feeder

7.16 Relay outputs and Digital outputs

As an option, the Electronics Module can be equipped with a "Rivo™ Flex Mod 2Rel-2DO". It makes two further relay outputs and two digital outputs available, which can be configured as alarm outputs. The digital outputs are optocoupler switching outputs for the power-free activation of dosing devices. The maximum control voltage (external) of 24 V DC and a maximum switching current of 20 mA must be observed here (these digital outputs are currently not supported in the Rivo™ I System).

7.17 Relay outputs

The Electronics Module has two on-board relays and can be expanded with relay modules. Further relays can be added as modules. To do this, the "Rivo™ Flex Mod 2Rel-2DO" must be installed. The modules are configured via the menu setting. These switches are assigned various switching tasks depending on the respective application. See the Chapter Description – Configuration options.

The connection and switching of non-approved devices/loads destroys the relay contacts. The device then functions in an uncontrolled manner! In order to switch inductive loads or capacitive loads that exceed the technical properties of the relay contact, an additional switching element such as a contactor or load relay with suitable specifications must be installed. To suppress radio interference, the relay contacts are protected internally by suppressor diodes.

All on-board relays are protected by fuses. They act as overcurrent limiters protecting the terminal and relay connections. The fuses of the Rivo™ Backboard 4 are replaceable (Type TR5, T3, 15A). To fuses of the "Rivo™ Flex Mod 2Rel-2DO" are not replaceable.

- ! If the internal power supply L1 and N/L2 is used for dosing pumps or other devices, the current consumption must not exceed the value of the selected back-up fuse.

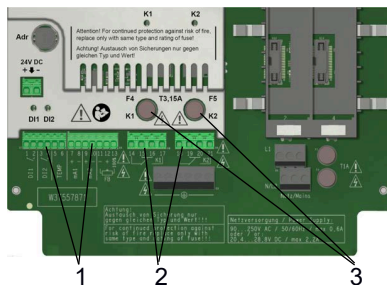


Fig. 17 Detail of PCB - relay outputs

- 1 Terminal strips for control inputs
- 2 Terminal strips for relays
- 3 Fuses of the Rivo™ Backboard 4 relay

7.18 Alarms and messages

Alarms, warnings, messages and errors are displayed by means of a colored message symbol (🔔 red alarm bell) and a RGB LED above the display. Tap the alarm bell to open the message window. All active messages are displayed with text and the corresponding color. Acknowledgeable messages are confirmed or acknowledged with the ACK button.

See Chapter Function - Status LED states.

7.19 Configuration

The Electronics Module supports the creation of freely configurable alarms. The alarms are output optionally via relay contacts and a color message display. At the same time, a message is displayed in the message system. The number of available relays depends on the configuration. The alarm relays can be used, for example, for safety deactivation of dosing when specific values are exceeded or not reached. The assignment of a relay as a switching function is optional.

Each alarm can be configured as described below. Multiple assignment is possible:

Message	freely configurable text
Description	freely configurable text
delay time	hh:mm:ss 00:00:00 to 10:49:59
Notification level	Error/warning
Acknowledge	Without/simple ACK/ACK with reset
Assignment	Single/multiple assignment

Relay assignment	Assignment to relay
	Depending on the configuration, a maximum of four relays are available. Rel1 and Rel2 are located on the Rivo™ Backboard 4 and are labelled K1 or Rel1 and K2 or Rel2 in the wiring diagram. Rel3 and Rel4 are the two relays of the optionally equipped Rivo™ Flex Mod 2Rel-2DO. The relays are labelled K1 = Rel3 and K2 = Rel4 in the wiring diagram.

7.19.1 Without Acknowledge

- The alarm symbol and the message symbol light up in the event of an alarm and go out automatically when the condition is eliminated.
- Unlatched alarms are displayed in yellow as messages.
- The relay is active when the alarm symbol is displayed and the alarm is active.

7.19.2 ACK with reset

- In the event of an alarm, the alarm symbol and the message symbol flash and the relay is active until acknowledged.
- The alarm symbol and the message go out even if the conditions still apply when the alarm is acknowledged.
- Latched alarms are displayed in red as messages.
- The relay becomes inactive after acknowledgment if the condition is still pending.

7.19.3 Simple ACK

- The relay becomes active as soon as the alarm is active.
- In the event of an alarm, the alarm symbol and the message symbol flash until the alarm is acknowledged.
- If the condition is no longer present when the alarm is acknowledged, the alarm symbol goes out and the message disappears.
- If the condition is still present when the alarm is acknowledged, the alarm symbol and the message are reset from flashing to a permanent state. The alarm symbol and the message light up until the condition is eliminated (auto-reset).
- Latched alarms are displayed in red as messages.
- The relay is only deactivated when the condition has been eliminated and acknowledged.

7.19.4 Safety functions

Various safety functions are integrated to ensure system safety and minimize the risk of accidents:

- alarms freely configurable
- external STOP for dosing (depending on the configuration of the digital inputs)
- password protection
- Safe manual mode stops dosing if the sample water flow rate is too low or in the event of an external stop or external stop in manual mode.
- Secure calibration switches off the dosing if the calibration is not completed.

7.20 Status LED states

The HMI, the “Rivo™ Flex Mod” Modules and the Rivo™ Backboard 4 use LEDs. The LEDs signal the operating status by change in color (RGB colors) and different frequencies.

NOTICE

The status with the highest priority is always displayed.

Alarms and messages	Meaning
red	Error active
yellow	Warning active
neutral	General notes
blue	Update

Explanation of the status LED on the device (LED above the display)

Status LED	Description (HMI)
white flashing	The device is working trouble-free. Keine anstehenden Fehler bzw. aktuell keine Meldung im Meldesystem.
red flashing	Alarm active
yellow flashing	Warning active
green permanent	HMI update completed
blau flashing	Update: • HMI • Rivo™ Flex Mod • Rivo Flex Board • Rivo™ Backboard 4

Explanation of the status LED

Status LED	Modus	Description
white illuminated	BOOT	Only displayed briefly during booting. Module restarts.
red illuminated	STOP	Module is in stop mode. No outputs active, or output based on StopBehavior.
green illuminated	RUN	The module is in run mode. All outputs are active and are activated. This is the normal state during operation.
red flashing	STOP, TIMEOUT	Module has switched to stop mode due to a communication interruption after a timeout has expired. If this state occurs, communication with the control unit has been unexpectedly interrupted.
blue lashing	UPDATE	Module is in update mode. Firmware update is being carried out.

Rivo™ Flex Mod Dis

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	Up green	Upot aktive
7	M green	Membran aktive
8	E red	Error: • Hardware Range Underflow • Hardware Range Overflow • Hardware Error • Factory calibration error
S	S white red green red flashing blue	Status Boot Stop Run Stop, Timeout Update

Rivo™ Flex Mod pH**Rivo™ Flex Mod mV****Rivo™ Flex Mod Fluoride**

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	E red	Error: • Hardware Range Underflow • Hardware Range Overflow • Hardware Error • Factory calibration error
S	S white red green red flashing blue	Status Boot Stop Run Stop, Timeout Update

Rivo™ Flex Mod 2AI

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	E1	red Error Input 1: • Hardware Range Underflow • Hardware Range Overflow • Hardware Error • Factory calibration error
8	E2	red Error Input 2: • Hardware Range Underflow • Hardware Range Overflow • Hardware Error • Factory calibration error
S	S	white red green red flashing blue Status Boot Stop Run Stop, Timeout Update

Rivo™ Flex Mod Con

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	E	red Error: • Error Voltage • Hardware Range Underflow • Error Current Hardware Range Overflow • Current Hardware Range Underflow • Overload Error • Hardware Error • Factory calibration error
S	S	white red green red flashing blue Status Boot Stop Run Stop, Timeout Update

Rivo™ Flex Mod 2AO-mA

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	E1	red Error Input 1: • Load Error • Hardware Error • Factory calibration error
8	E2	red Error Input 2: • Load Error • Hardware Error • Factory calibration error
S	S	white red green red flashing blue Status Boot Stop Run Stop, Timeout Update

Rivo™ Flex Mod 2Rel-2DO

LED	LED color	Description
1	-	-
2	-	-
3	-	-
4	-	-
5	1	green Relay 1 aktive
6	2	green Relay 2 aktive
7	3	green Opto Out 1 aktive
8	4	green Opto Out 2 aktive
S	S	white red green red flashing blue Status Boot Stop Run Stop, Timeout Update

Rivo™ Backboard 4

LED	LED color	Description
K1	green	Relais 1 aktiv
K2	green	Relais 2 aktiv
S	white red green red flashing blue	Status Boot Stop Run Stop, Timeout Update

7.21 Auto tune

This only applies with Cl₂ single feedback control.

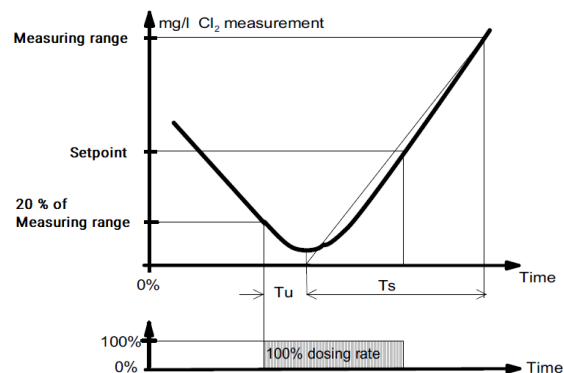


Fig. 18 Diagram Auto tune

The Auto tune is used for automatic ascertainment of the reaction times of the control loop (loop dead time T_u and loop rise time T_s) or the resulting control parameters X_p and T_n .

The control parameters X_p and T ascertained by the Auto tune must be considered as a recommendation for the first commissioning!

The control parameters X_p and T can be manually optimized to ensure maximum control quality.

Requirements:

- Positioner set to automatic (manual wheel engaged)
Dosing pump to automatic
- Calibrated Cl_2 measuring (zero point and DPD value)
- Loop dead time < 60 min
- Loop rise time < 480 min (8 h) for measuring range 0 to 100 %
- Decomposition time < 480 min (8 h) of the current value to 20 % of 2x setpoint
- Correct menu setting of the end value, control direction (direct or inverse), actuator (e.g. positioner), positioner running time (T_y)

Auto tune may not be started:

- if a large volume of fresh water is being added
- if the measuring cell has not been run in
- during cleaning work
- during filter backwashing
- while the circulation changes
- if there are flow rate fluctuations

Start Auto tune:

- 1 Click Measurement channel menu field " Cl_2 Single feedback control".
- 2 Click  Symbol – Settings.
- 3 Click "Controller".
- 4 Click "Auto tune".
=> The status and the loop parameters T_u and T_s are displayed.
- 5 Click "Start" button.
=> Auto tune will start.

ATTENTION

Danger due to faults in the control loop

Possible consequence: injury or material damage.

- Auto tune can take up to 13 hours, depending on the control loop. During this time no errors should occur on the control loop (e.g. filter backwashing, changes in the circulation or widely fluctuating number of visitors).

Various status messages can be output, depending on the selection of the actuator. Different status messages also have different execution times. It is possible that some status messages are only displayed briefly or not at all if the execution time is very short.

Status messages
Abort
Done
Dosing 0 %
Wait for X = 20%
Dosing 100 %
Measuring Dead Time
Measuring Rise Time

7.21.1 Completing auto tune without errors

When the loop times (dead time T_u and rise time T_s) have been completed without error, calculation of the control parameters X_p and T_n commences. This is indicated by the message "Auto tune OK". The calculated parameters are entered in the menus.

When auto tune has been concluded, the measuring amplifier adjusts with the newly calculated control parameters and continues in the selected operating mode (e.g. automatic).

To monitor the determined loop times they are entered into the " T_u " and " T_s " menus .

If errors occur in the control loop during auto tune, incorrect loop times and therefore incorrect control parameters can be determined.

⚠ ATTENTION**Danger due to excessive chlorination or inadequate chlorination**

Possible consequence: injury or material damage.

- The remaining control parameters Ymin, Ymax and Tp are not influenced when auto tune is performed.
- The control parameters Xp and Tn are determined for Ymin = 0 % (no basic load) and Ymax = 100 % (no dosing rate limitation). If there is a system-specific requirement for a basic load Ymin or a dosing rate limitation Ymax, it must be taken into account that the control loop is restricted as a result. There is then the risk of excessive chlorination (Ymin too high) or inadequate chlorination (Ymax limits excessively).

7.21.2 Completing auto tune with error

Completing auto tune with error If errors occur in the control loop during auto tune (e.g. filter backwashing, changes in the circulation or widely fluctuating number of visitors to the pool) or if the reaction times of the control loop are too long, auto tune is interrupted.



If any of the error conditions described above occur, auto tune is interrupted. The measuring amplifier displays a fault message. The "old" parameters Xp and Tn are not changed.

Possible error conditions

- Initial value not reached (Display: "T = >8h")
When auto tune has started and the dosing system has closed or the dosing pump has switched off, the measuring amplifier waits until the actual value has dropped below the initial value (0.2 x the measurement range value). This delay is indicated by the message "2: X = 20 %" and the maximum permissible time is 8 hours.

- Loop dead time too high (Display: "Tu = > 1h")
The value determined by the time measurement between starting up the dosing, switching on the dosing pumps and the rise of the actual value may only take a maximum of 1 hour. This measured time is displayed by "6: Tu!".
- Loop rise time too great (display: "Ts = > 8h")
The time is determined by a measurement, which the control loop requires at a 100 % dosing rate of the dosing system or the dosing pump, to increase the actual value to 50 % of the measuring range. This measurement is indicated with "9: Ts!" and may take a maximum of 4 hours.

Determination of the control parameters with known Tu and Ts times

If the loop times Tu and Ts are already known or if these cannot be determined automatically due to specific system conditions, the loop times can be entered into the "Tu" and "Ts" menus. When Tu or Ts are saved, the control parameters Xp and Tn are also calculated and entered in the menus.

7.22 Sample water inlet disinfection (Sample line dosing)

For certain applications it is necessary to disinfect the sample water inlet and the measuring cells occasionally using disinfectant such as chlorine solution, for example for measuring the zero chlorine point or for dechlorination. Because there should ideally be no disinfectant in the sample water, you may find that the sample water inlet and the measuring cell become contaminated with bacteria, resulting in an incorrect reading.

NOTICE

This function is only available with DEPOLOX®-R (Depolox 5), 3-Electrode single-rod measuring sensor Chlorine (Rod electrode) and Membrane Sensors (Membrane FC, Membrane TC, Membrane CD, Membrane OZ).

To avoid this, switch on the Electronics Module "Sample Line dosing" function. This adds disinfectant to the water at one or more specific times (range start) for a certain length of time (dosing time). The system has a relay output for this function, for example to control a dosing pump (Rel4).

The figure below shows a typical application for monitoring drinking water to ensure it is free of disinfectant. Such systems may be installed upstream of ion exchange columns, for example, to protect the system against chlorine.

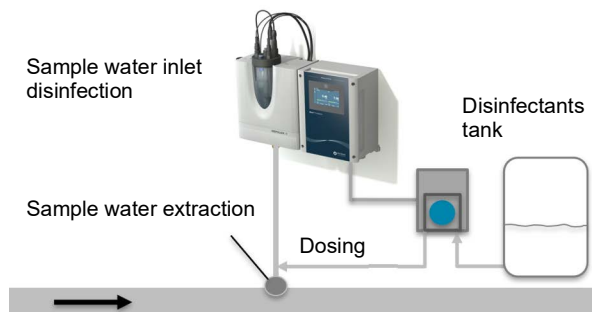


Fig. 19 Sample water inlet disinfection (Sample line dosing)

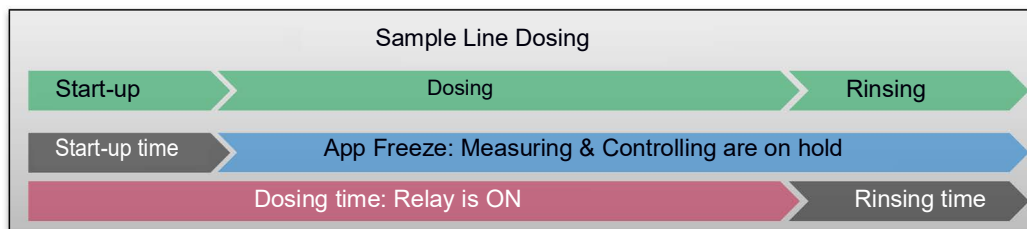
The Sample water inlet disinfection (Sample line dosing) is configured via the Application settings - Sample line dosing menu.

Sample line dosing	Start	Manual, one-off start of the disinfection process
State		Displays the current status of the process flow.
Start-up time	hh:mm:ss	Enter the delay time between the start of dosing and the start of the hold function
Rising time	hh:mm:ss	Enter the rising time after dosing
Dosing time	hh:mm:ss	Enter the duration of dosing
Time module enabled	ON / OFF	Activation of the timer for recurring automatic sample water inlet disinfection via time control.
Time control	 Time control - Sample line dosing	Four timer modules are available: Time module 1 Time module 2 Time module 3 Time module 4
 Time modules 1 to 4 have the same structure.		

Time module 1	Enabled	ON / OFF	
	Skip once	ON / OFF	Skip selection next time interval
	Start date	YY.MM.DD	Enter the date from which the function is to be started.
	Start time	hh:mm	Enter the start time
	Weekdays	Mon Tue Wed Thu Fri Sat Sun	Enter the weekdays
	Serial pattern	Once Daily Weekly Monthly	Repeat cycle selection

 If this function is activated, the Rel4 is no longer available!

The disinfection process is shown schematically below:



The function starts at the times and on the days programmed automatically, whether the system is in manual or automatic mode. The process is shown below (see also the schematic diagram on the previous page).

- Relay 3 switches on to start the dosing pump.
The "Dosing time" starts running.
At the same time, the "Delay" (the dead time between the dosing point and the measurement) starts as well.
- As soon as the "Delay" has finished, the "Sample water stop time" starts
The message "Sample line dosing" is displayed instead of the measurement.
The measurement cannot be changed via the ports (e.g. RS485) any more (constant).
The controller output cannot be changed any more (constant).
The mA output cannot be changed any more (constant).
- Once the dosing time has finished, relay 3 switches the dosing pump off.

- Once the "Sample water stop time" has finished the measurement is displayed again (and the message disappears).
- After the hold delay has elapsed:
All of the measurements are current again.
The controller output is current again.
The mA output is current again

ATTENTION

Danger caused by uncontrolled disinfectant dosing

Possible consequence: injury or material damage.

- This function always starts as programmed, irrespective of whether the system is in manual or automatic mode and irrespective of whether the sample water flow rate!
- This function needs to be deactivated if maintenance work is being carried out or if the system is shut down for any length of time, otherwise it will feed disinfectant unchecked and the disinfectant may leak!

8 INTERFACES



WARNING

Danger due to inadequately qualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe operation and prevent serious injury, the device must be installed by trained and authorized specialist personnel.

8.1 USB interface

The Electronics Module is equipped with a USB interface that can be used as follows:

- Transfer of firmware updates (Software version).
Download the firmware file via our homepage.
- Transfer of configuration data for reproduction and back-up of a device configuration.
Only suitable for use with identical device configurations.

8.2 Firmware update (Software version)

The firmware (Software version) can be updated using a USB memory stick or Internet Browser.

You can read off the currently installed firmware version of the CPU in the ≡ system menu under „System information“ - “Software information“.

See chapter Installation- Firmware update (software version).



The firmware file is available for free download on our homepage.

A firmware update (Software version) is only possible with a higher or newer version than the installed version. An update with an older version is not possible.

8.3 RS485 interface (optional)

As an option, the Electronics Module can be equipped with a "Rivo™ COM-Board USB 485" expansion board. This expansion board has an integrated RS485 interface. The RS485 interface is used for data transfer to higher-level control systems or other systems that support the Wallace & Tiernan RS485 protocol.

The RS485 interface is electrically isolated. It has four integrated terminals and a terminating resistor R_t for incorporation into a Wallace & Tiernan bus system.



For more detailed information and the address reference list, see the Installation manual "Rivo™ Communication Interfaces" (article number W3T606371) and the Quick Guide (article number W3T591365). You can request this installation manual and the Quick Guide from us or download it from our homepage.

8.4 Ethernet interface



This instruction manual does not cover installation and commissioning in combination with routers or wireless routers. Responsibility for this lies with the operator.

- For security reasons, access to the device should only be granted to authorized personnel.
- Permanent, unsafe connections via the Internet or WLAN are not permitted. Safe connections can, for example, be set up via a VPN-secured communication channel or an encoded WLAN connection.
- The Electronics Module only supports the unencrypted communication protocol "http" and is designed for operation within an Intranet (closed network).

The Electronics Module has an integrated Ethernet interface.

The installed LAN interface allows data visualization via an Internet-capable device and HTTP protocol or standard browser.

The LAN interface also supports data communication with higher level control systems via Modbus TCP protocol.

Visualization and operation are effected via the web pages integrated in the Electronics Module.

Wireless access via mobile devices such as tablet computers or smartphones is possible by installing a wireless router on-site and connecting it to the Electronics Module.

To access the web pages of the Electronics Module with an Internet-enabled device and Internet browser, enter the IP address of the device with the additional port ":8221" in the address line of the Internet browser.

The Electronics Module must be connected to a local network/intranet via the Ethernet connection.

Example for browser address input: 10.26.70.149:8221

The IP address must be specified or requested by the network administrator.

The Ethernet interface supports a transmission rate of 100 Mbit/s.

The Ethernet interface is electrically isolated.

Connection is via a standard Ethernet connection cable.

To allow the use of pre-terminated Ethernet cables with connectors, one special M25 cable gland with slit rubber seals and larger grommets is installed. The Ethernet connectors can be inserted through these fittings.

The Ethernet connection is designed in accordance with IEEE 802.3. There is a RJ45 socket installed at the HMI. Connection to a network is possible using a patch cable (1:1) or a crossover cable (crossover network cable). The LEDs are fitted in the RJ45 socket. They display the interface statuses.

The connection runs in Auto negotiation mode. The data transfer rate and full or half duplex are defined automatically with the connected switch/HUB.

LED	Status	Meaning
green	illuminated	Ethernet connection established
green	flashing	Data being transferred
yellow	off	10 Base-T
yellow	illuminated	100 Base-T

LED (yellow) LED (green)

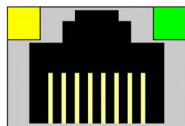


Fig. 20 Ethernet connection

8.5 Modbus TCP Interface

The integrated Ethernet interface supports data communication via the Modbus TCP protocol.

Various data points are available for data exchange (see "Reference list").



For more detailed information and the reference list, see the Installation manual "Rivo™ Communication Interfaces" (article number W3T606371). You can request this installation manual from us or download it from our homepage.

9 INSTALLATION



DANGER



Danger of fatal injury caused by electric shock

External voltages may still be connected even if the operating voltage is switched off.

Possible consequence: fatal or serious injury.

- All electrical installation work must be performed by a qualified electrician.
- Work on the device must be carried out when it is in de-energized state.
- Do not carry out work on active parts and equipment to which voltage is applied.
- In the event of a fault in the electrical power supply, switch the device off immediately.
- The device operates with liquids. For this reason, DIN EN IEC 62368/60950 must be observed when connecting the devices.



WARNING

Danger from unqualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe operation and prevent serious injury, the device must be installed by trained and authorized specialist personnel.
- Local installation regulations, general guidelines, technical data and construction regulations of the respective water or building authority as well as applicable national and local regulations must be observed.

NOTICE

The assembly accessories included in the scope of delivery must be used for installation.

9.1 Requirements with regard to the environment and installation location

 WARNING	
	Danger caused by fire or explosive material Possible consequence: fatal or serious injury. - Do not use the device in environments where there are flammable gases, fumes or dust or conductive dust. - Smoking, fire, naked flames, welding, and work that may generate sparks are forbidden in the vicinity of the device.

The installation location must meet the following requirements:

- The installation location must not be accessible to the public.
- The installation location must be such that operation by unauthorized personnel is ruled out.
- The installation location must not be used as a permanent workplace.
- Protect the device against moisture, rain, frost, heat and direct sunlight.
- Do not install the device outdoors.
- Do not expose the device to strong vibration or impact, magnetic fields or electromagnetic radiation.
- Provide sufficient aeration and ventilation.

- Note the minimum ceiling height.
- The installation wall must be vertical, flat and stable.
- The device must be accessible and visible from the front and side for installation, operation and maintenance.
- Operating and ambient temperature must lie between 0°C and +50 °C (32°F and 122°F) (technical data).
- The air in the room must be non-condensing.
- The Electronics Module is not suitable for electrical connection with permanently installed cable conduits. If the cable glands do not meet local installation rules and regulations, these glands must be replaced with suitable ones.

9.2 Installation location for drinking water, industrial water and waste water

For problem-free mixing of the chlorine solution, the distance between chlorine addition and sample water take-off must be at least ten times the pipe diameter:

Example:	Pipe DN300 => $300 \text{ mm} \times 10 = 3000 \text{ mm}$ => minimum distance = 3 m
----------	--

The time between chlorine addition and free over dosing is the total sampling time. It consists of the travel time between chlorine addition point and sample water take-off and the travel time between sample water take-off and measurement (sample water line to flow cell). Keep the sample water line to the flow cell as short as possible.

For longer required soak times, for example 5 to 15 minutes, a delay tank can be installed into the sample water line immediately before the flow cell.

Note that longer soak time prevents chlorine addition control based purely on excess chlorine. Instead, combined flow and excess chlorine dependent control must be used. This also applies to the use of chlorine, chlorine dioxide and ozone as disinfectant.

9.2.1 Installation site for swimming pool water

The sample water take-off point must be installed in the pool return line according to standards.

Make sure that the sample water take-off point is upstream of the flocculant station.

9.3 Installation the device

The Electronics Module and the Flow Cell Module can be installed using a DIN rail or tallow-drop screws (wall installation). Several of those devices can be installed directly next to each other. A special variant is available for control cabinet mounting.



Install the Flow Cell Module to the left of the Electronics Module.

If the Electronics Module and the Flow Cell Module are mounted at separate locations, the sensor cable extensions with a maximum length of 30 m must be used.

Required material and tools:

- DIN rail (optional)
- screws and dowels (assembly accessories)
- drill
- screwdriver

ATTENTION

Danger caused by incorrect mounting fixtures

Possible consequence: injury or material damage.

- Use the corresponding screws and dowels.
- Dowels and screws/tallow-drop screws for fixing to a solid wall are included in the scope of delivery.
- If the device is to be installed on a suitable light-weight wall, the corresponding mounting fixtures must be used. These mounting fixtures are not included in the scope of delivery!

9.3.1 Installation with DIN rail

Procedure:

- 6 Secure the DIN rail to a vertical, stable and flat solid wall using the dowels and screws supplied.
- 7 Hook the Electronics Module onto the DIN rail so that it is flush at the right.
- 8 Hook the Flow Cell Module on the DIN rail to the left of the Electronics Module.
- 9 Fasten the Electronics Module and the Flow Cell Module to the solid wall at the bottom by the brackets using dowels and screws.

9.3.2 Installation without DIN rail (wall installation)



The dimensions (mm/Inch) for the drilling pattern can be found on the back of the plastic housing. Use the rear housing panel as a drilling template.

Procedure:

- 1 Secure the tallow-drop screws rail to a vertical, stable and flat solid wall using dowels.
- 2 Hook the electronics module and the flow cell module onto the tallow-drop screws.
- 3 Fasten the electronics module and the flow cell module to the solid wall at the bottom by the brackets using dowels and screws.

9.3.3 Installation drawings

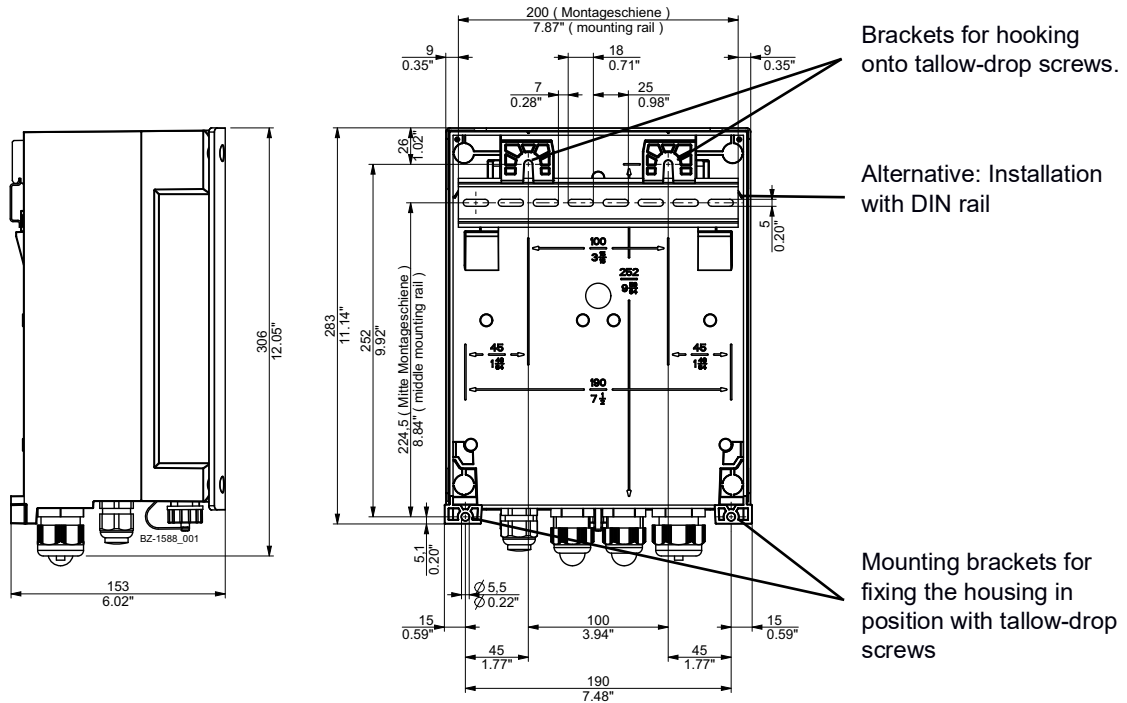


Fig. 21 Electronics Module

Rivo™ I Municipal/Industrial / Rivo™ I Municipal/Industrial PC

EN

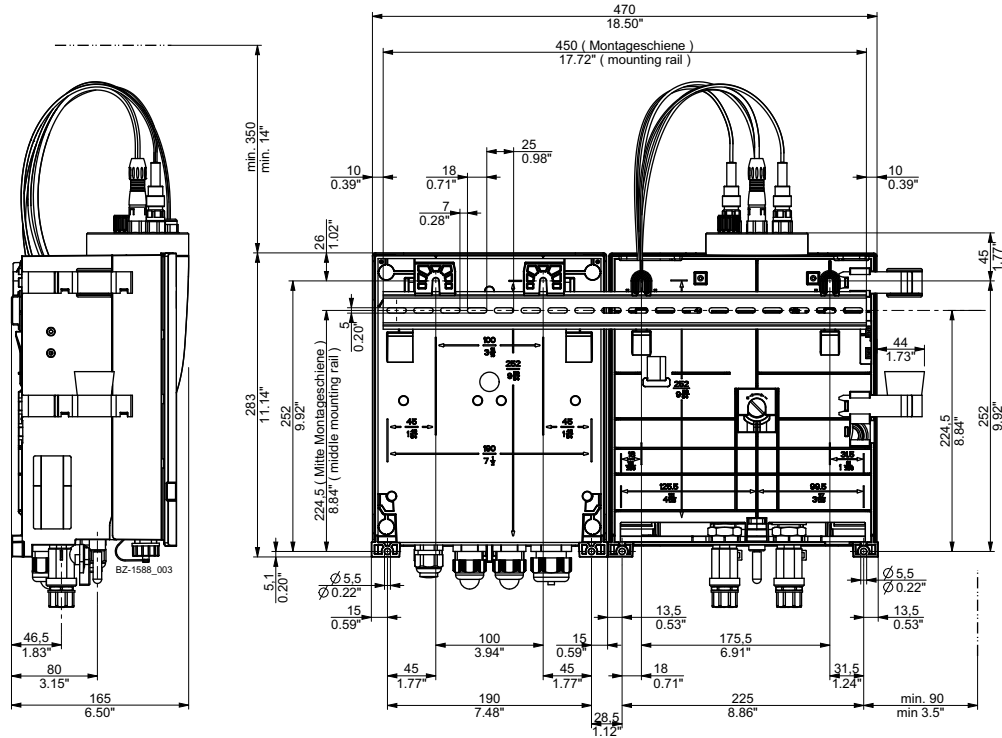


Fig. 22 Flow Cell Module and Electronics Module

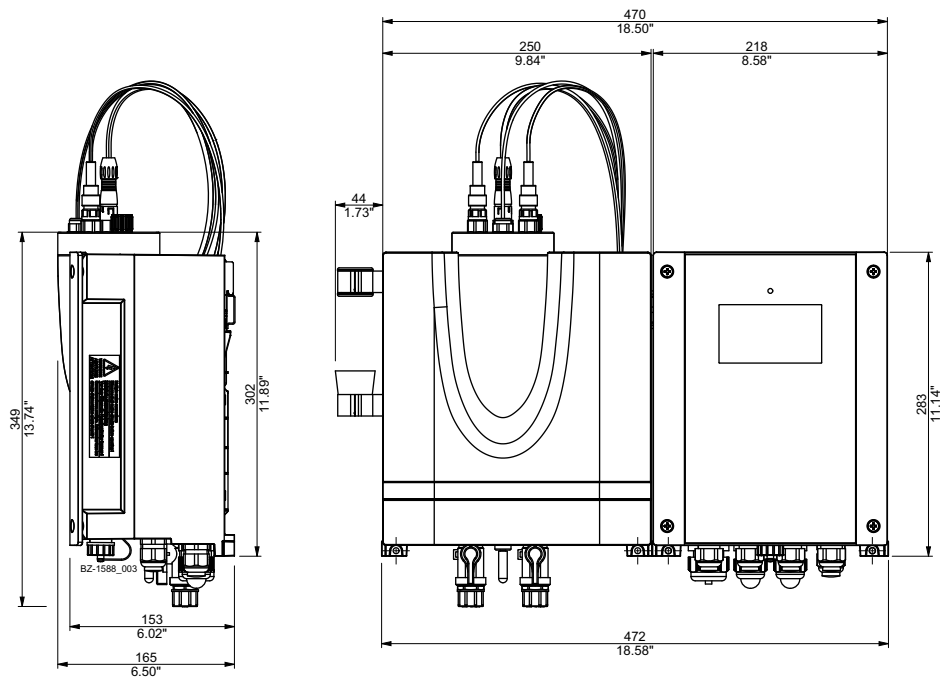


Fig. 23 Flow Cell Module and Electronics Module

9.4 Removing and fitting the housing cover

9.4.1 Removing

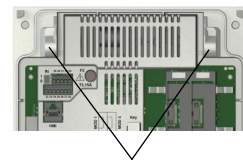
- 1 Release the four screws on the housing cover.
- 2 Carefully remove the housing cover.
- 3 Hook the housing cover into the brackets on the basic housing.



One or two strain relief cables are integrated into the housing as mechanical retaining devices. They prevent the housing cover from accidentally falling when opened. For disassembly, the cables can be released if necessary

9.4.2 Fitting

- 1 Carefully unhook the housing cover from the brackets on the basic housing and fit it onto the basic housing.
- 2 Tighten the four housing screws by hand (to a maximum torque of $0.7 \text{ Nm} \pm 0.15 \text{ Nm}$).



Brackets on the basic housing

Fig. 24 Housing cover hooked on - brackets

9.5 Installation of “Rivo™ Flex Mod“ Modules

CAUTION**Danger of damage to the “Rivo™ Flex Mod“ Modules and the HMI**

Possible consequence: Significant material damage.

- The “Rivo™ Flex Mod“ Modules and the HMI must not be plugged in or unplugged with the power supply switched on.

Procedure:

- 1 Disconnect the Electronics Module from the power supply and check that it is de-energized.
- 2 Remove the housing cover of the Electronics Module.
- 3 Insert the “Rivo™ Flex Mod“ Modules into the module slots provided (see chapter Description – Electronics Module with “Rivo™ Flex Mod“ Modules) and ensure that the module locking mechanism (blue) is engaged and pressed downward.
To dismantle the “Rivo™ Flex Mod“ Module, first pull the module locking mechanism (blue) upwards and then remove the module.

- 4 Route connection cables into the cable holder and into the housing through the cable glands.
- 5 Tighten cable gland. Make sure that all cable glands are installed correctly.
- 6 Switch power supply back on.
- 7 When the device has booted, a scan must be carried out in order to transfer the new module configuration. To do this, open “Setup“ - “System settings“ - “General“ and press the “Scan“ (hardware) button.
=> The device scans the changed module configuration and configures itself accordingly.



Observe the order of module slots during allocation. See chapter Structure - Rivo™ Backboard 4 (Base Housing) and chapter Description - Electronics Module with “Rivo™ Flex Mod“ Modules.

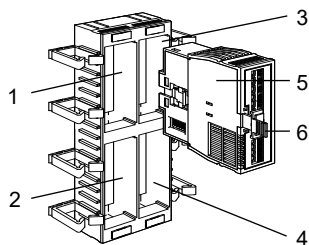


Fig. 25 Section, module slots

- 1 Module slot 1
- 2 Module slot 2
- 3 Module slot 3
- 4 Module slot 4
- 5 "Rivo™ Flex Mod" Module
- 6 Module locking mechanism (blue) - unlocking/locking

9.6 Remove the battery insulator

CAUTION

Danger due to battery insulator

Possible consequence: Material damage

- When commissioning the HMI for the first time, the battery insulator of the lithium button cell must first be removed.

Procedure:

- 1 Fix the battery in the battery holder with a non-conductive pin and pull the battery insulator out to the left. Ensure that the battery is not pulled out at the same time.
- 2 The date and time must be set or checked during commissioning.

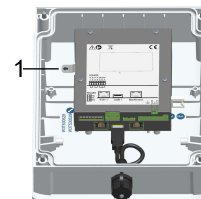


Fig. 26 HMI (housing cover)

- 1 Battery insulator

9.7 Connecting the Ethernet cable

**NOTICE**

- The cable glands on the Electronics Module are already fitted at the factory.
- Only one Ethernet cable can be connected. A cable gland (M25, left side) is intended and suitable for routing Ethernet connectors.
- Blind plugs are fitted in the cable glands at the factory. These must be removed during installation in order to install the corresponding cables.

Procedure:

- 1 Route the Ethernet cable into the housing through the M25 cable gland. Only one Ethernet cable can be connected. Only one cable gland is provided and suitable for the insertion of Ethernet connectors (M25 left side).
- 2 The other cable glands can be used as required. Multiple sealing inserts (4x5 mm, 2x6 mm) are included with the accessories.
- 3 Plug the Ethernet cable into the HMI as shown in the wiring diagram.

9.8 Electrical installation

 DANGER
**Immediate danger caused by electric current**

Possible consequence: fatal or serious injury and significant material damage.

- External voltages may still be connected even if the operating voltage is switched off.
- The Electronics Module must be de-energized before opening it.
- When connecting the Electronics Module to the power supply, a back-up fuse must be used in the mains supply line. The connection values must match the data on the type plate.

⚠ WARNING**Risk of injury and damage to the device!**

Possible consequence: injury and significant material damage.

- Only trained and authorized electricians are permitted to install the Electronics Module and open the housing.
- The Electronics Module may only be put into operation when the housing is closed.
- Connect the Electronics Module in accordance with the wiring diagram and applicable local and national regulations.
- The Electronics Module is not equipped with a mains switch and is in operation as soon as the supply voltage is applied. For this reason, an external switch or circuit breaker with a clearly identifiable "Off" switch position is necessary. This external switch or circuit breaker should be installed directly beside the Electronics Module.

⚠ WARNING

- Line cross-section for the mains input side at least 0.75 mm² (AWG 18), on-site mains fuse 6 A with 100 to 240 V AC supply.
- Use the recommended tripping characteristics C for switch mode power supplies. Ensure the maximum pre-fuse rating is 20 A, and the line cross section complies with local installation guidelines.
- If devices are connected to the internal power supply (e.g. dosing devices) or via fixed connection cables (e.g. connectors), the current consumption must not exceed the installed back-up fuse (max. 20A).
- When connecting system components (e.g. devices, motors, pumps) as well as when entering operating data, the system components must be switched off in order to prevent uncontrolled activation or incorrect operation.
- Rivo™ Flex Modules and the HMI must not be plugged in or unplugged with the power supply switched on.
- The device operates with liquids. For this reason, DIN EN IEC 62368/60950 must be observed when connecting the devices.



WARNING

- Avoid high temperatures at the terminals of the relays and the mains supply. Due to the high ambient temperatures at the terminals, connected cables must be designed as follows:
Ambient temperature <30°C:
 Cables heat-resistant up to at least 60°C
Ambient temperature <40°C:
 Cables heat-resistant up to at least 70°C
Ambient temperature >40°C:
 Cables heat-resistant up to at least 80°C



- The Electronics Module is not suitable for electrical connection with permanently installed cable conduits.
- If the cable glands do not meet local installation rules and regulations, these glands must be replaced with suitable ones.
- The Electronics Module is equipped with a flexible voltage supply input and accepts AC voltages from 100 to 240 volts. Take the power consumption into account when dimensioning.
- Note the correct polarity of the voltage connections and the correct dimensioning of the wire cross-sections.

Carry out electrical installation as follows:

- 1 Remove the housing cover of the Electronics Module.
- 2 Connect voltage supply in accordance with the wiring diagram.
- 3 Install optional Rivo™ Flex Mod Modules.
See chapter Installation "Installation of Rivo™ Flex Mod Modules".
- 4 Connect HMI/Rivo™ Backboard 4 in accordance with the wiring diagram. Make sure that all cable glands are installed correctly.
- 5 Connect optional Rivo™ Flex Mod Modules in accordance with the wiring diagram in chapter "wiring diagram".
- 6 The battery insulator of the lithium button cell must be removed on the HMI. See chapter Remove the battery insulator.
- 7 Fit housing cover.
- 8 Then put the Electronics Module into operation.

 If the module configuration is changed, a scan must be carried out. To do this, open "Setup" - "System settings" - "General" and press the "Scan" (hardware) button.

9.9 Firmware update (software version)

The firmware (software version) can be updated using a USB memory stick or Internet Browser or Ethernet connection.



- The firmware file can be downloaded free of charge from our homepage.
- It is not necessary to download and upload the device configuration. The device automatically transfers the previous device configuration after the update.
- You can read off the currently installed firmware version of the CPU in the menu "System Information".
- Before the update, make sure that the Electronics Module is set to the current date and time.
- The update takes several minutes.

9.9.1 Firmware update via USB memory stick

 The memory size of the USB memory stick must be at least as large as the firmware file.

Procedure:

- 1 Copy firmware file to the USB stick.
Do not use subdirectories!
- 2 Plug the USB stick into the USB socket (on the bottom of the device).
- 3 Open the Service-Centre and log in.
- 4 Click on the "Update" button.
Follow the instructions on the display.
The device executes a restart.
- 5 Firmware update starts. The LED (above the display) flashes during the firmware update.
- 6 When the firmware update is complete, the LED remains static.
- 7 Remove the USB stick.
- 8 Following a successful firmware update, check whether the new firmware version is displayed in the menu.
- 9 Check the settings, adjust if necessary.

9.9.2 Firmware update via Internet browser

 The firmware file is provided for download under the following file name (x.x.x defines the software version):
EAE1283-RivoOS-x.x.x.rvup

Procedure:

- 1 Copy the firmware file to the drive.
- 2 Open the Service-Centre and log in.
- 3 Click on the "Update" button.
- 4 Click on the "Select file" button to select the firmware file on the drive.
=> Follow the instructions on the display.
=>The device executes a restart.

9.10 RS485 interface (optional)



For more detailed information and the address reference list, see the Installation manual “Rivo™ Communication Interfaces” (article number W3T606371) and the Quick Guide (article number W3T591365). You can request this installation manual and the Quick Guide from us or download it from our homepage.

10 START-UP

**WARNING****Danger from unqualified personnel and incorrectly connected devices**

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe and correct commissioning, knowledge of the operation, connected electrical load, measurement signals, cable assignment and fuse protection of the connected devices and machines and the relevant safety regulations is required.
- Startup of the Electronics Module must be performed by trained and authorized electricians.
- Incorrectly connected devices can be damaged, possibly irreparably, or cause faults in other equipment when they are switched on or in operation.
- Ensure that the measuring and control cables are not confused or make contact with one another.
- Never connect or disconnect any cables to which voltage is applied.

**DANGER****Risk of injury or death!**

Possible consequence: fatal or serious injury.

- The Electronics Module must not be operated with flammable liquids.

**DANGER****Danger fatal injury caused by electric shock**

External voltages may still be connected even if the operating voltage is switched off.

Possible consequence: fatal or serious injury.

- The Electronics Module is not equipped with a mains switch and is in operation as soon as the supply voltage is applied.
- An external switch or circuit breaker with a clearly identifiable "Off" switch position is necessary. This external switch or circuit breaker should be installed directly beside the Electronics Module.

10.1 Initial commissioning and putting back into operation



Observe the instructions in the corresponding instruction manuals.



On delivery, the language setting of the Electronics Module is set to English.

Item	Work steps
1 1	Install the electronics module and the flow-through adapter: • with or without top-hat rail
2	Install an external switch or a circuit breaker with a clearly identifiable "Off" switch position directly beside the Electronics Module.
3	Install optional fine filter (filter unit). Flow cell module only.
4	Install optional strainer.
5	Install optional pressure booster pump.
6	Install optional pressure reducing valve.
7	Install shut-off ball valve. Y-style Flow-through Assembly only.

Item	Work steps
8	Connect sample water inlet and outlet: • with rigid pipework • with hose connection
9	Prepare Flow Cell Module: DEPOLOX®-R: • Remove the felt ring. • Remove and replace transport caps. • Fill electrode cleaning sand. DEPOLOX® Pool-R: • Fill electrode cleaning sand
10	Prepare sensors.
11	Install sensors in the flow-through adapter.
12	Optional: Install and lock the "Rivo™ Flex Mod" Modules in the corresponding module slots as specified.
13	Optional: Install Sensor Kits "Rivo™ Sens/Mem".
14	Connecting the sensor cable and connecting them with the Electronics Module.
15	Installing optional USB interface, "Rivo™ COM-Board USB 485" extension board and setting up Ethernet interface.

Item	Work steps
16	Checking whether sample water monitoring is active.
17	Integrating or activating safety shutdown.
18	Check whether monitoring of the circulation capacity or flow rate is installed.
19	Start up the Electronics Module.

10.2 Start up Electronics Module

Item	Work steps
1.	Switch on power supply.  The Electronics Module may only be operated with the specified supply and control voltage (see Chapter Technical Data and the type plate).
2.	Click  (System menu) => click  and select the language - possible without a password.
3.	 Login For access data, see label "Important System Information" - App Default (user/password).
4.	Check the currently installed software version. Software version:  under "System information"  If necessary, we recommend downloading the latest software version from the download area of our homepage. See chapter Interfaces - Firmware update (software version).

Item	Work steps
5.	Click  and configure following settings:
	Operation mode Select manual mode or automatic mode.
	Application Setup "Overview" =>  =>  => "Basic settings" => "Application name" => enter system name. "Alarm Configuration" => select alarms. "Functions" => select control connections and source outputs.

Item	Work steps
	System Setup Basic settings "Basic settings"  => "General" => enter device name. - Enter "Time config." - Enter "Global unit settings". - Select "Secure calibration". Hardware - Enter relay outputs, digital inputs, analog outputs and analog inputs. Connections - Select Network Configuration and Modbus TCP.
	User administration Log in and enter password.
	System information Display of installed software versions, e.g. Rivo OS - Display of serial numbers. It is also possible to open the Service- Center.

Item	Work steps
6.	Check the following: 1. Carry out the scan and check whether all installed Rivo™ I/O Modules (Input and Output Modules) have been recognized. Carry out the scan as follows: • ≡ => "System Setup" => "Basic settings" => "Hardware" or • ≡ => "Hardware" 2. Activate or deactivate measurement 1 and measurement 2 in the application settings. 3. Activate or deactivate measuring channel 1 and measuring channel 2 in the application settings. 4. Set controller type for measuring channel 1 and 2. 5. Configure mA outputs (optional). 6. Configure signal input for flow rate. 7. If necessary, configure signal input for external dosing factor. 8. Configure measuring channel 1 and 2 (range, unit, ect.).

Item	Work steps
	9. Set dosing for measuring channel 1 and 2. 10. Controller settings for measuring channel 1 and 2. 11. If necessary, carry out the first servomotor calibration. 12. Configure digital inputs as required. 13. Configure alarms as required. 14. Parameterise the interfaces. 15. In manual mode, check all dosing devices for correct function. 16. Test safety shutdowns. 17. Configure user administration.

11 SHUT-DOWN



WARNING

Danger from unqualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe operation and prevent serious injury, the device must be taken out of operation by trained and authorized specialist personnel.



WARNING



Risk of injury due to chemicals

Dosing liquids are caustic and oxidizing.

Possible consequence: fatal or serious injury.

- Observe safety regulations and the prescribed protective clothing for handling chemicals.
- All instructions in the product data sheet for the dosing medium must be complied with.



See the corresponding instruction manuals of the flow-through adapter and sensors.

Procedure:

- 1 Disconnect the Electronics Module from the power supply.
- 2 Shut down the flow-through adapter.
- 3 Shut down the sensors.

Disconnect all cables from the Electronics Module.

12 OPERATION

12.1 Display and control elements

The colored graphic display with touchscreen serves as the display and control element of the Electronics Module. It displays operating states, parameters, and system messages, and allows direct input via the touch-sensitive surface.

Alternatively, the Electronics Module can be operated remotely via an Ethernet connection using an internet-enabled device and a standard web browser.

The web-based user interface mirrors the structure and functionality of the local display and control unit on the electronic module.

User login is required to access configuration functions or to change the operating mode.

CAUTION

Damage to the touchscreen!

Touching the touchscreen with pointed or sharp objects, or tapping it forcefully with hard objects, may damage the glass surface and impair the functionality of the device.

Possible consequence: Significant material damage.

- Operate the touchscreen only with your finger or a suitable stylus designed for touch panels.

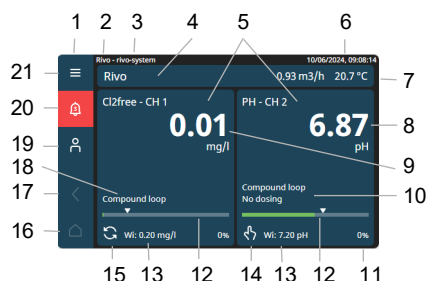


Fig. 27 Main menu (example)

- 1 Menu bar
- 2 Series Rivo (Rivo cannot be changed)
- 3 Device name (individual entry)
- 4 Application bar (individual entry)
- 5 Measurement channel menu field (depending on Measuring Module, example Chlorine and pH)
- 6 Date, time (Date display depends on language setting English GB or English US)
- 7 Temperature display and measurement unit (°C/°F and l/h)
- 8 e.g. pH value display (pH)
- 9 e.g. chlorine value display (mg/l)
- 10 PI controller - Compound loop, no dosing
- 11 Control output
- 12 Bar graph display with indication of limit value
- 13 Setpoint

- 14 Operation mode (example: manual mode)
- 15 Operation mode (example: auto mode)
- 16 Home key (main menu)
- 17 Back key
- 18 PI controller - Compound loop
- 19 Login
- 20 Alarms ACK
- 21 System menu

12.2 Menus, icons and buttons

Some menus, icons, buttons or terms serve merely as displays, while others are assigned an underlying function (interactive menu navigation) or selection option. Values or terms can be entered, edited or saved in the input boxes.

Icons	Meaning
☰	System menu
🔔	Alarms - ACK
👤	Log in / Log out
⬅	Back button
🏠	Home button

Icons	Meaning
	Operating mode selection
	Operating mode "automatic mode" inactive/active Icon blue = "automatic mode" inactive Icon green = "automatic mode" active
	Operating mode "manual mode" inactive/active Icon blue = "manual mode" inactive Icon green = "manual mode" active
	Modul information
	Delete
	Calibration archive
	Calibration
	Calibration settings
	Trend view
	Settings
	Open detail view
	This will irreversibly acknowledge all active alarm messages.

12.3 Symbol "Login and Logout"

NOTICE

The first login is carried out by  symbol.
For initial configuration, the user must always have administrator rights. Further users can only be created via the administrator.

For access data, see label "Important System Information" - App Default (user/password). See Chapter General notes - Important System Information - Recovery Key -.

Procedure for the first login:

- 1 Click  symbole.
 - 2 Enter "User" and "Password".
See label "Important System Information" - App Default (user/password).
-  When logging in for the first time, the factory password must be replaced by a customer-specific password with at least eight characters.
- 3 Confirm with the "Log in" icon.
 - 4 Click  (System menu) and create additional users and their rights under "User administration".

 The currently registered users are displayed in this menu.

12.4 Password protection and user administration

NOTICE

Rules for password entry

Password must have at least eight characters. Upper case/lower case letters are allowed, as are figures and special characters.

When logging in for the first time, the factory password must be replaced by a customer-specific password with at least eight characters.

NOTICE

For initial configuration, the user must always have administrator rights. Further users can only be created via the administrator.

See Chapter Operation - Symbol "Login und Logout".

Users log in with the corresponding rights (user levels) in the "User administration" menu (≡ System menu). Three user levels (roles) with different rights are available.

User levels (Role)	Meaning
Operator (User)	Read rights for all settings Write access to: • Calibration • Simple setting • Operation modes
Administrator User: adminpassword: admin	Read rights and write access for all settings Write access to: • User assignment (User) • Configuration applications • Service-Center • Factory setting • Configuration, system type
Maintainer	Read rights for all settings Write access to: • All settings • Setup • Operation modes • Calibration

Procedure for setting up user levels:

- 1 Click the  symbol (system menu).
- 2 Click "User administration".
- 3 Click the  symbol (create user).

Enter or select the following:

- Name
- Password
- Description
- User level (Roles) 
(Operator – Administrator – Maintainer)

Click "Create" symbol to save.

=> Edit the user with  icon.

12.5 Resetting a password

Passwords can be reset via the Service-Center.

NOTICE

Resetting access data

If you forget your access data, you can reset the system at any time using the Recovery Key. See label "Important System Information".

12.6 Menu bar

The menu bar on the left of the display is visible on all menu levels. The system menu, alarm messages and the user login are opened via the menu bar. Return to the main menu for any menu level with the Home button. Press the arrow key to return to the previous level.

12.7 Application Bar

The following settings can also be made via the application bar:

Symbols	Meanings
	Alarms - ACK
	Trend view
	Application menu: • Basic settings • Measurements • Functions • Alarm Configuration
	Open the detailed view and select the following via icons: • Operation mode • Calibration • Trend view • Wq Settings

12.8 System menu

Input and selection options – Function	
 System menu	
Menu 	<i>Language selection symbol - select the language: Deutsch – English GB – English US – Français – Español – Nederlands – Polski – Svenska – Chinesisch</i>  See device.

System menu overview:

 System menu
Operation mode
Calibration
Application Setup
System Setup
User administration
Factory settings
System information

12.9 Operation mode

 There are two ways to set or select the operating mode of the respective controller:

- via  symbol (System menu)
- via Measurement channel menu field

Access authorization: Administrator required!

Set the operating mode via the symbol (system menu):

- 1 Call up the Home menu (if applicable, click the Home key).
- 2 Click  Symbol.
- 3 Click "Operation mode" menu.
=> Display of the device - CH1 (e.g. DEPLOX-R) or CH2 (e.g. DEPOLOX Pool-R)
- 4 Click on the  symbol (select operating mode) for the corresponding device.
=> Click on the  symbol (automatic mode) or  symbol (manual mode) to set the corresponding operating mode.
- 5 Select the following in the "Bumpless-Transfer" menu:
Off - Once - Permanent.
- 6 For automatic mode: Enter "Setpoint".
- 7 For manual operation: Enter "Dosing timer" and "Dosing".

Set the operating mode via the Measurement channel menu field:

- 1 Call up the Home menu (if applicable, click the Home key).
- 2 Click measurement channel menu field.
- 3 Click on the  symbol (select operating mode).
- 4 Click on the corresponding symbol for the operating mode:
 Automatic mode or  manual mode
- 5 Select the following in the "Bumpless-Transfer" menu:
Off - Once - Permanent.
- 6 Enter additional:
 - For automatic mode: Enter "Setpoint".
 - For manual operation: Enter "Dosing timer" and "Dosing".

The following settings are possible:

 	Automatic mode Automatic activation of dosing (symbol is green).
 	Manual mode Dosing is controlled manually (symbol is green). • Option of manual dosing in % for an adjustable time. • After expiry of this time => change to the operation mode set under "next operation mode". • With man. dosing time = 0, the running time man. dosing is unlimited.

	Manual mode Dosing: display value in % • Option of manual dosing in % for an adjustable time. • Dosing = 0.0 % The running time for manual dosing is unlimited. • After expiry of this time => change to the operation mode set under "next operation mode". Operation mode: Manual Dosing is controlled manually.
---	---

12.10 Calibration

! Under “Calibration” in the  (system menu), the settings and views of the calibration are displayed differently than under “Calibration” in the Measurement menu field

	Input and selection options – Function
Calibration	
Wq	
Wq - Calibration	 Calibration archive
Lower Value	 Calibration => Enter calibration value
Upper Value	 Calibration => Enter calibration value
Temperature	
Temperature - Calibration	
Offset	 Calibration => Enter calibration value



CH 1 and CH 2 are identical.

Example: CH 1 (e.g. Measuring - DEPOLOX®-R) or CH 2 (e.g. Measuring - DEPOLOX® Pool-R)

CH 1 / CH 2	>
CH 1 / CH 2 - Calibration	 Calibration archive  Calibration settings: Expert mode: • Enabled: ON/OFF switch Calibration reminder: • Enabled: ON/OFF switch • Calibration due in: 24 days • Interval: individual • Unit: Select => Seconds – Minutes – Hours – Days – Weeks • Alarm level: Select => Info – Warning – Alert
Zero point	 Calibration => Close sample water inlet – Enter calibration value
DPD	 Calibration => Close sample water inlet – Enter calibration value

12.11 Application settings

Basic settings for the application are made in this menu.



Basic settings are:

- Activate Channel 1 and 2
- Activate or deactivate control for Channel 1 and 2

Procedure:

- 1 Call up the Home menu (if applicable, click the Home key).
- 2 Click "Application setting" and make the corresponding settings.



Check login authorisation.

The switch in the Activate menu must be set to ON.

Input and selection options – Function	
Application Setup	
Overview	
Overview	 Alarm Configuration => Alarm 1 to 8  Trend view  Application menu* (see "Application menu" Explanation" auf Seite 162)

Wq	 Trend view  Detail selection:  Calibration  Trend view  Wq - Settings** (see "***Wq - Settings" Explanation" auf Seite 167) Limit values  => Wq - Setting the Limit values I/II (Min – Max – Hysteresis)
Temperature	 Trend view  Detail selection:  Calibration  Trend view  Settings*** (see "***Wq - Settings" Explanation" auf Seite 167) Temperature  => Setting the Wq - Limit values I/II (Min – Max – Hysteresis)

! CH 1 and CH 2 are identically structured.

Example: CH 1 (e.g. Measurement - DEPOLOX®-R) or CH 2 (e.g. Measurement - DEPOLOX® Pool-R)

CH 1 / CH 2



Trend view



Detail selection



Operation mode



Calibration



Trend view



*Settings** (see "****Wq - Settings" Explanation" auf Seite 167)*

*Limit values ➤ => CH 1 / CH 2 - Setting the Limit values I/II
(Min – Max – Hysteresis)*

Dosing: Display

Operation mode: Display

Alarm Configuration	 Alarms 1 to 8 are identically structured.
Alarm 1	
Message	<i>Setting: individual</i>
Description	<i>Setting: individual</i>
Delay Time	<i>Select: Hours – Minutes – Seconds</i>
Alarm level	<i>Select: Warning – Error</i>
ACK Mode	<i>Select: None – Simple ACK – ACK with reset</i>
Assignment	<i>Select: Sample Water Stop – Digital In 1 – Digital In 2 – Warning – Error –</i> <i>CH 1 Operation mode – Limit values CH1 – Limit values CH2 –</i> <i>Limit values CH1 Yout – Limit values CH2 Yout</i>
Relay Assignment	<i>Select: Rel 1 B00 S01 C01 – Rel 3 BB00 S04 C01 – Rel 4 BB00 S04 C02</i>

Functions	<i>Alarm 1 to 8</i>
Control connections	 Control connection 1 and 2 are identically structured.
Control connection 1	ON/OFF switch 
Digital input selection	Select: No selection – Digital In 1 – Digital In 2
Activity selection	Select: No function – Controller Stop – Max. Dosing – Controller freeze – 2xYout – Ignore external setpoint / dosing factor – Switch to proportional control – Application freeze – Application standby
Source output	 Source output 1 and 2 are identically structured.
Source output 1	ON/OFF switch 
Source output 1	 Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality, Normalized value, Analog Value
Analog output Selection	Select: No selection – Analog Out 1 – Analog Out 2
Source	Select: Measurement – Controller (calculated controller output Yout) - Dosing output (controller output or dosing output taking into account the linearisation function)
Assignment	Select: No selection No function – Measured values of the available measuring channels – Wq – Temperature
Range	Select: 0 - 20 mA – 4 - 20 mA
Stop behavior	Select: 0 mA – 4 mA – 10 mA – 12 mA – 20 mA – 22 mA – Hold last value (defines the behavior of the mA output in the event of a communication error of the module)

Other functions	
Sample line dosing	ON/OFF switch 
Sample line dosing	 Modul information: Label, Hardware address, Part number, Serial number, Software version, Product Name, Error Code, State, Relay-Out, Last execution, Next execution
Sample line dosing	Button "Start"
State	-
Start-up time	Select: Hours – Minutes – Seconds
Rinsing time	Select: Hours – Minutes – Seconds
Dosing Time	Select: Hours – Minutes – Seconds
Assignment	Select: No selection – Rel 4 – Rel 3
Time module enable	ON/OFF switch 
Time control	
Time module activated	ON/OFF switch 
Time module 1	  Time module 1 and 4 are identically structured.
Time module 1	 Information: Last execution – Next execution
Enable	ON/OFF switch
Skip once	ON/OFF switch
Start date	Select: Hours – Minutes – Seconds

Start time	Select
Weekdays	Select: Mon – Tue – Wed – Thu – Fri – Sat – Sun
Serial pattern	Select: Once – Daily – Weekly
Repeat after weeks	Input
Sample water stop	ON/OFF switch 
Sample water stop	 Module information: State
Digital input selection	Select: No selection – Digital In 1 – Digital In 2
Label	Input: individual
Controller selection	Select: CH 1
Sample water delay time	Select: Hours – Minutes – Seconds

! **Application menu“ Explanation 

	Input and selection options – Function
Application menu	
Basic settings	
Application name	<i>Input: Individual name</i>
Measurements	
Wq	ON/OFF switch  Detail view:  Calibration  Trend view  Settings*** (see “***Wq - Settings“ Explanation” auf Seite 167) Limit values  => Wq - Set limit values I/II (Min – Max – Hysteresis)

Temperature	ON/OFF swich  Detail view:  Calibration  Trend view  Settings*** (see “***Wq - Settings“ Explanation” auf Seite 167) Limit values  => Temperature - Set limit values I/II (Min – Max – Hysteresis)
 CH 1 and CH 2 are identically structured. Example: CH 1 (e.g. Measurement - DEPOLOX®-R) or CH 2 (e.g. Measurement - DEPOLOX® Pool-R)	
CH 1 / CH 2	ON/OFF swich  Detail view:  Operation mode  Calibration  Trend vies  Settings** (see “***Wq - Settings“ Explanation” auf Seite 167) Limit values  => CH 1 / CH 2 - Set limit values I/II (Min – Max – Hysteresis) Dosing: Display Operation mode: Display

Functions	
Control connections	 Control connections 1 and 2 are identically structured.
Control connection 1	ON/OFF switch 
Digital input selection	Select: No selection – Digital In 1 – Digital In 2
Activity selection	Select: No function – Controller Stop – Max. Dosing – Controller freeze – 2xYout – Ignore external setpoint / dosing factor – Switch to proportional control – Application freeze – Application standby
Source output	 Source output 1 and 4 are identically structured.
Source output 1	ON/OFF switch 
Analog output Selection	Select: No selection – Analog Out 2
Source	Select: Measurement – Controller
Assignment	Select: No selection – AI 2 – Ch1 – CH 2 – Wq – Temperatur
Range	Select: 0 - 20 mA – 4 - 20 mA
Stop behavior	Select: 0 mA – 4 mA – 10 mA – 12 mA – 20 mA – 22 mA – Hold last value
Other functions	
Sample line dosing	ON/OFF switch 
Sample line dosing	 Modul information: Label, Hardware address, Part number, Serial number, Software version, Product name, Error Code, State, Relay-Out, Last execution, Next execution
Sample line dosing	Button "Start"
State	-

Start-up time	Select: Hours – Minutes – Seconds
Rinsing time	Select: Hours – Minutes – Seconds
Dosing time	Select: Hours – Minutes – Seconds
Assignment	Select: No selection – Rel 4 – Rel 3
Time module enabled	ON/OFF switch
Time control	
Time control 1	 Time control 1 to 4 are identically structured. 
Time control 1	 Informationen: Last execution – Next execution
Enabled	ON/OFF switch
Skip once	ON/OFF switch
Start date	Select: Year – Month – Day
Start time	Input
Weekdays	Select: Mon – Tue – Wed – Thu – Fri – Sat – Sun
Serial pattern	Select: Once – Daily – Weekly
Repeat after weeks	Input

Sample water stop	ON/OFF switch 
Sample water stop	 Modul information: State
Digital input selection	Select: No selection – Digital In 1 – Digital In 2
Label	Input: individual
Controller selection	Select: CH 1
Sample water delay time	Select: Hours – Minutes – Seconds
Alarm Configuration	
Alarm configuration	 Alarm 1 to 8 are identically structured.
Alarm 1	
Message	Input: individual
Description	Input: individual
Delay Time	Select: Hours – Minutes – Seconds
Alarm level	Select: Warning – Error
ACK Mode	Select: None – Simple ACK – ACK with reset
Assignment	Select: SampleWaterStop– Digital In 1 – Digital In 2 – Warning
Relay Assignment	Select: Rel 1 B00 S01 C01 – Rel 4 BB00 S04 C02



***“Wq - Settings“ Explanation



Input and selection options – Function	
Wq - Settings	 Modul information: Hardware address, Part number, Serial number, Software version, Product name, Error Code, Data Quality
Measurement	
Label	Input of a customer-specific measuring point identifier - e.g. container inlet
Input signal	Select: 0 - 20 mA – 4 - 20 mA – 10 V – 2 V
Measurement filter	Select: Off – Minimal – Low – Medium – Strong
Input signal direction	Select: Direct – Inverse
Unit	Input: l/min
Lower range	Input: l/min (max. 3.99)
Upper range	Input: l/min (min. 0.01)
Format	#0 – #0.0 – #0.00 – #0.000
Upper calibration point input	Input: mA
Upper calibration point output	Input: l/min
Basic settings	
Demo Mode	Select: Off – Demo Mode (Sinus)
Input selection	Select: Internal – External COM

Temperature - Settings	① <i>Modul information: Hardware address, Part number, Serial number, Software version, Product name, Error Code, Data Quality</i>
Measurement	>
Label	<i>Input of a customer-specific measuring point identifier - e.g. temperature</i>
Measurement filter	<i>Select: Off – Minimal – Low – Medium – Strong</i>
Data Source	<i>Select: Sensor – Manual</i>
Lower range	<i>Select: °C (min. 0 – max. 100)</i>
Upper range	<i>Select: °C (min. 0 – max. 100)</i>
Default Temperature	<i>Select: °C (min. 0 – max. 100)</i>
CH 1 (e.g. Measurement - DEPOLOX®-R)	① <i>Modul information: Hardware address, Part number, Serial number, Software version, Product name, Error Code, Data Quality</i>
Measurement	>
Label	<i>Input of a customer-specific measuring point identifier - e.g. Chlorine Inlet</i>
Range	<i>Select: 0 - 0.20 – 0 - 0.50 – 0 - 1.0 – 0 - 2.00 – 0 - 3.0 – 0 - 10.0 – 0 - 20.0 – 0..50.0</i>
Unit	<i>Select: mg/l – µg/l</i>
Measurement filter	<i>Select: Off – Minimal – Low – Medium – Stron</i>

Sensor settings	
Sensor type	Select: Cl2free – Cl++ – KMnO4 – O3 – ClO2 – Br – NH4+ – Freie Auswahl
Sensor tpe def.	Input: individual
Sensor	Select: DEPOLOX 5 (DEPOLOX R) – Rod electrode – Membrane FC – Membrane TC – Membrane CD – Membrane OZ – Micro 2000
µA Range	Select: 1000 µA – 100 µA – 10 µA – Auto
Upot	Input: mV (min. 9 – max. 1.000)
Dosing	
CH 1 - Dosing (e.g. DEPOLOX®-R)	 Dosing information: Dosing quantity, Average dosage, Max. dosing, Min. dosing
Actuator	Select: Non selection – Actuator with Ym – Pump 2P – Analog output 2P Further options in the menu.  When selecting the actuators, a corresponding relay must be available, otherwise the selection of actuators may be restricted.
Settings actuator	
Analog output Selection	Select: No selection – Analog Out 1 – Analog Out 2  The menu selection depends on the actuator selection.
Range	Select: 0 - 20 mA – 4 - 20 mA
Enable relay	
Enable really	Select: No selection – Rel 1

Dosing agent settings	
CH 1 - Dosing agent settings	 <i>Dosing information: Dosing quantity, Average dosage, Max. dosing, Min. Dosing</i>
Dosing Statistics	<i>Button "Reset"</i>
Unit dosing performance	<i>Input: individual</i>
Time base dosing performance	<i>Select: Min. – h – Day</i>
Max. rate	<i>Input: % (min. 0)</i>
Linearization	
Dosing	<i>Display: Current dosage in %</i>
Linearization point 0%	<i>Input: % (min. 0.0 – max. 100.0)</i>  => Delete linearization point  => Use current position as linearization point.
Linearization point 10%	
Linearization point 20%	
Linearization point 30%	
Linearization point 40%	
Linearization point 50%	
Linearization point 60%	
Linearization point 70%	
Linearization point 80%	
Linearization point 90%	
Linearization point 100%	

Controller	
Bumpless-Transfer	Select: Off – ONCE – Permanent
Feed delay time	Select: Hours – Minutes – Seconds
Safety MAN. Mode	ON/OFF switch
Controller settings	
CH 1 - Controller settings (e.g. DEPOLOX®-R)	 Controller information: P-Part, I-Part, Max. PID output, Uncorrected PID output, Controller state, Dosing factors  (=> Dosing factors view) Dosing factor  (delete)
Source setpoint	Select: Internal – AI 2
Setpoint	Input: individual
Tconst	Select: Hours – Minutes – Seconds
Tvar	Select: Hours – Minutes – Seconds
Max.lin.correction	Input: % (min. 0.0 – max. 100.0)
Control factor	Input: min. 0.1 – max. 50.0
Control direction inverse	ON/OFF switch
Flow jump threshold	Input: % (min. 5.0 – max. 100.0)
Zero threshold	Input: % (min. 0.0 – max. 20.0)
Max	Input: % (min. 0.0 – max. 100.0)
Min	Input: % (min. 0.0 – max. 100.0)
Switch to proportional control	
Enabled	ON/OFF switch

Basic settings	
CH 1 - Basic settings	
Demo Mode	<i>Input: Off – Demo Mode (Sine)</i>
Input selection	<i>Select: Internal – External COM</i>
Controller	<i>ON/OFF switch</i>
Controller type	<i>Select: Proportional controller – Single feedback control – Compound loop – Dosing contact</i>
CH 2 - Einstellungen (e.g. DEPOLOX® Pool-R)	 <i>Modul information: Hardware address, Part number, Serial number, Software version, Product name, Error Code, Data Quality</i>
Measurement	
Label	<i>Input: individual</i>
Range	<i>Select: 0 - 0.20 – 0 - 0.50 – 0 - 1.0 – 0 - 2.00 – 0 - 3.0 – 0 - 5.0 – 0 - 10.0 – 0 - 20.0 – 0..50.0 – 0 - 100.0 – 0 - 200.0</i>
Unit	<i>Select: mg/l – µg/l</i>
Measurement filter	<i>Select: Off – Minimal – Low – Medium – Strong</i>
Sensor settings	
Sensor type	<i>Select: Cl2free – Cl++ – KMnO4 – O3 – ClO2 – Br – NH4+ – Freie Auswahl</i>
Sensor type def.	<i>Input: individual</i>
Sensor	<i>Select: DEPOLOX 5 (DEPOLOX R) – Rod electrode – Membrane FC – Membrane TC – Membrane CD – Membrane OZ – Micro 2000</i>
µA Range	<i>Select: 1000 µA – 100 µA – 10 µA – Auto</i>
Upot	<i>Input: individual</i>
Impeller Relay	<i>Select: No selection – Rel 2 – Rel 1</i>

Basic settings	
CH 2 - Basic settings	
Demo Mode	<i>Select: Off – Demo Mode (Sine)</i>
Input selection	<i>Select: Internal – External COM</i>
Controller	<i>ON/OFF switch</i>
Controller type	<i>Select: Proportional controller – Single feedback control – Compound loop</i>

12.12 System Setup

	Input and selection options – Function
System Setup	
Basic settings	
General	
Device name	<i>Entry of a customised device name or measuring point identifier</i>
Language	 <i>Select a language: See device.</i>
Service-Center	 => <i>Service-Center opens</i>
Hardware	 => <i>Perform a scan when changing the module configuration to accept the changed configuration.</i>
Time Config.	
NTP	<i>ON/OFF switch</i> <i>Activate/deactivate time synchronisation from the network.(Network Time Protocol):</i> <i>• If OFF is selected, the time and date must be set manually or if there is no network available.</i> <i>• If ON is selected, the date and time are taken from the network.</i>
Timezone	<i>Select: Europa – Asien – America – Africa – Antarctica – Pacific – Australia – Atlantic – Indien</i>

Date	<i>Display: Year – Month – Day Depending on the time zone, the date format is displayed differently.</i>
Time	<i>Display: Hours – Minutes Depending on the time zone, the time format is displayed differently.</i>
Global unit settings	
Global Unit Setting	<i>Units of Measurement: Metric – Imperial</i>
Temperature Unit	<i>Select: °C – °F</i>
Safety	
Secure calibration	<i>ON/OFF switch</i> <i>Activate/deactivate: Switches off the dosing after a delay of 10 minutes if the calibration process has not been completed correctly (e.g. sample water inlet closed, calibration menu is not exited).</i>
Hardware	 => Perform a scan when changing the module configuration to accept the changed configuration.
Relay outputs	  Depending on the configuration of the measuring modules Rivo™ Flex Mod
e.g. Relay 1 (depending on the configuration)	 <i>Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality, State, State (raw signal)</i>
Label	<i>Input: individual</i>
Inverse	<i>ON/OFF switch</i>

Digital inputs	  DI 1 and DI 2 are identically structured.
DI 1 / DI 2	 Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality, State, State (raw signal)
Label	Eingabe: individuell
Input signal direction	Select: Direct – Inverse
Debouncing	Input: max 1000 ms
Analog outputs	  Depending on the configuration of the „Rivo™ Flex Mod“ Measuring modules
e.g. mA Output 1 (depending on the configuration)	 Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality, Normalized value, Analog Value
Label	Input: individual
Range	Select: 0 - 20 – 4 - 20
Stop behavior	Select: 0 mA – 4 mA – 10 mA – 12 mA – 20 mA – 22 mA – Hold last value <i>Behavior of the mA output in the event of communication faults in the device.</i>

Analog inputs	  Depending on the configuration of the “Rivo™ Flex Mod” measuring modules
e.g. mA Input 1 (depending on the configuration)	 Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality, mA-Value, Percentage
Demo Mode	Select: Off – Demo Mode (Sine)
Label	Input: individual
Input signal	Select: 0 - 20 mA – 4 - 20 mA
Measurement filter	Select: Off – Minimal – Low – Medium – Strong
Input signal direction	Select: Direct – Inverse
Unit	Input: individual
Lower range	Input: individual
Upper range	Input: individual
Format	Select: #0 – #0.0 – #0.00 – 0.000
Limit values	
Limit values	
Limit value I / II	 Limit value I and II are identically structured.
Min	Input
Max	Input
Hysteresis	Input

Connections	
Network Configuration	 
DHCP	ON/OFF switch
IP address	Input IP address If ON is selected, the IP address is automatically assigned by the network.
Subnet mask	Input Subnet Mask
Gateway	Input Gateway
MAC address	Display (automatic) Display of the physical hardware address of the device in the Ethernet.
Modbus TCP	
Enabled	ON/OFF switch
Codepage	Select: UTF-8 – Windows-1252 – CP437
Port	Input: individual
Write protection	Select: Off – On – On with Password
Password timeout	Input: ms  Only appears if write protection is set to “On with password”.

 The “Timeout (Extern COM)” interface parameters are available in the system menu under “Application Setup” => “Overview” =>  =>  => “Basic settings”.

12.13 User administration

Input and selection options – Function	
User administration	
	<i>Create a new user.</i>
Name	<i>Input: User name</i>
Password	<i>Input: Password</i>
Description	<i>Input: z.B. Name, Position</i>
Roles	<i>Select: Operator - Administrator - Maintainer</i>
admin	 => <i>Edit the created users</i>

12.14 Factory settings

	Input and selection options – Function
Factory settings	
Reset system settings	
Reset	 To reset the device. <i>The following system settings can be made: e.g. IP settings, system name, time settings set to factory settings</i>
Reset application settings	
Reset	 To reset the applications. <i>The following applications can be carried out: All application settings or setting parameters set to factory settings</i>

12.15 System information

Input and selection options – Function	
System information	 Service-Center
Rivo OS	
Version	<i>Display the latest version</i>
Software version	
Helio	<i>Display the latest version</i>
Helio Application	<i>Display the latest version</i>
IO-Connector	<i>Display the latest version</i>
SystemConfig	<i>Display the latest version</i>
Rivo	<i>Display the latest version</i>
ComGateway	<i>Display the latest version</i>
Service-Center	<i>Display the latest version</i>
Yaml information	
Yaml Name	<i>Display the latest version</i>
Yaml Version	<i>Display the latest version</i>
Yaml Hash	<i>Display the latest version</i>
Serial number HMI	
Serial number Device	

12.16 Trend view

Trend	Input and selection options – Function
	<i>Select: diagram view CH 1</i>
	<i>Select: diagram view CH 2</i>
	<i>Select: diagram view temperature</i>
	<i>Select: diagram view controller</i>
	<i>Sample water stop</i>
	<i>Select: 2h – 6h – 12h – 24h – 7d</i>
	<i>Back/forward button for diagram display</i>
	<i>Advance button for diagram display</i>
	<i>Select: CH1 – CH2 – Temperature – Flow – DI1 – Yout</i>

12.17 Acknowledge and Messages

Display of error messages	
 Acknowledge (ACK)	
	<i>Acknowledge all alarms - All active alarm messages are irrevocably cancelled.</i>
	<i>Type</i> <i>Code</i> <i>Runtime</i> <i>Timestamp</i> <i>Acknowledged</i> <i>Description</i> <i>TODO: Empty description</i>

12.18 Menu field measurement channel

The menu field Measurement channel shows the current measured value and the sensor signal. All settings relating to measurements, such as range, limit values and controller settings, must be made via this menu.

NOTICE

The measured values displayed depend on the various settings. Name can be entered individually. Depending on the user administration configuration and the currently registered users, the changes that can be made are limited. To change, it is necessary to log in at the appropriate user level. See Chapter Login - user administration (user level).

Procedure for opening the menu field Measurement channel:

- 1 Call up the Home menu (if applicable, click the Home key).
- 2 Click the menu field of the measurement channel to be opened.
- 3 Click the corresponding symbol to make the desired settings.

 Interactive menu navigation.

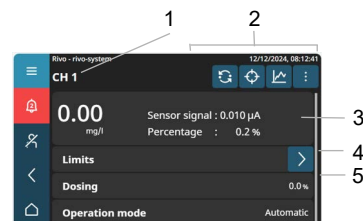


Fig. 28 Example menu field Measurement channel

- 1 Display of measurement (Customer-specific name or label can be set in the Measurement menu.)
- 2 Function buttons (selection option via symbols)
- 3 Display of measured values - measured value - sensor signal - percentage (display only)
- 4 Dosing (display only)
- 5 Operation mode (display only)

Measuring channel - Measurement 1

- ! The menu structure of “Measuring channel 1” is described below using the example of chlorine measurement.
The menu structure for “Measuring channel 2” is identical to “Measuring channel 1”.

Measurement 1 (Chlorine measurement as an example)

	Input and selection options – Function
CH 1	 Selection via icon: Operating mode, Calibration, Trend, Settings
Limit values	
Limit values	Set limit values I/II (Min – Max – Hysteresis)
Dosing	Display
Operation mode	Display
 CH 1 - Operation Mode	! Operating mode settings see Chapter 12.9 Operation mode.
Operation mode	
	Icon blue = Automatic mode inactive
	Icon green = Automatic mode active
	Icon blue = Manual mode inactive
	Icon green = Manual mode active
Bumpless-Transfer	Select: Off – Once – Permanent
Setpoint (only possible in automatic mode)	Input: mg/l (max. 1 mg/l)
Dosing time (only manual mode)	Input: Hour– Minutes – Seconds
Dosing (only manual mode)	Input: %

 CH 1 - Calibration	 <i>Delete</i>  <i>Calibration archive</i>  <i>Calibration settings</i>
Zero point	<i>Automatic display μA</i>  <i>Switch off the sample water supply</i>
DPD	<i>Automatic display $\mu\text{A}/\text{mg/l}$</i>  <i>Switch off the sample water supply</i>
 Calibration settings	
Calibration reminder	
Enabled	<i>ON/OFF switch</i>
Calibration due in	<i>Display</i>
Interval	<i>Input: individual</i>
Unit	<i>Select: Seconds – Minutes – Hours – Days – Weeks</i>
Alarm level	<i>Select: Info – Warning – Error</i>
 Trend	 Explanation see Chapter 11.15 Trend view

 CH 1 - Settings	 <i>Modul information: Hardware address, Part number, Serial number, Software version, Product Name, Error Code, Data Quality</i>
Measurement	
CH 1 - Measurement	
Label	<i>Entry of a customer-specific measuring point identifier - e.g. chlorine</i>
Range	<i>Select: 0 - 0.20 / 0 - 0.50 / 0 - 1.00 / 0 - 2.00 / 0 - 3.00 / 0 - 5.00 / 0 - 10.0 / 0 - 20.0 / 0 - 50.0</i>
Unit	<i>Select: mg/l – µg/l</i>
Measurement filter	<i>Select: Off – Minimal – Low – Medium – Strong</i>
Sensor settings	
Sensor type	<i>Select: Cl2free – Cl++ – KMnO4 – O3 – ClO2 – Br – NH4+ – Free selection</i>
Sensor type def.	<i>Input: individual</i>
Sensor	<i>Select: Depolox 5 (DEPOLOX®-R) – Rod electrode (3-Electrode single-rod measuring sensor Chlorine) – Membrane FC – Membrane TC – Membrane CD – Membrane OZ (Membrane sensor)</i>
µA Range	<i>Select 1000 µA – 100 µA – 10 µA – Auto</i>
Upot	<i>Input: mV (min 0 – max. 1000)</i>

Dosing	
CH 1 - Dosing	 <i>Dosing information: Dosing quantity, Average dosage, Max. dosing, Min. dosing</i>
Actuator	<i>Select: No selection – Analog output 2P</i>
Settings actuator	
Analog output Selection	<i>Select: No selection – Analog Out 1</i>
Range	<i>Select: 0 - 20 mA – 4 - 20 mA</i>
Enable relay	
Enable relay	<i>Select: No selection– Rel 3 – Rel 4</i>
Dosing agent settings	
Dosing agent settings	 <i>Dosing information: Dosing quantity, Average dosage, Max. dosing, Min. dosing</i>
Dosing Statistics	<i>Button "Reset"</i>
Unit dosing performance	<i>Input: individual</i>
Time bade dosing performance	<i>Select: Min. – h – Day</i>
Max. rate	<i>Input: % (min. 0)</i>

Linearization	>
CH 1 - Linearization	
Dosing	<i>Input: current dosing</i>
Linearization point 0%	<i>Input: % (min. 0.0 – max. 100.0)</i>
Linearization point 10%	 => Delete linearization point  => Use current position as linearization point.
Linearization point 20%	
Linearization point 30%	
Linearization point 40%	
Linearization point 50%	
Linearization point 60%	
Linearization point 70%	
Linearization point 80%	
Linearization point 90%	
Linearization point 100%	

Controller	
CH 1 - Controller	
Bumpless-Transfer	Select: Off – Once – Permanent
Feed delay time	Select: Hours – Minutes – Seconds
Safety MAN. Mode	Activate/deactivate
Controller settings	
CH 1 - Controller settings	 Controller information: P-Part, I-Part, Max. PID output, Uncorrected PID output, Controller state, Dosing factors Dosing factor  => Display Dosing factor  => Delete
Source setpoint	Select: Internal – AI 2
Setpoint	Input: individual
Tconst	Input: Hours – Minutes – Seconds
Tvar	Input: Hours – Minutes – Seconds
Max.lin.correction	Input: %
Control factor	Input: individual
Control direction inverse	Activate/deactivate
Flow jump threshold	Input: min. 5 % / max. 100 %
Max	Input: max. 100 %
Min	Input: max. 100 %

Switch to proportional control	 => activate/deactivate
Threshold	Input: min. 0 % / max. 100 %
Hysteresis	Input: min. 0 % / max. 100 %
Dosing factor	Input: min. 0.1% / max. 400 %
Adaption	
Adaption	"Start" Button
Status	Anzeige
Ts	Eingabe: Stunden – Minuten – Sekunden
Tu	Eingabe: Stunden – Minuten – Sekunden
Basic settings	
CH 1 - Basic settings	
Demo Mode	Select: Off – Demo Mode (Sine)
Source	Select: Internal – External COM
Controller	ON/OFF switch
Controller type	Select: Proportional controller – Single feedback control – Compound loop – Dosing contact

12.19 Service-Center

System information can be called up and service functions carried out via the Service Center.

Login is requested for various menus when a menu in the Service Center is opened. This login is not identical to the standard device login.

The standard device login on first opening the Service Center is:

User: service

Initial password: service

Following initial login, the user is prompted to change the password. The password must be saved in a safe place. If it is lost, it can be reset in the Service Center with the Recovery Key (see Chapter Operation - Resetting a password)

 Interactive menu navigation.

Language selection: English, German, Français

Exit the service menu via the “Reload” button.

There are two ways to open the Service Center:

- 1 Switch the Electronics Module on, the device boots.
 symbol appears briefly on the bottom right of the screen.
- 2 Click the  symbol. Service Center opens.
- 3 Select menus.

OR:

- 1 Click the  symbol (system menu).
- 2 Select System information menu.
- 3 Click Service Center.
- 4 Click on the “Confirm” button to open the Service-Center.
=> Service Centre is displayed.

Input and selection options – Function	
	
Resource Monitor	<i>Display of the current utilisation of the CPU/memory</i>
View licenses	<i>Display of the Licenses, Copyright information and Source Availability used (open source licences)</i>
Touch Calibration  Only possible directly on the device.	<i>This function allows the touchscreen to be recalibrated if inaccurate responses or input errors occur during operation.</i> <i>To perform the touchscreen calibration, the markers (cross symbols) displayed sequentially on the screen must be touched precisely. The calibration is complete once all four calibration points have been accurately activated in the specified order.</i>  <i>This function is not available for remote access via Internet browser.</i>
View journal logs  Administrator rights required!	<i>Display journal</i>  Sort  Download log file

Device configuration

 Administrator rights required!

Display and selection of the application or device configuration

 After changing the device configuration, it is necessary to press the “Clean up” button to delete old application data. If this is not done, the application may not run correctly or the display may show no or incorrect values.

Depending on the version of the device, it is possible to switch from the higher version to the lower version of the application.

Available applications:

- *2CH Analyser: 2
Channel measuring system without control function (Rivo™ I Municipal/Industrial – Analyser)*
- *2CH Control PC:
2 Channel measuring system with control function (Rivo™ I Municipal/Industrial (PC) – Analyser & Controller (PC))*
- *Rivo I Control SC:
Proportional without measured value support*

Import/Export  Administrator rights required!	<i>Menu for importing or exporting the device configuration of an identical device.</i> <i>There are two options for exporting/importing the device settings:</i> • <i>Exporting/importing the device settings on the device via USB interface</i> • <i>Exporting/importing the device settings via Internet browser access</i> <i>When exporting, the device creates a zip file with the name Rivo including the date and time stamp. (Press the "Export" button and follow the instructions on the display).</i> <i>When importing the device configuration, a Rivo Zip file of an identical device must be imported either via USB memory stick on the device or via Internet browser access (press the „Import“ button and follow the instructions on the display).</i>
Update  Administrator rights required!	<i>The Electronics Module can be updated using the corresponding Rivo I update file either via USB memory stick or via Internet browser. See chapter Function - Firmware update. The firmware update can be updated using the "Update" button.</i>
System information	<i>Display:</i> <i>Rivo-OS version</i> <i>Service-Center version</i> <i>Serial number HMI</i> <i>Serial number device</i>

Reload UI	<i>Return to main display.</i> <i>To leave the Service-Center and switch to the Rivo application, press the “Reload” button.</i>
Clearup  Administrator rights required!	<i>Delete application data.</i> <i>All application-specific data records and trend data are deleted.</i> <i>Deletes the application memory and resets the application. The device restarts and the system sets itself up again, including module scan.</i>

12.20 Resetting a password in the Service Center

It is possible to reset the device if the password is lost. To do this, you need the Recovery Key - Important Service Information (label included in the scope of delivery).

Procedure:

If an incorrect password is entered in the Service Center, a "Recovery" button appears in the login window.

- 1 Enter Recovery Key.
- 2 Click the "Reset device" button.
=> Device is reset. All passwords and settings are now deleted, and the device is reset to the factory settings.

13 CALIBRATION

- ! All installed measurements must be checked regularly. Test and calibration intervals must be adhered to in accordance with the applicable regulations. See also Chapter Maintenance - Maintenance Schedules.

To prevent impermissible control signals from being output during calibration, the controller outputs are kept constant during the calibration process.

A "Secure calibration" function is available for calibrating the sensors. If activated, this prevents the uncontrolled dosing of chemicals and switches off the dosing if the calibration menus are permanently active.

13.1 Temperature calibration

The temperature is calibrated via the "Application Bar". The temperature calibration can be carried out in the Temperature menu. If there is a deviation between the comparison measurement and the measured value display on the Electronics Module.

- ! It is possible to select °C or °F in the „Temp. unit“ menu. The required temperature input can be selected or switched off in the „Temp. sensor“ menu.

13.2 Chlorine calibration

Calibration of the 3-electrode measuring cell (DEPOLOX®-R) or 3-electrode single-rod measuring sensor Chlorine (DEPOLOX® Pool-R) for Cl_2 , KMnO_4 , O_3 , ClO_2 and Cl_2++ (pH-compensated).

 The sequence of calibration must not be reversed.

Before Cl_2++ calibration, it must be ensured that the pH measurement is calibrated correctly first.

When calibrating the 3-electrode measuring cell, first carry out a zero point calibration and then a measured value calibration (DPD).

The calibration process is nearly the same for chlorine, chlorine dioxide, ozone and potassium permanganate. The difference lies in the fact that some of the reagents are measured with a photometer and others with a colour meter.

Procedure:

Zero point calibration

- 1 Starting from the basic display in the main menu select the "Calibration" menu.
- 2 Select the measurement to be calibrated from the menu, e.g. Cl_2 free.
- 3 Select the "Cal. zero" parameter and follow the instructions on the display.

Zero point calibration with disinfectant-free water

- 4 If disinfectant-free water (e.g. by switching off the dosing system) is available, zero point calibration can be performed with it. In this case, switch off the dosing and use disinfectant-free water. Do not close the sample water inlet during zero point calibration.

Measurement value calibration (DPD)

- 5 After zero point calibration, wait at least two minutes.
- 6 Select the "Span" parameter and determine the content of free chlorine, ozone, chlorine dioxide or potassium permanganate, e.g. using a photometer. Follow the instructions on the display.

 In the DPD calibration of the Cl_2++ measurement the calibration value should be greater or equal to 25 % of the measuring range.

13.3 Membrane sensors calibration

Calibration is nearly identical for all membrane sensors. The difference lies in the fact that some of the chemicals are measured manually with a photometer and others with a colour meter.

For the membrane sensor calibration, there is the option of a one-point or a two-point calibration. The expert mode can be switched on or off in the calibration settings.

Expert mode On = two-point calibration

Expert mode Off = one-point calibration

Total chlorine

The span calibration must be performed for the total chlorine calibration. Proceed as follows:

- 1 Open the calibration menu.
- 2 Select "Span Calibration" and follow the instructions on the display.

Combined chlorine (optional)

When calibrating the combined chlorine measurement, the value of the free chlorine is also taken into account, so it must be ensured that the free chlorine display is correctly calibrated.

The value determined by the comparison measurement can then be calibrated according to the instructions on the display.

Zero point calibration for ozone, chloride dioxide, Cl_2 free (M)

Zero point calibration using 2-point calibration



Instead of the zero point, a DPD value determined by comparative measurement can also be calibrated.

DPD calibration using 1-point and 2-point calibration for Ozone, Chlorine dioxide and Chlorine

For calibration, determine the content of free chlorine, ozone, chlorine dioxide, e.g. with a photometer and follow the instructions on the display.

13.4 pH calibration

 During pH calibration the buffer solution and the sample water should have the same temperature. If there is a difference in temperature of $> 5\text{ }^{\circ}\text{C}$, first enter the temperature of the buffer solution in the menu "Calibration" - "pH" under "Cal. at temp.".

For pH calibration, there is the option of one-point calibration (offset) or a two-point calibration with buffer solutions. The expert mode can be switched on or off in the calibration settings.

Expert mode On = two-point buffer calibration

Expert mode Off = one-point offset calibration

Procedure:

pH-7 alignment

- 1 Starting from the basic display in the main menu select the "Calibration" menu and follow the instructions on the display under pH7 calibration.

Slope alignment

- 2 Wash the sensor in distilled water to prevent carry-over of the buffer solution.
- 3 Select the parameter "Cal. pH X".

 If buffer solutions other than those stated are used, the pH value of the buffer solution must be lower than pH 6 or higher than pH 8.

- 4 Dip the pH sensor at least 2 cm deep into the buffer solution until the indicated pH value remains constant.

pH correction

If external influences result in a constant difference between the displayed pH value and a pH value measured manually, this difference can be compensated.

Procedure:

- 1 Starting from the basic display, from the main menu, select the „Calibration“.
- 2 Select the parameter "Offset" and follow the instructions on the display.



The offset is deleted each time a new pH-7 alignment or span alignment is performed.

13.5 Redox calibration (mV)



Redox sensors have long running-in times. After calibration with a buffer solution, it can therefore take several hours until the value has stabilized.

Procedure:

- 1 Starting from the basic display, from the main menu, select the „Calibration“ menu.
- 2 Select menu item "ORP" and follow the instructions on the display.

13.6 Conductivity calibration



The conductivity sensor has an integrated temperature sensor and therefore an automatic temperature compensation feature.

In the conductivity calibration menu, the temperature of the temperature sensor in the conductivity sensor can be adapted with the parameter "Cal. temperature" to a comparative measurement.

Procedure:

- 1 Starting from the basic display, from the main menu, select the „Calibration“ menu and follow the instructions on the display.

Depending on the measuring range:

- 600 $\mu\text{S}/\text{cm}$ calibration solution for a measuring range of 2500 $\mu\text{S}/\text{cm}$
- 60 mS/cm calibration solution for all mS/cm measuring ranges

13.7 Fluoride calibration

The fluoride measurement is calibrated at 2 points, which should be as far from each other as possible, but within the measurement range. The lower value must be calibrated with a lower fluoride concentration than the upper value, e.g. lower value 0.20 mg/l and upper value 2.00 mg/l. Calibration solutions for 0.20 mg/l, 2.00 mg/l and 100 mg/l are available.

 Before use, the electrode must be placed in a 100 mg/l fluoride solution at pH 7 for approx. 24 hours. This is necessary to guarantee that the electrode functions properly.

Procedure:

- 1 Starting from the basic display, from the main menu, select the „Calibration“ menu and follow the instructions on the display.

Fluoride correction

If external influences result in a constant difference between the displayed value and a fluoride value measured manually, this difference can be compensated.

Procedure:

- 1 Starting from the basic display, from the main menu, select the „Calibration“ menu and follow the instructions on the display.

 The offset correction is deleted at every new fluoride calibration or slope alignment.

14 SYSTEM MESSAGES



If it is not possible to remedy the cause of the system messages yourself, please contact your service contractor.

There are error messages, warnings, information and status messages.

System messages are visualized in colour in the menu bar using the alarm symbol (bell). The number of pending messages is displayed in the alarm symbol. The message list is opened by pressing the alarm symbol.

The colored LED above the display (status LED on the device) also indicates messages or alarms. See Chapter Function - Status LED states.

Explanation of the message:

For more information on the message, click on the symbol (i) in the corresponding message.

The type of message is described under Type (warning, error, information, status message).

The time-stamp describes when the message occurred. The duration describes how long the message has been active.

Under Description you will find information about the cause of the message.

15 TROUBLESHOOTING



If it is not possible to remedy the fault or error yourself, please contact your service contractor.

Faults	Cause	Remedy
No indication on device.	No power supply.	External switch or fuse on.
	Device fuse defective.	Check the power supply and replace fuse. (Electrician)
	Housing cover is not fitted correctly.	Check and, if necessary, fit the housing cover correctly (cable possibly trapped).
Positioner/pump does not work.	Positioner in manual mode.	Engage manual knob.
	Dosing device selected incorrectly.	Select correct dosing device.
	Positioner/pump incorrectly connected.	Connect positioner/pump correctly. (Electrician)
	Relay defective.	Check. (Electrician)
Positioner runs in wrong direction.	Positioner incorrectly connected.	Correct connections. (Electrician)
Positioner closes.	Positioner feedback interrupted.	Correct connections. (Electrician)
Digital inputs without function.	Digital inputs not activated.	Activate digital inputs.

16 MAINTENANCE



WARNING

Danger from unqualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe operation and prevent serious injury, the device must be serviced by trained and authorized specialist personnel.
- Observe the specified maintenance intervals.
- Adhere to the applicable standards and national and regional regulations.

16.1 Maintenance intervals

Depending on the specifications, comparative measurements must be carried out several times a day or once a week using a test device. In the event of deviations, the measured values or sensors must be calibrated (see chapter Calibration).

Replace the battery of the Electronics Module after 5 years.

Article number	Designation
W2T555401	Lithium button cell battery CR1632

16.2 Replace battery

The battery is required for the real time clock in the event of a power failure. If the time is not correct or if time-controlled functions show faulty behavior, the battery must be changed. Replace the battery after 5 years at the latest.

Procedure:

- 1 Disconnect the Electronics Module from the power supply and check that it is de-energized.
- 2 Remove the housing cover of the Electronics Module.
- 3 Unscrew the metal cover on the HMI.
- 4 Remove the battery from the HMI holder.
- 5 Insert the new battery, type CR1632. Observe the correct polarity!
- 6 Re-attach the metal cover to the HMI.
- 7 Fit housing cover.
- 8 Turn the power supply on.
- 9 Set the date and time. No further settings are required.

16.3 Replacing the fuses on the CPU board

The mains input and all relays are protected by fuses of type TR5. 3.15 A (slow-blow) fuses are used for the relays and 2 A (slow-blow) fuses for the mains input. Spare fuses are included with the accessories.

Procedure:

- 1 Disconnect the Electronics Module from the power supply and check that it is de-energized.
- 2 Remove the housing cover of the Electronics Module.
- 3 Pull the defective fuse out of the fuse holder and insert the new fuse. Make sure the rated data match!
- 4 Fit housing cover.
- 5 Turn the power supply on.

16.4 Cleaning

CAUTION

Danger caused by incorrect cleaning agent

The use of non-approved cleaning agents can damage housings, seals, cables and the touchscreen.

Possible consequence: Serious material damage.

- Never use corrosive cleaning agents (e.g. isopropyl alcohol, spirit, scouring agents)!

16.4.1 Cleaning the housing

Clean housing, seals and cables with a moist cloth, if necessary with the addition of a commercially available neutral cleaning agent, and then dry them.

16.4.2 Cleaning the display

Clean the touchscreen with a non-linting microfiber cloth. To remove heavy soiling, moisten a corner of the cloth and wipe the touchscreen. Then dry immediately using the dry side of the cloth.

17 DISMANTLING AND DISPOSAL



WARNING

Danger from unqualified personnel

Possible consequence: fatal or serious injury and significant material damage.

- To ensure safe operation and to avoid serious personal injury, the appliance may only be dismantled and disposed of by trained and authorized specialist personnel.

17.1 Dismantling

- Prior to disposal, delete any personal data stored on the old equipment.
- De-energize the device.
- Dismantle and dispose of the device properly and recycle raw materials.

17.2 Disposal

17.2.1 General information

Ensure safe and environment-friendly disposal of old equipment, replacement parts, auxiliary materials, chemicals and their containers. Disposal must be effected in compliance with local, regional, national and international regulations.

NOTICE



The symbol with the crossed-out garbage can indicates that the product - electrical and electronic equipment, batteries and storage batteries - must not be disposed of with household waste. At the end of its service life, the product must be disposed of appropriately or recycled. The statutory requirements of the country in which the product is put into use apply here.

17.2.2 Used electrical/electronic equipment

Electrical or electronic equipment is labeled with the symbol showing a crossed-out garbage can and must not be disposed of with household waste, but must be collected and disposed of separately. The statutory requirements of the country in which the product is put into use apply. Before handover to a collection point, old batteries, storage batteries and lamps must be removed from the old equipment and turned over to the corresponding collection points.

Where such central collection systems are not available, used equipment purchased from us can be returned to us.

Further details can be found on our official website.

- Scan the QR code.
- OR enter the following link in your browser:
<http://qr.evoqua.com/bdYxgi>



17.2.3 Used batteries and used storage batteries

Batteries and storage batteries are labeled with the symbol showing a crossed-out garbage can. Where, for technical reasons, it is not possible to label the batteries themselves, the symbol may be printed on the packaging. Used batteries and used storage batteries must not be disposed of with household waste, but must be collected and disposed of separately. The statutory requirements of the country in which the product is put into use apply. If necessary, contact your regional or local authorities for details of collection points and options for separating and collecting waste.

DANGER

Risk of injury caused by damaged batteries and storage batteries!

Possible consequence: fatal or serious injury and significant material damage

- Short-circuiting, for example caused by external contact with the battery poles (metal on metal), may cause fire or an explosion. Prior to disposal, cover the poles of batteries and storage batteries with masking tape to prevent an external short-circuit.
- There is an increased hazard if batteries are damaged or leak. Avoid touching 'greasy' or leaking batteries with your bare hands wherever possible. Wash your hands thoroughly if they have come into contact with leaking components.
- Observe the respective safety instructions, in particular in the case of batteries and storage batteries containing lithium.

18 SPARE PARTS, ACCESSORIES, RETROFIT KITS



WARNING

Danger from incorrect spare parts, accessories and retrofit kits

There is a risk of malfunction or damage to the appliance if unauthorised spare parts, accessories, retrofit kits, maintenance parts kits and wearing parts are used.

Possible consequence: fatal or serious injury and significant material damage.

- For reasons of safety, only use original spare parts, accessories and retrofit kits.
- If required, please contact our customer service or visit our e-commerce store.

18.1 Spare parts

Article number	Designation
W3T601620	Rivo™ Backboard 4
W3T582385	Mains fuse 230V, TR5, T2A
W2T839300	Mains fuse 24V, relay, TR5, T3, 15A
W2T555401	HMI battery, CR1632
W3T604348	Operating front panel 4 RT Rivo™ I Municipal/Industrial
W3T604349	Operating front panel 4 RT Rivo™ I Municipal/Industrial PC
W3T607253	Patch cable to the display
W3T587503	HMI protective grounding
W3T570786	Accessory set EM E10

18.1.1 Modules for connection to sensors

Article number	Designation
W3T557878	Rivo™ Flex Mod Dis
W3T557901	Rivo™ Flex Mod mV
W3T557902	Rivo™ Flex Mod pH
W3T557903	Rivo™ Flex Mod Fluoride
W3T557907	Rivo™ Flex Mod Con

18.1.2 Plug-cable combination for sensor

Article number	Length	Designation Plug-cable combination
W3T364410	1,5 m	Sensor cable for 3 Single-rod measuring cell
W3T164515	5 m	3-electrode Single-rod measuring sequence Chlorine
W3T164516	10 m	3-electrode Single-rod measuring sequence Chlorine
W3T164547	15 m	3-electrode Single-rod measuring sequence Chlorine
W3T164548	30 m	3-electrode Single-rod measuring sequence Chlorine
W3T173161	1,5 m	Sensor cable for pH/Redox/Fluor electrode
W3T161786	5 m	pH/Redox/Fluoride Sensor
W3T161844	10 m	pH/Redox/Fluoride Sensor
W3T161883	15 m	pH/Redox/Conductivity Sensor
W3T571110	30 m	pH/Redox/Fluoride sensor

18 Spare parts, accessories, retrofit kits

EN Rivo™ I Municipal/Industrial / Rivo™ I Municipal/Industrial PC

W3T571274	1,5 m	Sensor cable for 4 Electrode Conductivity sensor LF325
W3T164529	5 m	Sensor cable for 4 Electrode Conductivity sensor LF325
W3T164553	10 m	Sensor cable for 4 Electrode Conductivity sensor LF325
W3T164554	15 m	Sensor cable for 4 Electrode Conductivity sensor LF325
W3T164555	30 m	Sensor cable for 4 Electrode Conductivity sensor LF325
W3T558964	2 m	Sensor cable Membrane sensor
W3T558965	5 m	Sensor cable Membrane sensor
W3T558966	10 m	Sensor cable Membrane sensor
W3T558967	15 m	Sensor cable Membrane sensor
W3T558968	30 m	Sensor cable Membrane sensor
W3T165563		Impedance converter for pH sensor or Redox sensor

18.2 Optional accessories

Article number	Designation
W3T557914	Rivo™ Flex Mod 2Rel-2DO Relay module for activation of dosing outputs and alarms
W3T557912	Rivo™ Flex Mod 2AO-mA (mA signal output module, 2-channel)
W3T639691	Rivo™ COM-Board USB 485
W2T504224	DIN Rail L=200mm
W3T570703	DIN Rail L=450mm

19 WIRING DIAGRAM



Wiring diagram WBE2150 – Issue 04-0525

The wiring diagram refers to the factory setting configuration.

If individual relay assignments are made, these must be clearly documented and handed over to the operator.

Only the part number of the modules is used in the wiring diagram.

Legend for the notes and warnings in the wiring diagram:

1)

Note



The terminal assignment described is based on the standard configuration of the device. The assignment of the relay outputs to the dosing outputs can be changed on a customer-specific basis. In this case, the changed configurations must be documented in detail.

2)

Note



Observe permissible contact load!
See chapter Relay outputs and technical data.

3)

Note



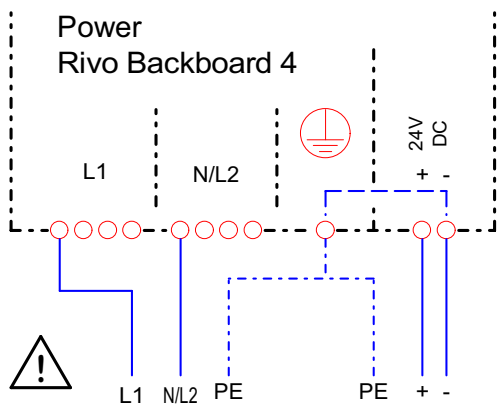
External voltage must not be connected to the digital inputs !

4)

Attention



External voltage may still be connected even when the main switch is set to OFF !



100...240V AC
50/60Hz
0,4...0,3A
 Pre fuse:
 max. C20A

24V DC
 Pre fuse:
 max. 4A

AC << alternatively >> DC

power consumption: 15W

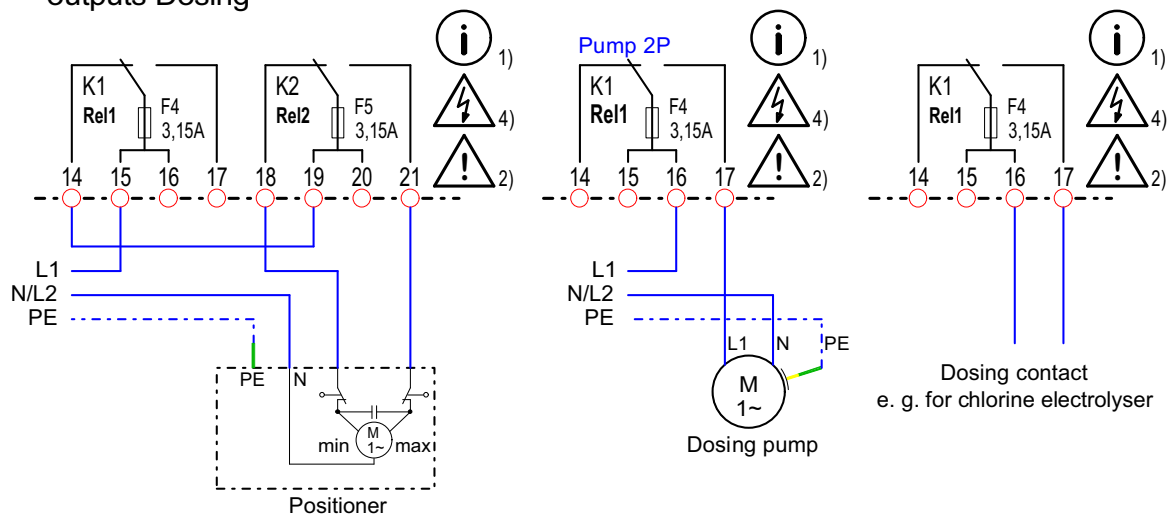
Note



With mains supply 100...240V AC
 the additional terminals L1 and N/L2
 are for connection of external loads.
 (Note prefuse!)

Measurement Channel I Controller outputs Backboard outputs Dosing

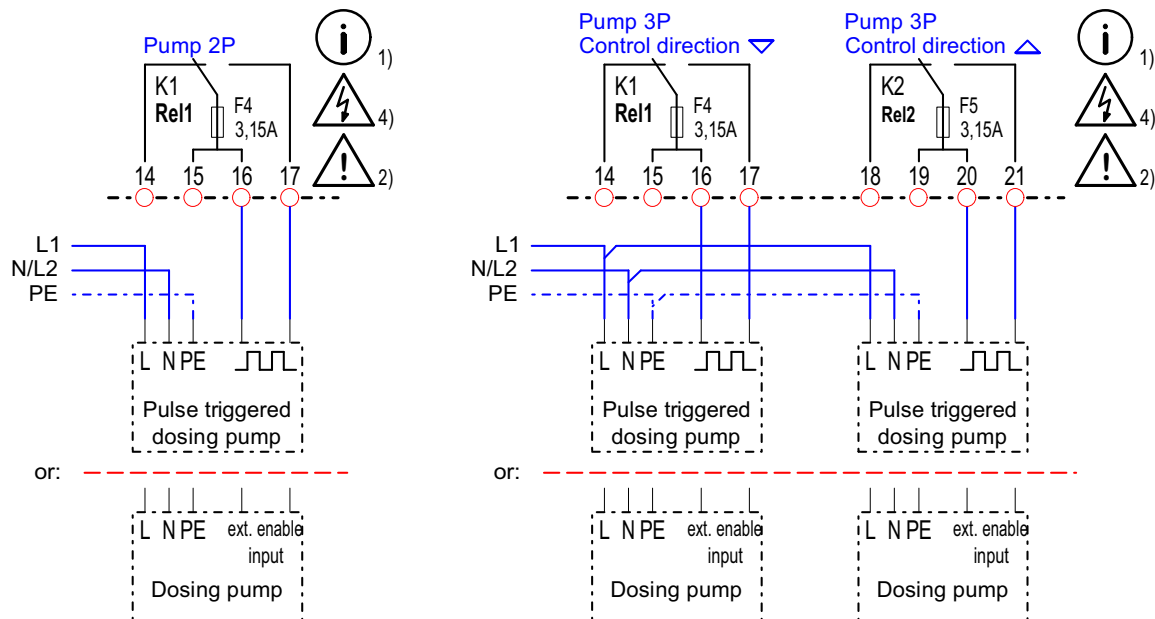
! Page 1 of 2



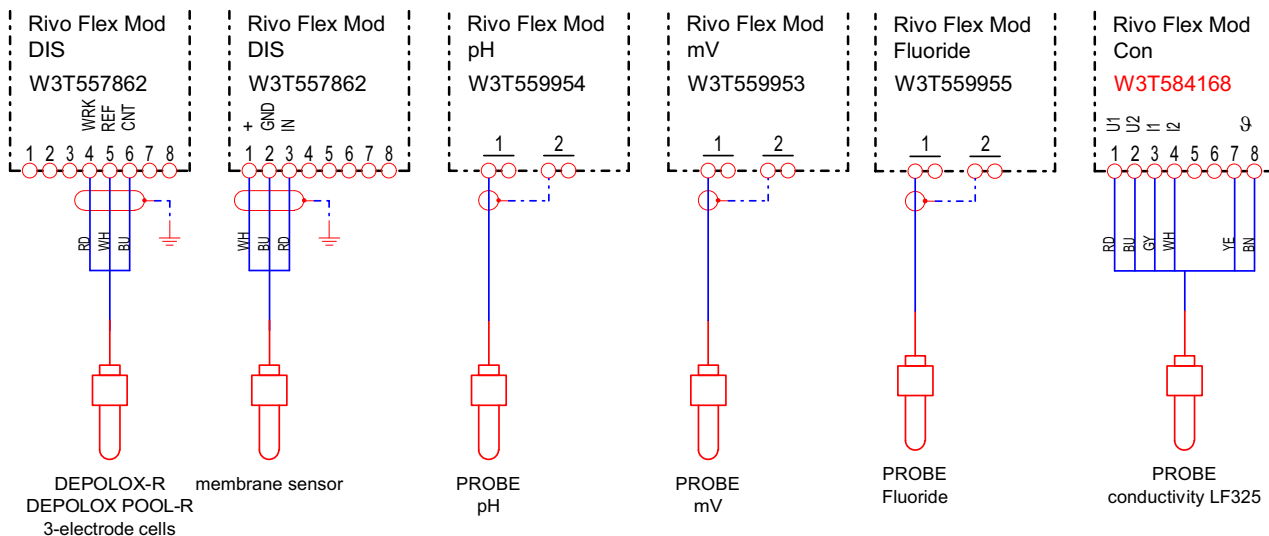
Measurement Channel I Controller outputs Backboard



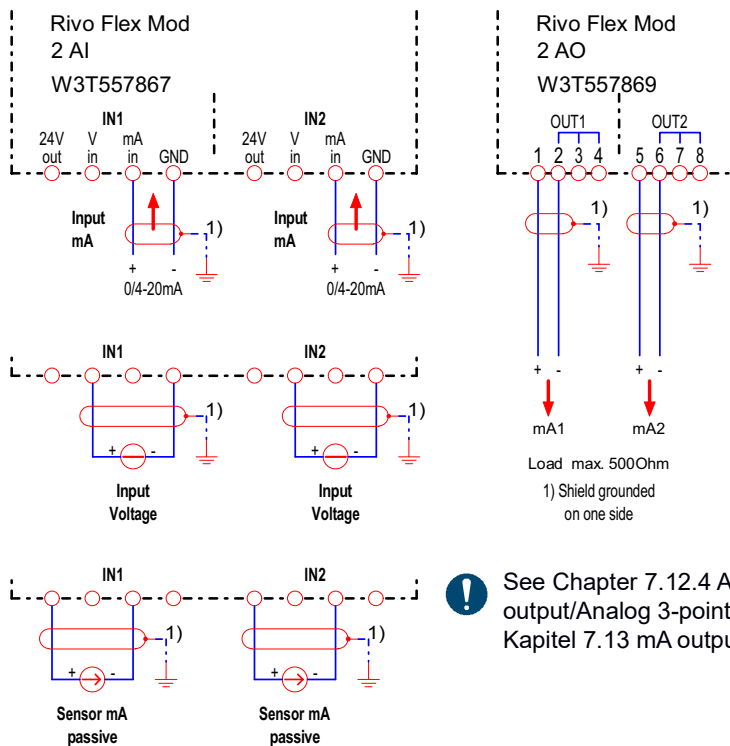
Page 2 of 2



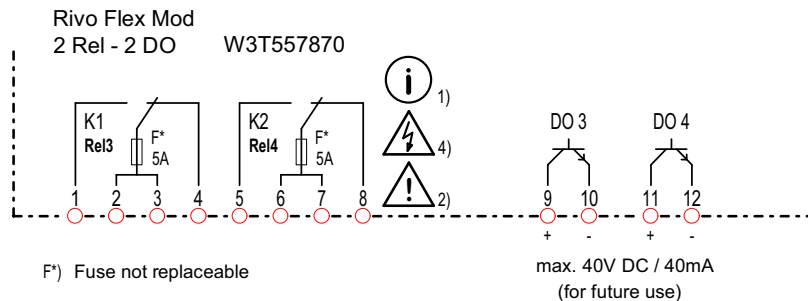
Connection (Sensor) - Measure module



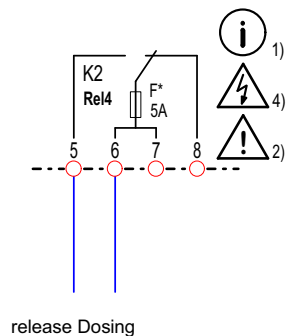
Connection (Sensor) - Measure module



See Chapter 7.12.4 Analog 2-point output/Analog 3-point output and Kapitel 7.13 mA outputs



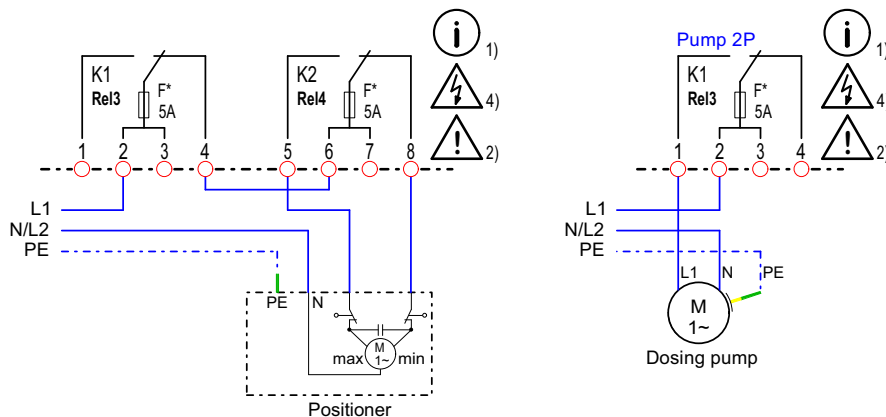
Sample water Inlet disinfection (Rivo Flex Mod 2 Rel - 2 DO)



Connection Rivo™ Flex Mod 2Rel-2DO



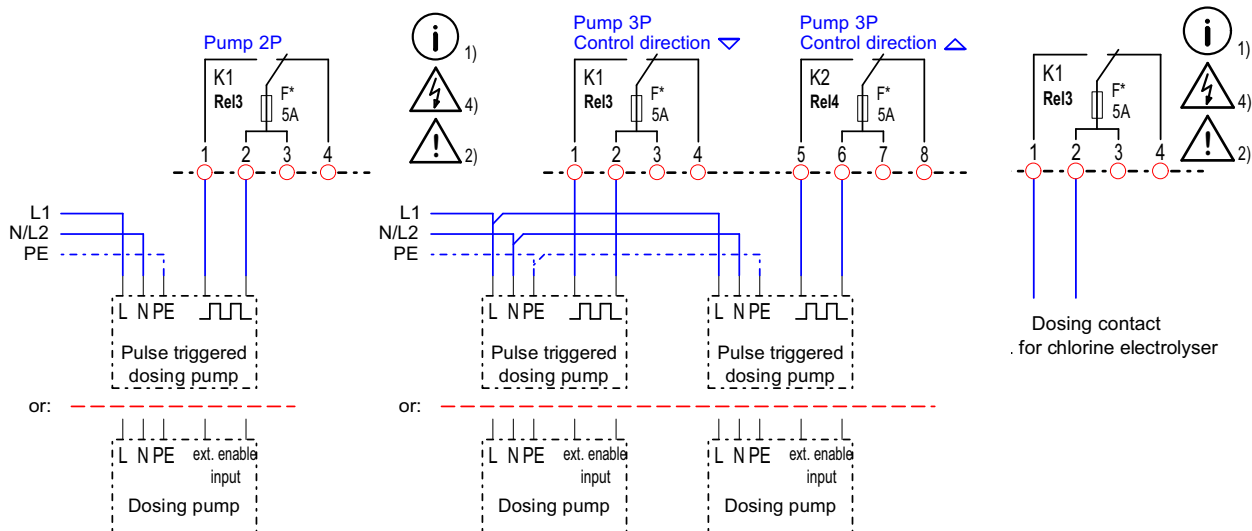
Measurement Channel II Controller outputs (Rivo Flex Mod 2 Rel - 2 DO)

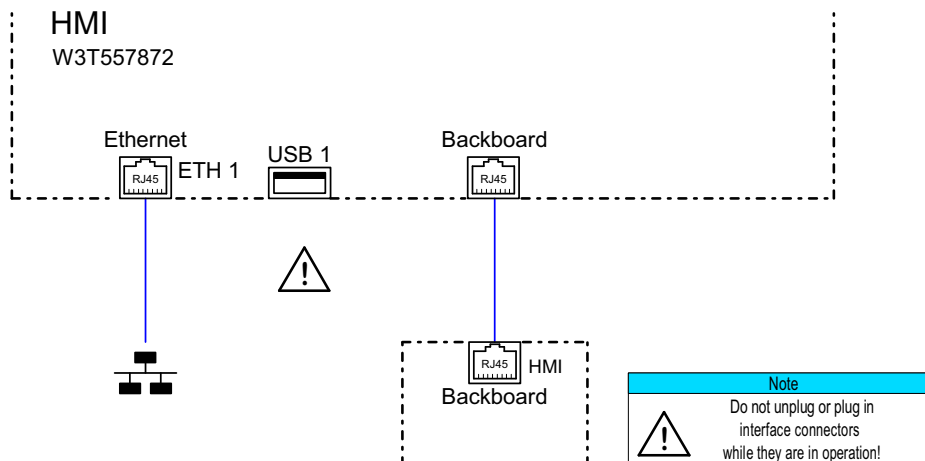


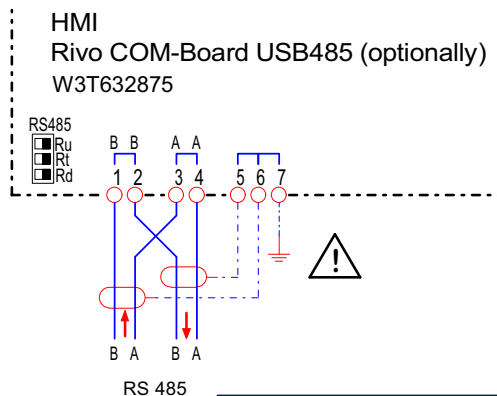
Connection Rivo™ Flex Mod 2Rel-2DO

 Page 3 of 3

Measurement Channel II Controller outputs (Rivo Flex Mod 2 Rel - 2 DO)





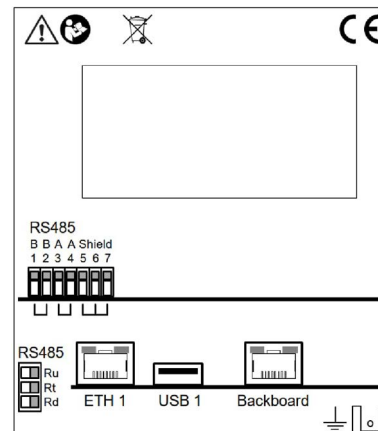


Note

Do not unplug or plug in interface connectors while they are in operation!

Note

Terminals 5 – 7 (no potential reference) for connecting the shielding establish. An additional PE connection at the start or end of the bus



20 MARKING AND APPROVAL

20.1 CE mark



The Rivo™ I Electronics Module (Mod. E10) with/without

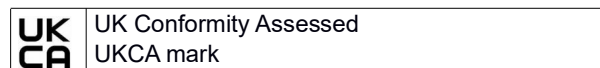
- Flow Cell Module (Mod. D10)
- Flow-Through Adapter (Mod. D11/D12/D13)

meets the requirements of the harmonized European standards and thus complies with the statutory provisions of the EU directives. The manufacturer confirms successful testing of the device by affixing the CE mark.

The following harmonized European standards were applied:

- EMV/EMC: 2014/30/EU
- NRL/LVD: 2014/35/EU
- RoHS: 2011/65/EU and 2015/863/EU

20.2 UKCA mark



The Rivo™ I Electronics Module (Mod. E10) with/without

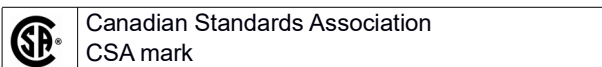
- Flow Cell Module (Mod. D10)
- Flow-Through Adapter (Mod. D11/D12/D13)

meets the requirements of the harmonized European standards and thus complies with the statutory provisions of the EU directives. By affixing the UKCA mark, the manufacturer confirms that the device placed on the British market complies with the conformity requirements in Great Britain.

The following standards were applied:

- BS EN 61010-1:2010 (+A1:2019)
- BS EN IEC 61326-1:2021
- BS EN IEC 63000:2018

20.3 CSA mark



The Rivo™ I Electronics Module (Mod. E10) with/without

- Flow Cell Module (Mod. D10)
- Flow-Through Adapter (Mod. D11/D12/D13)

was tested in accordance with applicable North American standards. The device meets the requirements for the Canadian and US market. The manufacturer confirms successful testing of the device by affixing the CSA mark.

The CSA mark is based on the following certificate:

Master Contract: 226676

20.4 Australian approval



The Rivo™ I (Mod. E10) Electronics Module with/without

- Flow Cell Module (Mod. D10)
- Flow-through Adapter (Mod. D11/D12/D13)

meets all corresponding regulatory requirements with regard to safety and electromagnetic compatibility and the specific requirements for radio equipment. The device meets the requirements for the Australian and New Zealand market. The manufacturer confirms compliance with the safety and EMC requirements and the requirements for radio equipment by affixing the RCM mark.

21 LICENSE AGREEMENTS

The Rivo™ I Electronics Module (Mod. E10) contains copy-right-protected software components covered by various Open Source licenses. Detailed information can be obtained from the Service-Center on the device.

NOTES

NOTES



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Subject to modifications

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