

# Operator's Manual

Firmware V6.20 and higher



SWISS  MADE



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## Table of Contents

|                                                            |           |
|------------------------------------------------------------|-----------|
| <b>1. Safety Instructions</b>                              | <b>6</b>  |
| 1.1. Warning Notices                                       | 7         |
| 1.2. General Safety Regulations                            | 9         |
| 1.3. Restriction for use                                   | 10        |
| <b>2. Product Description</b>                              | <b>11</b> |
| 2.1. Description of the System                             | 11        |
| 2.2. Instrument Specification                              | 16        |
| 2.3. Instrument Overview                                   | 19        |
| <b>3. Installation</b>                                     | <b>20</b> |
| 3.1. Installation Checklist                                | 20        |
| 3.2. Mounting of Instrument Panel                          | 21        |
| 3.3. Connecting Sample and Waste                           | 21        |
| 3.4. Install the Reference Electrode                       | 22        |
| 3.5. Install the Temperature Sensor                        | 23        |
| 3.6. Install the Optional pH or Redox Electrode            | 23        |
| 3.6.1 Install the pH or Redox Electrode into the Flow Cell | 24        |
| 3.6.2 Connect the pH Electrode to the Transmitter          | 25        |
| 3.6.3 Firmware Settings for pH/Redox Electrode             | 26        |
| 3.7. Electrical Connections                                | 27        |
| 3.7.1 Connection Diagram                                   | 29        |
| 3.7.2 Power Supply                                         | 30        |
| 3.8. Relay Contacts                                        | 31        |
| 3.8.1 Input                                                | 31        |
| 3.8.2 Alarm Relay                                          | 31        |
| 3.8.3 Relay 1 and 2                                        | 32        |
| 3.9. Signal Outputs                                        | 34        |
| 3.9.1 Signal Output 1 and 2 (current outputs)              | 34        |
| 3.10. Interface Options                                    | 34        |
| 3.10.1 Signal Output 3                                     | 35        |
| 3.10.2 Profibus, Modbus Interface                          | 35        |
| 3.10.3 HART Interface                                      | 36        |
| 3.10.4 USB Interface                                       | 36        |
| <b>4. Instrument Setup</b>                                 | <b>37</b> |
| 4.1. Establish sample flow                                 | 37        |
| 4.2. Programming                                           | 37        |
| 4.3. Calibration of pH electrode                           | 37        |
| 4.4. Correction of Trides sensor                           | 38        |

|                                           |           |
|-------------------------------------------|-----------|
| <b>5. Operation</b>                       | <b>39</b> |
| 5.1. Keys                                 | 39        |
| 5.2. Display                              | 40        |
| 5.3. Software Structure                   | 41        |
| 5.4. Changing Parameters and values       | 42        |
| <b>6. Maintenance</b>                     | <b>43</b> |
| 6.1. Maintenance Schedule                 | 43        |
| 6.2. Cleaning of Trides protective filter | 45        |
| 6.3. Cleaning of Trides sensor            | 46        |
| 6.4. Cleaning of Reference Electrode      | 48        |
| 6.5. Cleaning of pH Electrode             | 49        |
| 6.6. Cleaning of Flow Cell                | 50        |
| 6.7. Calibration of Trides Sensor         | 52        |
| 6.7.1 Process pH                          | 52        |
| 6.7.2 Standard pH                         | 53        |
| 6.7.3 Standard Redox                      | 54        |
| 6.7.4 Zero Trides                         | 54        |
| 6.7.5 Process Trides                      | 54        |
| 6.8. Longer Stop of Operation             | 56        |
| <b>7. Troubleshooting</b>                 | <b>57</b> |
| 7.1. Diagnostic Values                    | 57        |
| 7.2. Troubleshooting List                 | 58        |
| 7.3. Error List                           | 60        |
| 7.4. Replacing Fuses                      | 63        |
| <b>8. Program Overview</b>                | <b>64</b> |
| 8.1. Messages (Main Menu 1)               | 64        |
| 8.2. Diagnostics (Main Menu 2)            | 64        |
| 8.3. Maintenance (Main Menu 3)            | 65        |
| 8.4. Operation (Main Menu 4)              | 66        |
| 8.5. Installation (Main Menu 5)           | 67        |
| <b>9. Program List and Explanations</b>   | <b>69</b> |
| 1 Messages                                | 69        |
| 2 Diagnostics                             | 69        |
| 3 Maintenance                             | 70        |
| 4 Operation                               | 71        |
| 5 Installation                            | 72        |
| <b>10. Material Safety Data sheets</b>    | <b>86</b> |
| 10.1. Reagents                            | 86        |

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|     |                      |    |
|-----|----------------------|----|
| 11. | Default Values ..... | 87 |
| 12. | Index .....          | 90 |
| 13. | Notes .....          | 92 |

# AMI Trides–Operator’s Manual

This document describes the main steps for instrument setup, operation and maintenance.

## 1. Safety Instructions

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General</b>                 | <p>The instructions included in this section explain the potential risks associated with instrument operation and provide important safety practices designed to minimize these risks.</p> <p>If you carefully follow the information contained in this section, you can protect yourself from hazards and create a safer work environment.</p> <p>More safety instructions are given throughout this manual, at the respective locations where observation is most important. Strictly follow all safety instructions in this publication.</p> |
| <b>Target audience</b>         | <p>Operator: Qualified person who uses the equipment for its intended purpose.</p> <p>Instrument operation requires thorough knowledge of applications, instrument functions and software program as well as all applicable safety rules and regulations.</p>                                                                                                                                                                                                                                                                                   |
| <b>OM Location</b>             | <p>Keep the AMI Operator’s Manual in proximity of the instrument.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Qualification, Training</b> | <p>To be qualified for instrument installation and operation, you must:</p> <ul style="list-style-type: none"><li>♦ read and understand the instructions in this manual as well as the Material Safety Data Sheets.</li><li>♦ know the relevant safety rules and regulations.</li></ul>                                                                                                                                                                                                                                                         |

## 1.1. Warning Notices

The symbols used for safety-related notices have the following meaning:



### **DANGER**

Your life or physical wellbeing are in serious danger if such warnings are ignored.

- ♦ Follow the prevention instructions carefully.



### **WARNING**

Severe injuries or damage to the equipment can occur if such warnings are ignored.

- ♦ Follow the prevention instructions carefully.



### **CAUTION**

Damage to the equipment, minor injury, malfunctions or incorrect process values can be the consequence if such warnings are ignored.

- ♦ Follow the prevention instructions carefully.

### **Mandatory Signs**

The mandatory signs in this manual have the following meaning:



Safety goggles



Safety gloves

**Warning Signs**    The warning signs in this manual have the following meaning:



Electrical shock hazard



Corrosive



Harmful to health



Flammable



Warning general



Attention general

## 1.2. General Safety Regulations

### **Legal Requirements**

The user is responsible for proper system operation. All precautions must be followed to ensure safe operation of the instrument.

### **Spare Parts and Disposables**

Use only official SWAN spare parts and disposables. If other parts are used during the normal warranty period, the manufacturer's warranty is voided.

### **Modifications**

Modifications and instrument upgrades shall only be carried out by an authorized Service Technician. SWAN will not accept responsibility for any claim resulting from unauthorized modification or alteration.

### **WARNING**

#### **Electrical Shock Hazard**



If proper operation is no longer possible, the instrument must be disconnected from all power lines, and measures must be taken to prevent inadvertent operation.

- ♦ To prevent from electrical shock, always make sure that the ground wire is connected.
- ♦ Service shall be performed by authorized personnel only.
- ♦ Whenever electronic service is required, disconnect instrument power and power of devices connected to.
  - relay 1,
  - relay 2,
  - alarm relay

### **WARNING**



For safe instrument installation and operation you must read and understand the instructions in this manual.

### **WARNING**



Only SWAN trained and authorized personnel shall perform the tasks described in this document.

### 1.3. Restriction for use

**Sample requirements**

Addition or presence of disinfectants containing stabilizers like cyanuric acid or 5,5-Dimethylhydantoin or organic chlorine compounds perturb the measurement. A controlled dosing system depending on chlorine surplus cannot operate with these products. Cleaner and corrosion preventives (phosphates) may perturb the measurement.

Do not use copper tubes in the water treatment area. Copper perturbs the sensor system.

No sand (or other polishing material) or oil are allowed in the sample.

**Dechlorination**

After dechlorination the disinfectant value is always (near) zero: To prevent biological growth, we strongly recommend to flush the flow cell and sensor occasionally with water of higher disinfectant concentration, e.g. by switching to a sample line before dechlorination. To do a sensible correction, a certain amount of chlorine is required, which may not be available during normal operation.

**Mixture of several disinfectants**

The Trides always measures the total of all added disinfectants. Separation measurements are not possible.

**Download MSDS**

The current Material Safety Data Sheets (MSDS) for the above listed Reagents are available for downloading at **[www.swan.ch](http://www.swan.ch)**.

## 2. Product Description

### 2.1. Description of the System

**Application Range** The AMI Trides is used to measure and control the following disinfectants in potable water, sanitary water and swimming pools:

- ♦ Hypochlorous acid
- ♦ Free chlorine
- ♦ Ozone
- ♦ Chlorine-dioxide
- ♦ Bromine
- ♦ Iodine

There are two main applications:

#### 1) Control of setpoint

The instrument is used to measure and maintain a certain disinfectant value in the system. The disinfectant is added with a dosing unit.

#### 2) Dechlorination

The disinfectant is removed to protect a device which is sensitive to disinfectants, e.g. a reverse osmosis. The instrument detects the remaining disinfectant level after dechlorination and superintends that the disinfectant concentration does not exceed the max. limit value. Otherwise a warning is issued.

**Signal Outputs** Two signal outputs programmable for measured values (freely scalable, linear, bilinear, log) or as continuous control output (control parameters programmable).

Current loop: 0/4–20 mA  
Maximal burden: 510  $\Omega$

Third signal output available as an option. The third signal output can be operated as a current source or as a current sink (selectable via switch).

**Relays** Two potential-free contacts programmable as limit switches for measuring values, controllers or timer for system cleaning with automatic hold function.  
Maximum load: 1 A/250 VAC

|                                           |                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Alarm Relay</b>                        | One potential free contact.<br>Alternatively: <ul style="list-style-type: none"><li>♦ Open during normal operation, closed on error and loss of power.</li><li>♦ Closed during normal operation, open on error and loss of power.</li></ul> Summary alarm indication for programmable alarm values and instrument faults. |
| <b>Input</b>                              | For potential-free contact to freeze the measuring value or to interrupt control in automated installations ( <i>hold</i> function or <i>remote-off</i> ).                                                                                                                                                                |
| <b>Communication interface (optional)</b> | <ul style="list-style-type: none"><li>♦ USB Interface for logger download</li><li>♦ Third signal output (can be used in parallel to the USB interface)</li><li>♦ RS485 with Fieldbus protocol Modbus or Profibus DP</li><li>♦ HART interface</li></ul>                                                                    |
| <b>Safety Features</b>                    | No data loss after power failure. All data is saved in non-volatile memory.<br>Over voltage protection of in- and outputs.<br>Galvanic separation of measuring inputs and signal outputs.                                                                                                                                 |
| <b>Option pH or Redox</b>                 | An optional pH/Redox electrode can be installed. Temperature compensation of pH is done automatically.                                                                                                                                                                                                                    |
| <b>Display</b>                            | Selectable measuring unit as ppm or mg/l.                                                                                                                                                                                                                                                                                 |

**Measuring principle**

3-electrode amperometry:

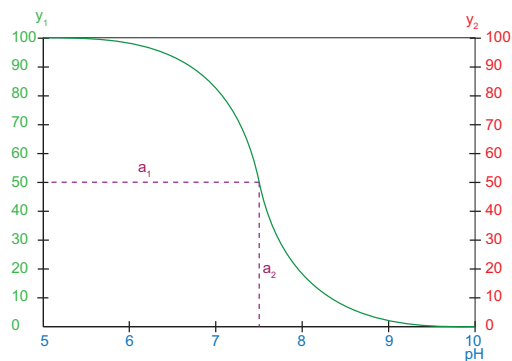
The sensor consists of two platinum electrodes and a reference electrode. A voltage is applied between the measuring electrode (platinum rod) and the counter electrode (platinum ring) of the Trides sensor. The disinfectant in the sample generates a small current between the electrodes, which is proportional to the disinfectant concentration. The reference electrode controls the voltage and guarantees optimal measuring conditions on the platinum sensor. For optimal sensitivity, a rotor continuously cleans the surfaces of the platinum electrodes (hydrodynamic cleaning). A Hall-effect sensor measures the rotations of the rotor to detect if there is sufficient flow. The signal of amperometric systems depends on flow. The flow cell with constant head excludes all flow effects if the sample always overflows into the longer constant head tube. Temperature compensation is done automatically.

**About free chlorine**

If chlorine is dissolved in water, it decomposes into hypochlorous acid and hypochlorite. Free chlorine = hypochlorous acid + hypochlorite. The ratio depends on the pH value.

- ♦ At pH 7: 77% hypochlorous acid, 23% hypochlorite
- ♦ At pH 8: 25% hypochlorous acid, 75% hypochlorite

The hypochlorous acid is a much better disinfectant than hypochlorite. This means the efficiency of disinfection depends on pH value.



$y_1$  % HOCL (hypochlorous acid)

$y_2$  % Disinfection

$a_1, a_2$  Sensitivity of electrochemical measurement in %

The DPD test always indicates free chlorine.

Amperometric sensors measure mainly the hypochlorous acid. Therefore, the higher the pH value is, the lower the current of the sensor.

A pH compensation of the sensor signal is necessary to be able to compare the value directly to the DPD method. For that select <Free chlorine> in menu 5.1.3 <Installation/Sensors/Disinf.> The pH must be measured by an optional pH electrode or programmed correctly.

**Hypochlorous acid**

If hypochlorous acid is chosen as disinfectant in 5.1.3, the pH compensation is switched off. The displayed values show the efficiency of disinfection. Only when the correction is activated the value is displayed as free chlorine and can therefore be compared directly with the manual DPD value.

**Free Chlorine + HOCl**

If you program Free+HOCl (HOCl=hypochlorous acid) as disinfectant in 5.1.3 you can set hypochlorous acid as parameter for the signal outputs. The displayed value will be free chlorine.

**On-line operation**

The sample enters at the sample inlet [E]. It passes the filter vessel [G] and the flow regulating valve [D], where the sample flow is adjusted, and fills the constant head [A]. Sample must always overflow via the overflow tube [B] into the waste to ensure constant pressure at the Trides sensor [F].

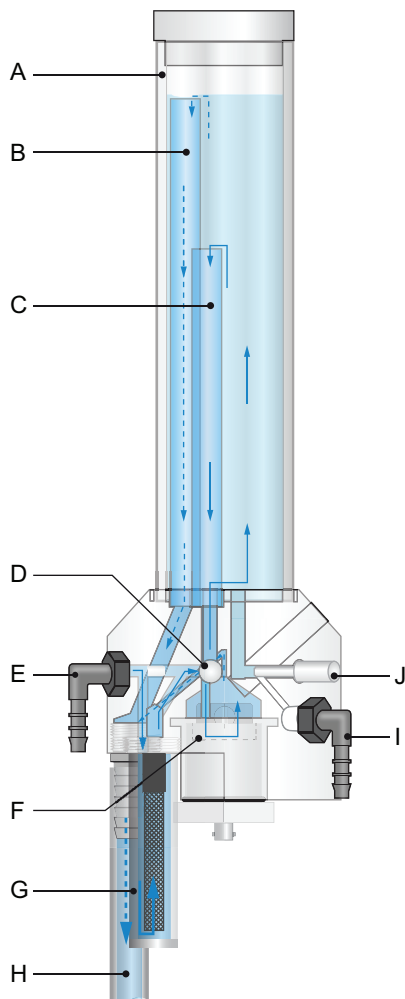
A part of the sample flows through the overflow tube [C] to the Trides sensor [F], turns the rotor and leaves via sample outlet [H] into the waste. The rotation of the rotor is detected with a hall effect sensor to assure sufficient sample flow. An inconsistent sample flow causes the rotor to turn slowly (or stop) and produces a system error.

**Grab sample**

The grab sample outlet is used to take sample from the Trides constant head. This sample can be used to perform a comparison measurement with an other instrument.

The standard method to correct the AMI Trides is the DPD photometric method. Use a high quality photometer to determine the reference value, e.g. Swan Chematest.

**Fluidics  
overview**



- |                                  |                             |
|----------------------------------|-----------------------------|
| <b>A</b> Constant head           | <b>F</b> Trides sensor      |
| <b>B</b> Overflow tube to waste  | <b>G</b> Filter vessel      |
| <b>C</b> Overflow tube to sensor | <b>H</b> Sample outlet      |
| <b>D</b> Flow regulating valve   | <b>I</b> Grab sample outlet |
| <b>E</b> Sample inlet            | <b>J</b> Grab sample valve  |

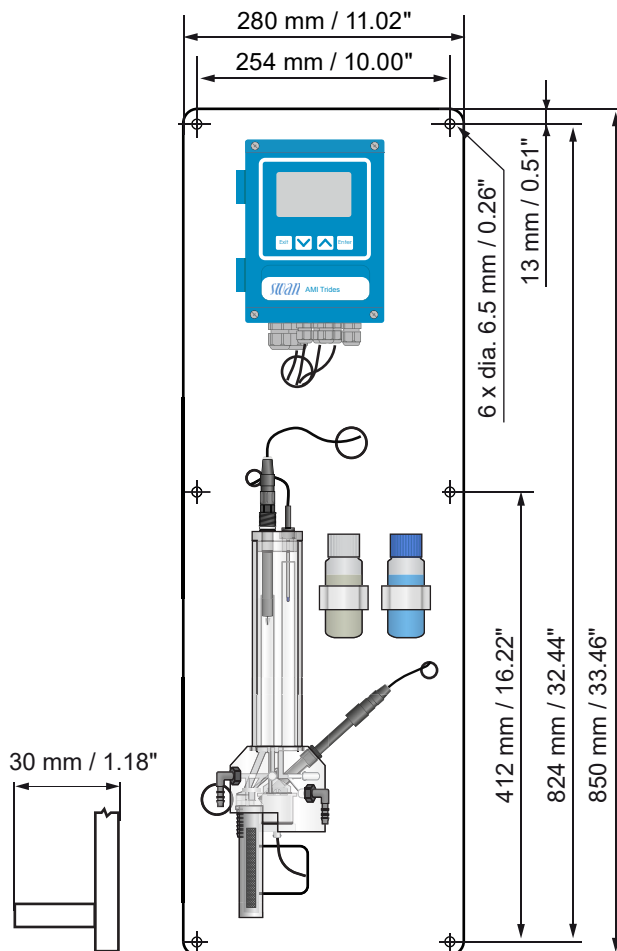
2.2. Instrument Specification

|                                   |                                               |                                                       |
|-----------------------------------|-----------------------------------------------|-------------------------------------------------------|
| <b>Power Supply</b>               | AC variant:                                   | 100–240 VAC (± 10%)<br>50/60 Hz (± 5%)                |
|                                   | DC variant                                    | 10–36 VDC                                             |
|                                   | Power consumption:                            | max. 35 VA                                            |
| <b>Transmitter specifications</b> | Housing:                                      | aluminum, with a protection degree of IP 66 / NEMA 4X |
|                                   | Ambient temperature:                          | –10 to +50 °C                                         |
|                                   | Storage and transport:                        | –30 to +85 °C                                         |
|                                   | Humidity:                                     | 10–90% rel., non condensing                           |
|                                   | Display:                                      | backlit LCD, 75 x 45 mm                               |
| <b>Sample requirements</b>        | Water consumption:                            | approx. 40 l/h                                        |
|                                   | Temperature:                                  | 5–45 °C (41–113 F)                                    |
|                                   | Inlet pressure:                               | 0.15–2 bar (2.2–29 PSI)                               |
|                                   | Outlet pressure:                              | pressure-free                                         |
|                                   | Min. sample conductivity:                     | 5 µS/cm                                               |
|                                   | no oil and no grease                          |                                                       |
| <b>On-site requirements</b>       | The analyzer site must permit connections to: |                                                       |
|                                   | Sample inlet:                                 | Hose nozzle R ¼" x 6 mm                               |
|                                   | Sample outlet:                                | G ½" adapter for flexible tube<br>15 x 20 mm          |

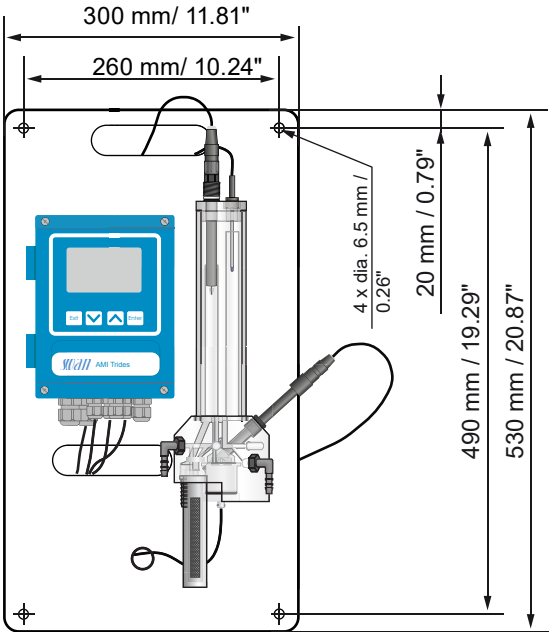
**Dimensions**

Panel:  
Dimensions:  
Screws:  
Weight:

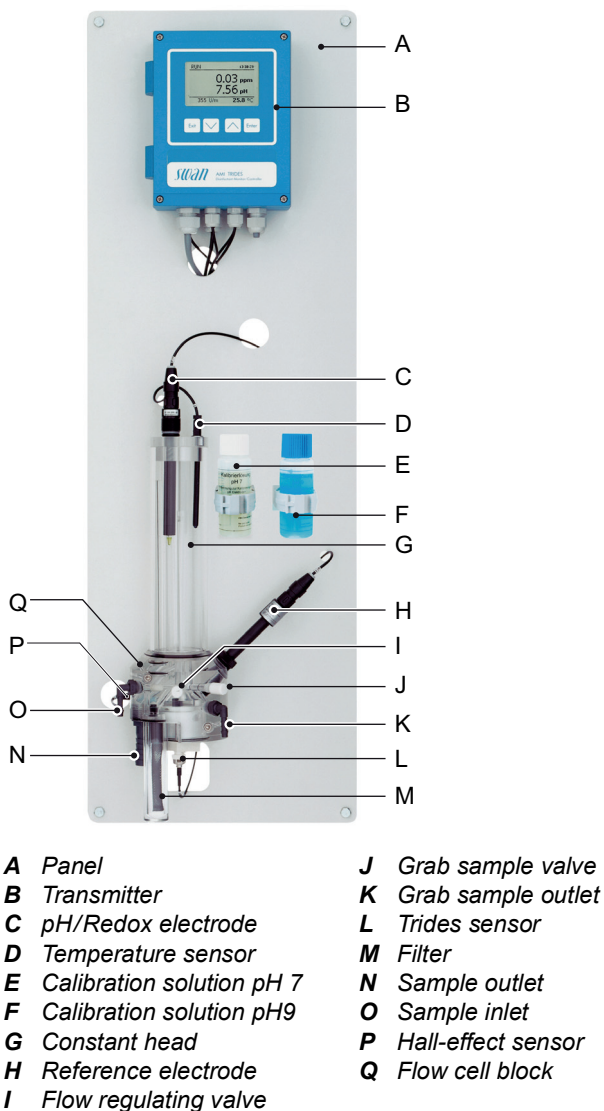
PVC  
850 x 280 x 200  
5 mm or 6 mm diameter  
6 kg



|                                             |             |                       |
|---------------------------------------------|-------------|-----------------------|
| <b>Dimensions<br/>(compact<br/>version)</b> | Panel:      | PVC                   |
|                                             | Dimensions: | 530x300x200 mm        |
|                                             | Screws:     | 5 mm or 6 mm diameter |



## 2.3. Instrument Overview



## 3. Installation

### 3.1. Installation Checklist

|                                       |                                                                                                                                                                                                                                                                                       |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>On-site requirements</b>           | AC variant: 100–240 VAC ( $\pm 10\%$ ), 50/60 Hz ( $\pm 5\%$ )<br>DC variant: 10–36 VDC<br>Power consumption: 35 VA maximum.<br>Protective earth connection required.<br>Sample line with sufficient sample flow and pressure (see <a href="#">Instrument Specification</a> , p. 16). |
| <b>Installation</b>                   | Mount the instrument in vertical position.<br>Display should be at eye level.<br>Mount the filter, filter vessel, the long and short overflow tube, the outer tube and constant head cover.<br>Connect the sample and waste line.                                                     |
| <b>Electrical Wiring</b>              | Connect all external devices like limit switches, current loops and pumps (see <a href="#">Connection Diagram</a> , p. 29).<br>Connect power cord; do NOT switch on power yet!                                                                                                        |
| <b>Electrodes</b>                     | Install the reference electrode.<br>Install the pH electrode (optional).                                                                                                                                                                                                              |
| <b>Temperature sensor</b>             | The temperature sensor is already connected to the transmitter and fixed to the panel with an adhesive tape.                                                                                                                                                                          |
| <b>Power-up</b>                       | Turn on the sample flow and wait until the rotor on the Trides sensor starts turning.<br>Switch on power.                                                                                                                                                                             |
| <b>Instrument set-up</b>              | Program all parameters for sensor and external devices (interface, recorders, etc.).<br>Program all parameters for instrument operation (limits, alarms).                                                                                                                             |
| <b>pH/Redox electrode calibration</b> | Calibrate pH/Redox electrode if installed.                                                                                                                                                                                                                                            |
| <b>Free chlorine &gt; 0.1 ppm</b>     | Let instrument operate 24 h without interruption at normal sample conditions. Then correct disinfection value if necessary.                                                                                                                                                           |
| <b>Free chlorine &lt; 0.1 ppm</b>     | Let instrument operate at least 5 days without interruption at normal sample conditions. Make zero point calibration. Correct disinfection value if necessary.                                                                                                                        |

### 3.2. Mounting of Instrument Panel

The first part of this chapter describes the preparing and placing of the system for use.

- ♦ The instrument must only be installed by trained personnel.
- ♦ Mount the instrument in vertical position.
- ♦ For ease of operation mount it so that the display is at eye level.
- ♦ For the installation a kit containing the following installation material is available:
  - 6 Screws 6x60 mm
  - 6 Dowels
  - 6 Washers 6.4/12 mm

#### **Mounting requirements**

The instrument is only intended for indoor installation.  
For dimensions see [Dimensions, p. 17](#).

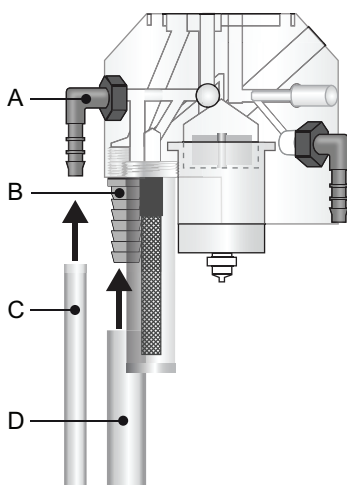
### 3.3. Connecting Sample and Waste

#### **Sample inlet**

Push the 6x9 plastic tube [C] over the elbow hose nozzle [A] at the sample inlet.

#### **Waste**

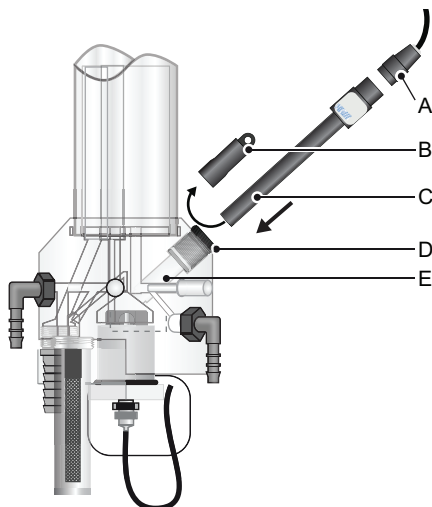
Connect the 1/2" tube [D] to the waste nozzle [B] and place it into the atmospheric drain.



- A** Elbow hose nozzle at sample inlet
- B** Sample outlet
- C** Plastic tube 6x9
- D** 1/2" tube

### 3.4. Install the Reference Electrode

The reference electrode is delivered separately and protected with a water-filled protective cap. The connector is fixed to the panel with an adhesive tape and already connected to the front end PCB in the AMI transmitter.



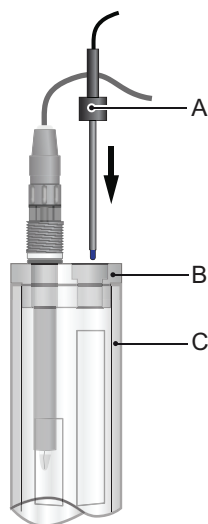
- |                           |                          |
|---------------------------|--------------------------|
| <b>A</b> Connector        | <b>D</b> Union nut       |
| <b>B</b> Protective cap   | <b>E</b> Flow cell block |
| <b>C</b> Reference sensor |                          |

To install the reference electrode proceed as follows:

- 1 Loosen the union nut [D].
- 2 Remove the protective cap [B] from the reference electrode [C].
- 3 Push the reference electrode through the union nut [D] into the bore of the flow cell block [E] as far as it will go.
- 4 Tighten the union nut.
- 5 Remove the connector [A] from the panel and screw it onto the reference electrode.

### 3.5. Install the Temperature Sensor

The temperature sensor is fixed to the panel with an adhesive tape and already connected to the front end PCB in the AMI transmitter.



- A** *Temperature sensor*
- B** *Constant head cover*
- C** *Constant head*

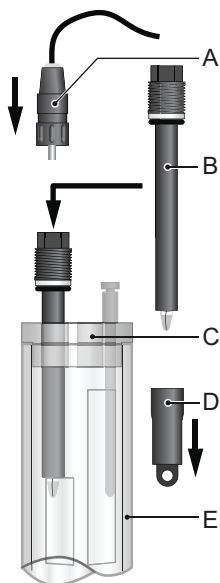
To install the temperature sensor proceed as follows:

- 1** Remove the temperature sensor [A] from the panel.
- 2** Put the temperature sensor in the designated hole of the constant head cover [B].
- 3** Push it into the hole as far as it will go.

### 3.6. Install the Optional pH or Redox Electrode

The following description assumes that the installation of the pH or redox electrode takes place after commissioning of the monitor.

### 3.6.1 Install the pH or Redox Electrode into the Flow Cell



- A** Connector
- B** pH/Redox electrode
- C** Constant head cover
- D** Sensor cap
- E** Constant head

- 1 Switch the instrument off.
- 2 Remove the cap [D] from the pH/redox electrode [B].
- 3 Insert the electrode through the cover [C] into the flow cell [E]
- 4 Screw the connector [A] onto the sensor.

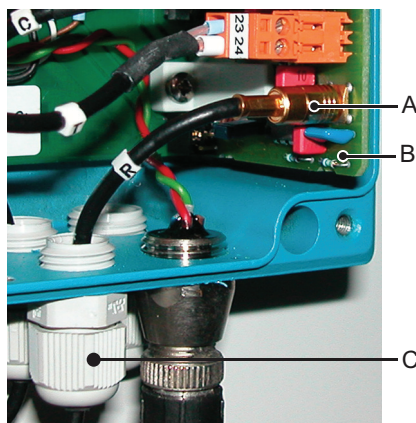
### 3.6.2 Connect the pH Electrode to the Transmitter



#### **WARNING**

##### **Risk of electrical shock**

Installation and maintenance of electrical parts must be performed by professionals. Always turn off power before manipulating electric parts.

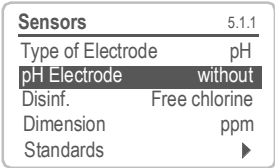


- 1 Open the transmitter housing
- 2 Feed the cable of the electrode through one of the PG 7 cable glands [C] into the transmitter housing.
- 3 Connect the coaxial plug [A] to the plug on the front end PCB [B].
- 4 Close the transmitter housing.
- 5 Switch on the instrument.

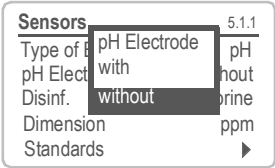
3.6.3 Firmware Settings for pH/Redox Electrode

After the pH/Redox electrode has been installed according to the previous instructions activate the pH/Redox electrode in the menu installation as follows:

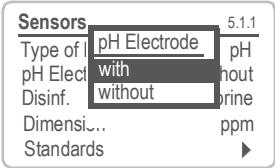
- 1 Navigate to Menu <Installation>, <Sensors>
- 2 Select pH Electrode.
- 3 Press [Enter]



<without> is highlighted.



- 4 Select <with>.
- 5 Press [Enter].
- 6 Press [Exit].
- 7 Confirm with Yes.



### 3.7. Electrical Connections



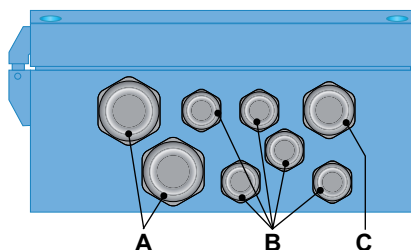
#### WARNING

##### Electrical hazard.

- ♦ Always turn off power before manipulating electric parts.
- ♦ Grounding requirements: Only operate the instrument from a power outlet which has a ground connection.
- ♦ Make sure the power specification of the instrument corresponds to the power on site.

#### Cable thicknesses

In order to comply with IP66, use the following cable thicknesses



**A** PG 11 cable gland: cable  $\varnothing_{outer}$  5–10 mm

**B** PG 7 cable gland: cable  $\varnothing_{outer}$  3–6.5 mm

**C** PG 9 cable gland: cable  $\varnothing_{outer}$  4–8 mm

**Note:** Protect unused cable glands

#### Wire

- ♦ For power and relays: Use max. 1.5 mm<sup>2</sup> / AWG 14 stranded wire with end sleeves.
- ♦ For signal outputs and input: Use 0.25 mm<sup>2</sup> / AWG 23 stranded wire with end sleeves.



**WARNING**

**External Voltage.**

External supplied devices connected to relay 1 or 2 or to the alarm relay can cause electrical shocks

- ♦ Make sure that the devices connected to the following contacts are disconnected from the power before resuming installation.
  - relay 1
  - relay 2
  - alarm relay



**WARNING**

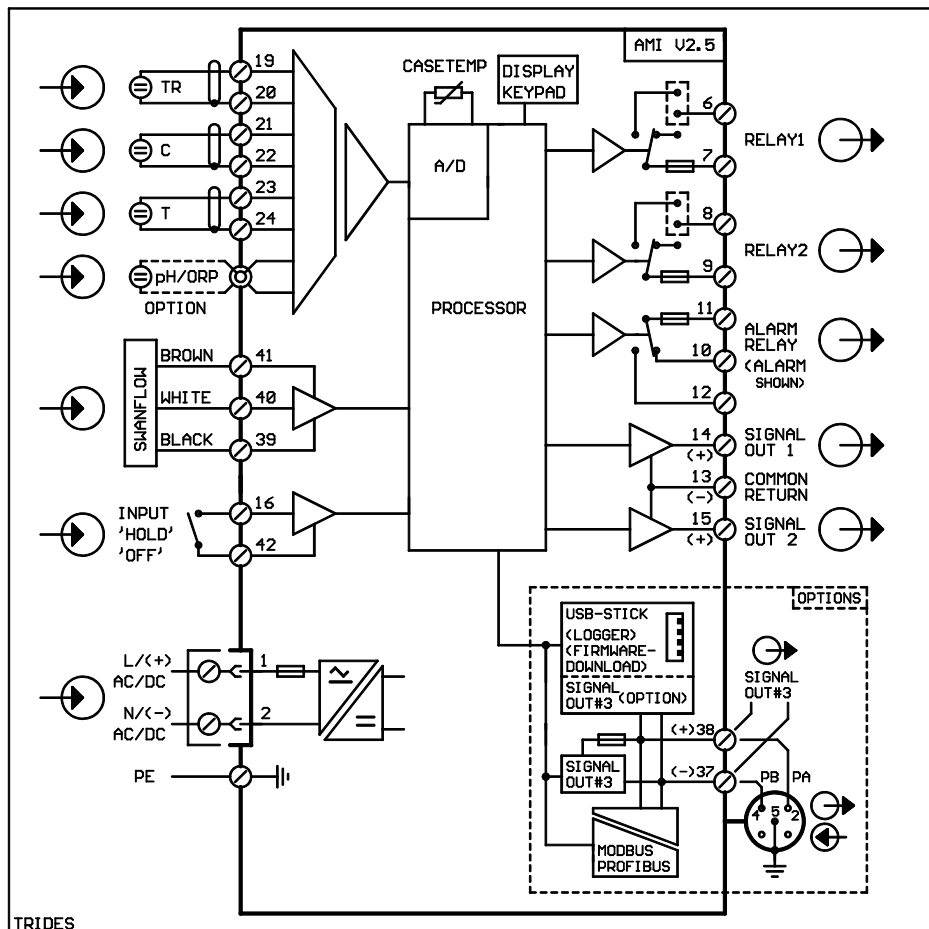
To prevent from electrical shock, do not connect the instrument to the power unless the ground wire (PE) is connected.



**WARNING**

The mains of the AMI Transmitter must be secured by a main switch and appropriate fuse or circuit breaker.

### 3.7.1 Connection Diagram



#### CAUTION



Use only the terminals shown in this diagram, and only for the mentioned purpose. Use of any other terminals will cause short circuits with possible corresponding consequences to material and personnel.

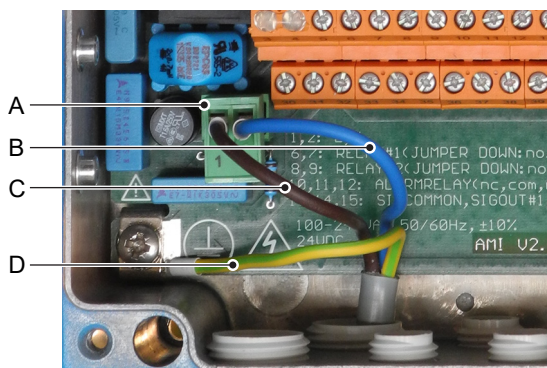
### 3.7.2 Power Supply



#### WARNING

##### Risk of electrical shock

Installation and maintenance of electrical parts must be performed by professionals. Always turn off power before manipulating electric parts.



- A** Power supply connector
- B** Neutral conductor, Terminal 2
- C** Phase conductor, Terminal 1
- D** Protective earth PE

**Note:** The protective earth wire (Ground) has to be connected to the grounding terminal.

#### Installation requirements

The installation must meet the following requirements.

- ♦ Mains cable to comply with standards IEC 60227 or IEC 60245; flammable rating FV1
- ♦ Mains equipped with an external switch or circuit-breaker
  - near the instrument
  - easily accessible to the operator
  - marked as interrupter for AMI Trides

### 3.8. Relay Contacts

#### 3.8.1 Input

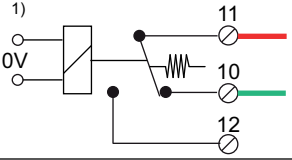
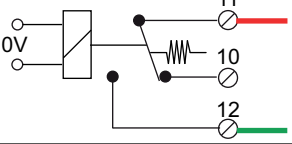
**Note:** Use only potential-free (dry) contacts.  
The total resistance (sum of cable resistance and resistance of the relay contact) must be less than 50  $\Omega$ .

Terminals 16/42  
For programming see Input [5.3.4, p. 83](#).

#### 3.8.2 Alarm Relay

**Note:** Max. load 1 A / 250 VAC  
Alarm output for system errors.  
Error codes see [Troubleshooting, p. 57](#).

**Note:** With certain alarms and certain settings of the AMI transmitter the alarm relay does not switch. The error, however, is shown on the display.

|                                            | Terminals | Description                                                                               | Relay connection                                                                     |
|--------------------------------------------|-----------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>NC</b> <sup>1)</sup><br>Normally Closed | 10/11     | Active (opened) during normal operation.<br>Inactive (closed) on error and loss of power. |   |
| <b>NO</b><br>Normally Open                 | 12/11     | Active (closed) during normal operation.<br>Inactive (opened) on error and loss of power. |  |

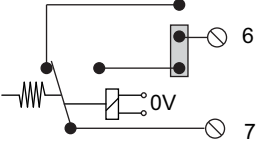
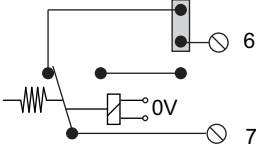
1) usual use

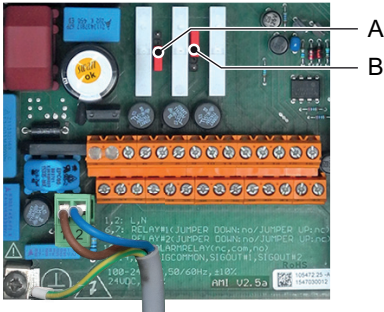
3.8.3 Relay 1 and 2

**Note:** Max. load 1 A/250 VAC

Relay 1 and 2 can be configured as normally open or as normally closed. Standard for both relays is normally open. To configure a Relay as normally closed, set the jumper in the upper position.

**Note:** Some error codes and the instrument status may influence the status of the relays described below.

| Relay config.   | Terminals                    | Jumper pos.                                                                       | Description                                                                                                             | Relay configuration                                                               |
|-----------------|------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Normally Open   | 6/7: Relay 1<br>8/9: Relay 2 |  | Inactive (opened) during normal operation and loss of power.<br>Active (closed) when a programmed function is executed. |  |
| Normally Closed | 6/7: Relay 1<br>8/9: Relay 2 |  | Inactive (closed) during normal operation and loss of power.<br>Active (opened) when a programmed function is executed. |  |



- A** Jumper set as normally open (standard setting)  
**B** Jumper set as normally closed

For programming see Menu Installation 5.3.2 and 5.3.3, p. 79,



## CAUTION

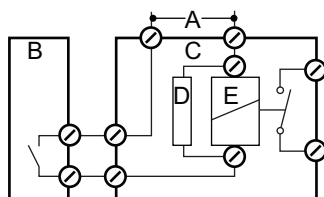
### Risk of damage of the relays in the AMI Transmitter due to heavy inductive load.

Heavy inductive or directly controlled loads (solenoid valves, dosing pumps) may destroy the relay contacts.

- ♦ To switch inductive loads > 0.1 A use an AMI relay box available as an option or suitable external power relays.

## Inductive load

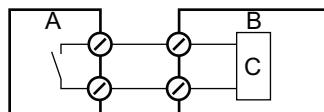
Small inductive loads (max 0.1 A) as for example the coil of a power relay can be switched directly. To avoid noise voltage in the AMI Transmitter it is mandatory to connect a snubber circuit in parallel to the load. A snubber is not necessary if an AMI relaybox is used.



- A** AC or DC power supply
- B** AMI Transmitter
- C** External power relay
- D** Snubber
- E** Power relay coil

## Resistive load

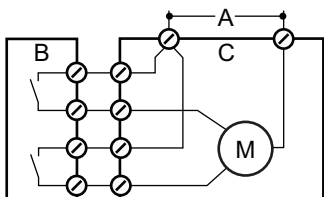
Resistive loads (max. 1 A) and control signals for PLC, impulse pumps and so on can be connected without further measures.



- A** AMI Transmitter
- B** PLC or controlled pulse pump
- C** Logic

## Actuators

Actuators, like motor valves, are using both relays: One relay contact is used for opening, the other for closing the valve, i.e. with the 2 relay contacts available, only one motor valve can be controlled. Motors with loads bigger than 0.1 A must be controlled via external power relays or an AMI relay box.



- A** AC or DC power supply
- B** AMI Transmitter
- C** Actuator

## 3.9. Signal Outputs

### 3.9.1 Signal Output 1 and 2 (current outputs)

**Note:** Max. burden 510  $\Omega$

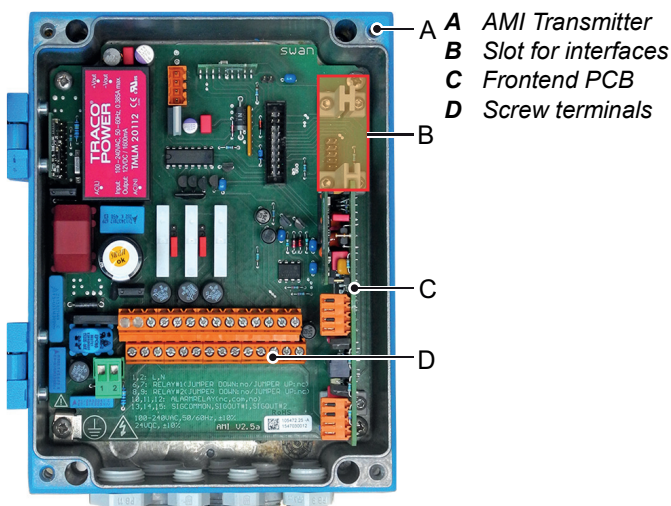
*If signals are sent to two different receivers, use signal isolator (loop isolator).*

Signal output 1: Terminals 14 (+) and 13 (-)

Signal output 2: Terminals 15 (+) and 13 (-)

For programming see [Program List and Explanations](#), p. 69, Menu Installation.

## 3.10. Interface Options



The slot for interfaces can be used to expand the functionality of the AMI instrument with either:

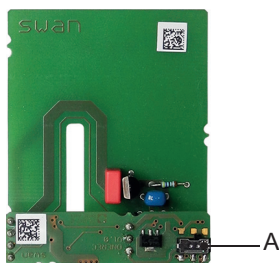
- ♦ a third signal output
- ♦ a Profibus or Modbus connection
- ♦ a HART connection
- ♦ a USB Interface

### 3.10.1 Signal Output 3

Terminals 38 (+) and 37 (-).

Requires the additional board for the third signal output 0/4–20 mA. The third signal output can be operated as a current source or as a current sink (switchable via switch [A]). For detailed information see the corresponding installation instruction.

**Note:** Max. burden 510  $\Omega$ .



Third signal output 0/4 - 20 mA PCB

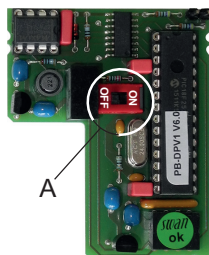
A Operating mode selector switch

### 3.10.2 Profibus, Modbus Interface

Terminal 37 PB, Terminal 38 PA

To connect several instruments by means of a network or to configure a PROFIBUS DP connection, consult the PROFIBUS manual. Use appropriate network cable.

**Note:** The switch must be ON, if only one instrument is installed, or on the last instrument in the bus.



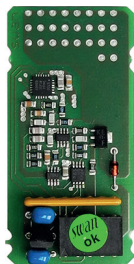
Profibus, Modbus Interface PCB (RS 485)

A On - OFF switch

### 3.10.3 HART Interface

Terminals 38 (+) and 37 (-).

The HART interface PCB allows for communication via the HART protocol. For detailed information, consult the HART manual.

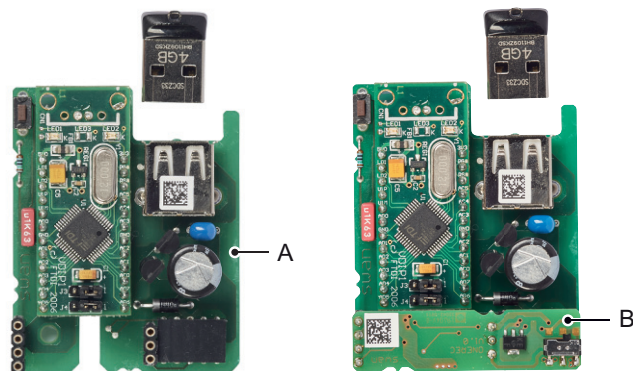


HART Interface PCB

### 3.10.4 USB Interface

The USB Interface is used to store Logger data and for Firmware upload. For detailed information see the corresponding installation instruction.

The optional third signal output 0/4 – 20 mA PCB [B] can be plugged onto the USB interface and used in parallel.



USB Interface

*A* USB interface PCB

*B* Third signal output 0/4 - 20 mA PCB

## 4. Instrument Setup

After the analyzer is installed according to the previous instructions, connect the power cord. Do not switch on power yet!

### 4.1. Establish sample flow

- 1 Open the flow regulating valve.
- 2 Wait until the constant head is filled, and the rotor of the Trides sensor starts rotating.
- 3 Switch on power.  
⇒ *The AMI Transmitter performs a self test, displays the firmware version and then starts normal operation.*

### 4.2. Programming

- ♦ Program all parameters for external devices (interface, etc.).
- ♦ Set all parameters for instrument operation (limits, alarms). See [Program List and Explanations, p. 69](#)

### 4.3. Calibration of pH electrode

Enter the 2 Standards you want to use for calibration in menu 5.1.5.

**Note:** *The default values of the standards pH 7 and pH 9 corresponds with the standards delivered by SWAN.*

Calibrate the pH electrode with two buffers, e.g. pH 7.00 and pH 9.00.

See [Process pH, p. 52](#) or [Standard pH, p. 53](#).

#### **4.4. Correction of Trides sensor**

If you measure concentrations > 0.1 ppm chlorine or 0.01 ppm ozone correct the instrument after 24 h running in. A zero point calibration is not necessary.

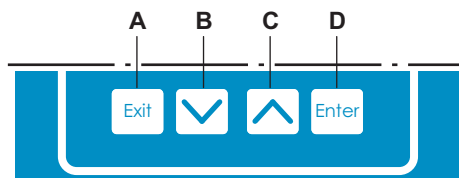
The standard method to correct the AMI Trides sensor is the DPD photometric method. Use a high quality photometer (e.g. Swan Chematest), to determine the reference value. Perform 3 manual measurements and calculate the average value.

The manual sample must be taken from the grab sample outlet of the flow cell.

If you measure concentrations < 0.1 ppm chlorine or 0.01 ppm ozone, let the instrument run continuously for at least 5 days in normal operation before performing a zero point calibration!

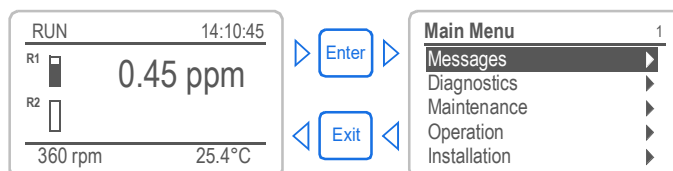
## 5. Operation

### 5.1. Keys

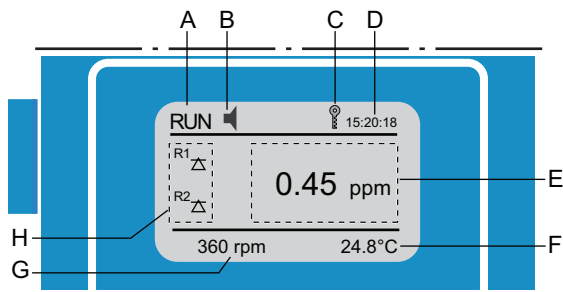


- A** to exit a menu or command (rejecting any changes) to move back to the previous menu level
- B** to move DOWN in a menu list and to decrease digits
- C** to move UP in a menu list and to increase digits
- D** to open a selected sub-menu to accept an entry

#### Program Access, Exit



## 5.2. Display



- A** RUN normal operation  
 HOLD input closed or cal delay: Instrument on hold (shows status of signal outputs).  
 OFF input closed: control/limit is interrupted (shows status of signal outputs).
- B** ERROR  Error  Fatal Error
- C** Keys locked, transmitter control via Profibus
- D** Time
- E** Process values in ppm or mg/l
- F** Sample temperature
- G** Sample flow in rotations per minute (rpm)
- H** Relay status

### Relay status, symbols

-   upper/lower limit not yet reached  
  upper/lower limit reached  
 control upw./downw. no action  
 control upw./downw. active, dark bar indicates control intensity  
 motor valve closed  
 motor valve: open, dark bar indicates approx. position  
 timer  
 timer: timing active (hand rotating)

### 5.3. Software Structure

|                  |          |
|------------------|----------|
| <b>Main Menu</b> | <b>1</b> |
| Messages         | ▶        |
| Diagnostics      | ▶        |
| Maintenance      | ▶        |
| Operation        | ▶        |
| Installation     | ▶        |

|                 |            |
|-----------------|------------|
| <b>Messages</b> | <b>1.1</b> |
| Pending Errors  | ▶          |
| Message List    | ▶          |

|                    |            |
|--------------------|------------|
| <b>Diagnostics</b> | <b>2.1</b> |
| Identification     | ▶          |
| Sensors            | ▶          |
| Sample             | ▶          |
| I/O State          | ▶          |
| Interface          | ▶          |

|                    |                   |
|--------------------|-------------------|
| <b>Maintenance</b> | <b>3.1</b>        |
| Calibration        | ▶                 |
| Simulation         | ▶                 |
| Set Time           | 23.09.06 16:30:00 |

|                  |            |
|------------------|------------|
| <b>Operation</b> | <b>4.1</b> |
| Sensors          | ▶          |
| Relay Contacts   | ▶          |
| Logger           | ▶          |

|                     |            |
|---------------------|------------|
| <b>Installation</b> | <b>5.1</b> |
| Sensors             | ▶          |
| Signal Outputs      | ▶          |
| Relay Contacts      | ▶          |
| Miscellaneous       | ▶          |
| Interface           | ▶          |

#### Menu 1 Messages

Reveals pending errors as well as an event history (time and state of events that have occurred at an earlier point of time).  
It contains user relevant data.

#### Menu 2 Diagnostics

Provides user relevant instrument and sample data.

#### Menu 3 Maintenance

For instrument calibration, relay and signal output simulation, and to set the instrument time.  
It is used by the service personnel.

#### Menu 4 Operation

User relevant parameters that might need to be modified during daily routine. Normally password protected and used by the process-operator.  
Subset of menu 5 - Installation, but process-related.

#### Menu 5 Installation

For initial instrument set up by SWAN authorized person, to set all instrument parameters. Can be protected by means of password.

## 5.4. Changing Parameters and values

### Changing parameters

The following example shows how to change the logger interval:

Logger 4.4.1  
Log interval 30 min  
Clear logger no

Logger 4.1.3  
Log interval Interval.  
Clear logger 5 min  
10 min  
30 min  
1 Hour

Logger 4.1.3  
Log interval 10 min  
Clear logger no

Logger 4.1.3  
Log interval Save ?  
Clear logger Yes  
No

- 1 Select the parameter you want to change.
- 2 Press [Enter]
- 3 Press [] or [] key to highlight the required parameter.
- 4 Press [Enter] to confirm the selection or [Exit] to keep the previous parameter).

⇒ The selected parameter is highlighted (but not saved yet).

- 5 Press [Exit].

⇒ Yes is highlighted.

- 6 Press [Enter] to save the new parameter.  
⇒ The system reboots, the new parameter is set.

### Changing values

Alarm DIS. 5.3.1.1.1  
Alarm High 10.0 ppm  
Alarm Low 0.000 ppm  
Hysteresis 10.0 ppm  
Delay 5 Sec

Alarm DIS. 5.3.1.1.1  
Alarm High 16.00 ppm  
Alarm Low 0.000 ppm  
Hysteresis 10.0 ppm  
Delay 5 Sec

- 1 Select the value you want to change.
- 2 Press [Enter].
- 3 Set required value with [] or [] key.
- 4 Press [Enter] to confirm the new value.
- 5 Press [Exit].  
⇒ Yes is highlighted.
- 6 Press [Enter] to save the new value.

## 6. Maintenance

### 6.1. Maintenance Schedule

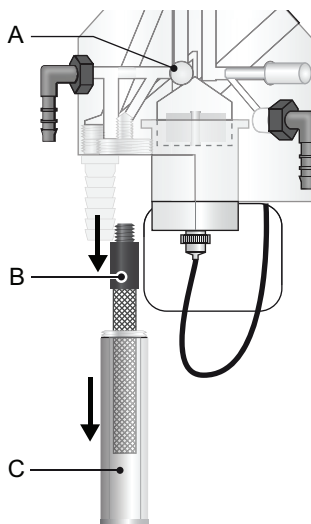
Preventive maintenance frequency depends on water quality, on the application, and on national regulations.

|                                      |                                                                                                                                                            |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Daily up to every 2 weeks</b>     | Check sample supply for dirt.<br>Clean all filters and strainers, if necessary.<br>Clean AMI Trides protection filter, if necessary.<br>Check sample flow. |
| <b>Weekly (some countries daily)</b> | pH/Redox option: Perform Process pH/Redox.<br>Determine disinfectant value by manual DPD analysis and, if necessary, perform Process Trides.               |
| <b>Every 2 months</b>                | Option pH/Redox: Perform pH/Redox calibration.                                                                                                             |
| <b>3–4 Years</b>                     | Replace the reference electrode.                                                                                                                           |

Control of dechlorination: Measured value near 0 ppm:

|                                      |                                                                                                                                                                                                                                                     |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>7 days after start-up</b>         | Perform a <Zero Trides> according to chapter <a href="#">Zero Trides, p. 54</a>                                                                                                                                                                     |
| <b>Daily up to every 2 weeks</b>     | Check sample supply for dirt.<br>Clean all filters and strainers, if necessary.<br>Clean AMI Trides protection filter, if necessary.<br>Check sample flow.                                                                                          |
| <b>Weekly (some countries daily)</b> | pH option: Perform Process pH.<br>Determine disinfectant value by manual DPD analysis and, if necessary, perform <Process Trides>.<br><br><i><b>Note:</b> Before performing &lt;Process Trides&gt; flush the instrument with chlorinated water.</i> |
| <b>Every 2 months</b>                | pH/Redox option: Perform pH/Redox calibration.                                                                                                                                                                                                      |
| <b>3–4 Years</b>                     | Replace the reference electrode.                                                                                                                                                                                                                    |

## 6.2. Cleaning of Trides protective filter

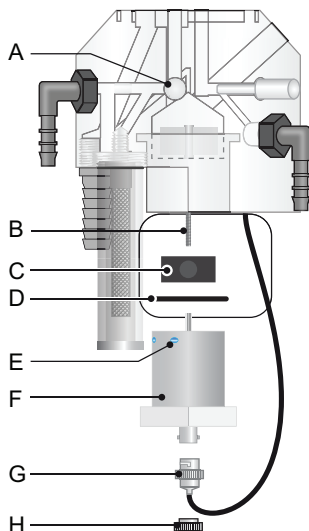


- A** *Flow regulating valve*  
**B** *Filter*  
**C** *Filter vessel*

If the protection filter shows deposits, proceed as follows:

- 1 Close the flow regulating valve [A].
- 2 Close the sample main tap before the filter.
- 3 Unscrew and remove the filter vessel [C] from the flow cell block.
- 4 Unscrew and remove the filter from [B] the flow cell block.
- 5 Backwash the filter under pressure of tap water. Clean the outside of the filter.
- 6 Install the filter and filter vessel again.
- 7 Open sample supply and flow regulating valve again.

### 6.3. Cleaning of Trides sensor



- |                                |                        |
|--------------------------------|------------------------|
| <b>A</b> Flow regulating valve | <b>E</b> Orifices      |
| <b>B</b> Threaded bolt         | <b>F</b> Trides sensor |
| <b>C</b> Rotor                 | <b>G</b> BNC connector |
| <b>D</b> O-Ring                | <b>H</b> Knurled nut   |

- 1 Close the flow regulating vale [A].
- 2 Wait until rotor [C] stops and DIS reading is 0 ppm.
- 3 Shut off power of the instrument.
- 4 Disconnect the BNC connector [G] from the Trides sensor [F].  
 ⚠ Prevent the connector from getting wet.
- 5 Unscrew and remove one of the two knurled nuts [H].



#### CAUTION

- ♦ Avoid damaging of the Trides sensor during removal. Once damaged, the sensor needs to be replaced.
- ♦ Do not touch the platinum ring in the center of the Trides sensor with your fingers or metallic objects.

- 6 Hold the Trides sensor [F] with one hand while unscrewing and removing the 2<sup>nd</sup> knurled nut.
- 7 Remove the Trides sensor from the flow cell.  
 *Take care not to spill the sample remaining in the sensor.*
- 8 Remove the rotor [C] from the Trides sensor.
- 9 Clean the two orifices [E] with a pipe cleaner.



### WARNING

#### Hydrochloric acid

Hydrochloric acid may be used to remove strong calcareous deposits.

- ♦ Hydrochloric acid causes severe skin burns and eye damage.
- ♦ Carefully read the Safety Data Sheet before handling hydrochloric acid

### Cleaning

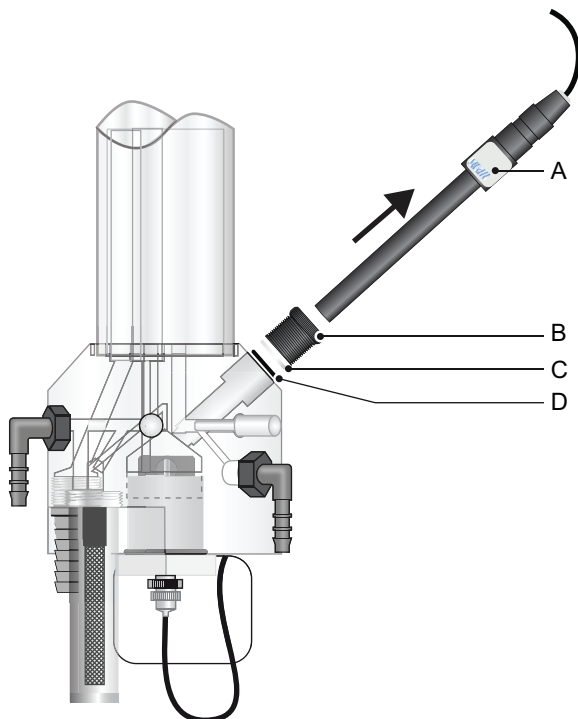
- 1 Clean the rotor with a soft tissue.
- 2 Cautiously wipe the sensor with a soft tissue, mainly the platinum parts and the whole area which is in contact with water.  
If necessary, strong calcareous deposits can be eliminated with 1% hydrochloric acid.
- 3 After cleaning rinse all parts well with clean water.

### Install

- 1 Put rotor on the sensor.
- 2 Install the Trides sensor into the flow cell.
- 3 Fasten the knurled nuts hand-tight.
- 4 Connect the BNC connector to the Trides sensor.
- 5 Open the sample flow.
- 6 As soon as the rotor is turning, switch on power.

**Note:** *After cleaning the sensor, the measuring value may be too high. Let the instrument run for about 24 h.*

## 6.4. Cleaning of Reference Electrode



**A** Reference electrode

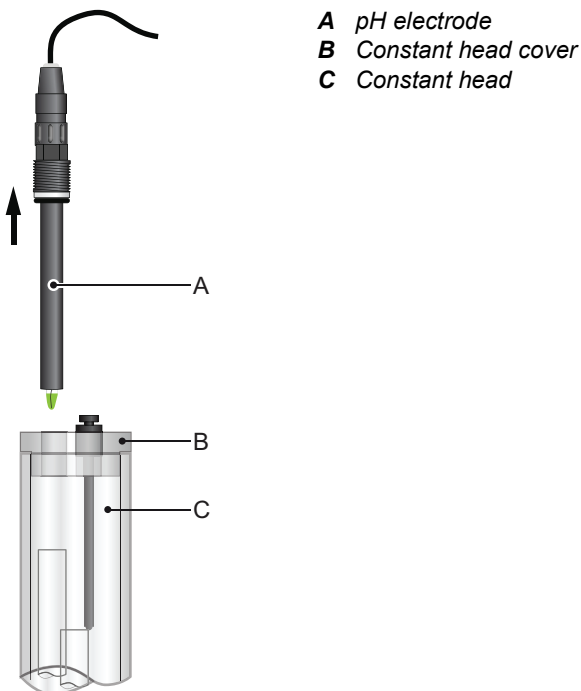
**E** Washer

**B** Union screw

**F** O-Ring

- 1 Close the flow regulating valve.
- 2 Loosen the union screw [B]
- 3 Pull the reference electrode out.
- 4 Wipe sensor tip cautiously with a soft tissue. If necessary use alcohol to remove oily deposits.  
**⚠ Do not use any acid!**
- 5 Push the reference electrode through the union screw into the flow cell as far as it will go.
- 6 Tighten the union screw.

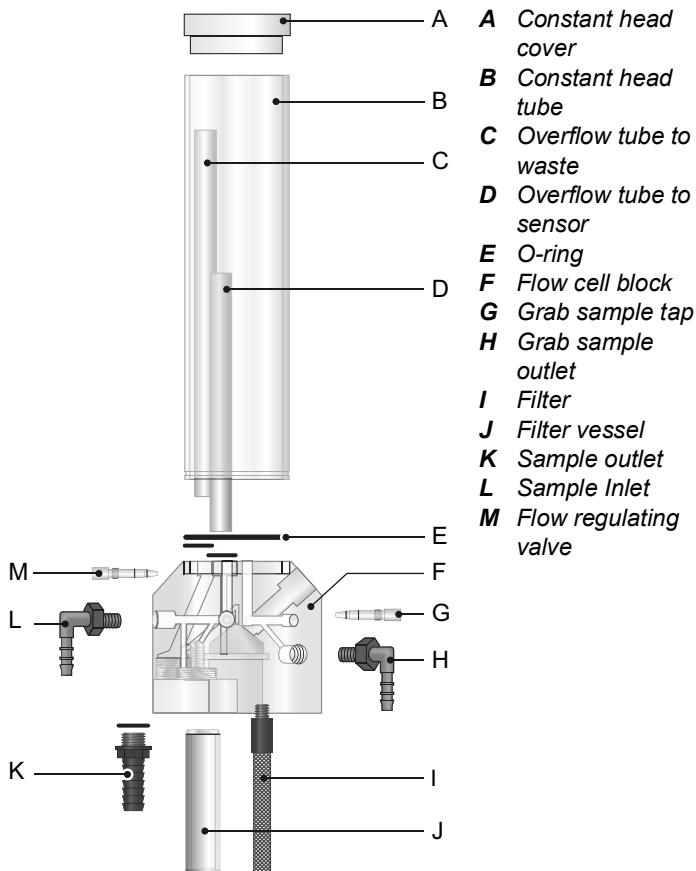
## 6.5. Cleaning of pH Electrode



### **Clean pH Electrode**

- 1 Pull the pH electrode [A] out of the constant head.
- 2 If necessary wipe the electrode shaft and the green tip cautiously with a soft, clean, and damp paper tissue.
- 3 Remove grease with a tissue moistened with alcohol.
- 4 If the electrode is very dirty, put its tip into 1% diluted hydrochloric acid for roughly 1 min.
- 5 Afterwards rinse the electrode tip thoroughly with clean water.
- 6 Install the electrode into the constant head again.
- 7 Let the electrode run-in for 1 h before the first calibration.

## 6.6. Cleaning of Flow Cell



### CAUTION

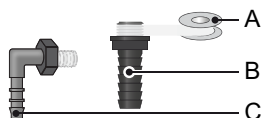


- ◆ Never use organic solvents or scrubbing materials to clean acrylic glass parts.
- ◆ Use soft detergent and rinse well. Eliminate calcareous deposits with a common household deliming agent in standard concentration.

**Disassemble  
the flow cell**

- 1 Switch off the instrument.
- 2 Stop the sample flow at the main tap before the sample inlet.
- 3 Open the grab sample tap [G] to empty the flow cell.
- 4 Remove all sensors.
- 5 Put the rubber cap on the tip of the reference (and pH) electrode and plug cap on sensor plug.
- 6 Remove the following parts from the flow cell block [F]:
  - Constant head cover
  - Constant head tube
  - Overflow tube long
  - Overflow tube short
  - O-ring
  - Grab sample tap
  - Grab sample outlet
  - Filter
  - Filter vessel
  - Sample outlet
  - Sample Inlet
  - Flow regulating valve
- 7 Clean all acrylic parts with a soft brush (e.g. a bottle cleaner) and soapy water. Remove calcareous deposits with a common household deliming agent with standard concentrations.
- 8 Clean the bores of the flow cell block with pipe cleaners.

**Assemble the  
flow cell**



- A** Teflon band  
**B** Hose nozzle at sample outlet  
**C** Elbow hose nozzle at sample inlet

- 1 Wrap 7 turns of teflon tape around the hose nozzle thread
- 2 Replace all o-rings and grease them with teflon paste.
- 3 Assemble the flow cell.
- 4 Install all sensors.
- 5 Open the main tap and wait until the flow cell is filled
- 6 Check all connection for leakage, if necessary retighten leaky points.
- 7 Switch on the instrument.

## 6.7. Calibration of Trides Sensor

The following description of the calibration procedure assumes that the AMI Trides is equipped with a pH electrode. In case your AMI Trides has no pH electrode, skip the pH calibration.

### 6.7.1 Process pH

The process calibration is based on a comparative measurement of the on-line instrument with a calibrated comparative electrode. Perform a valid manual measurement with the calibrated comparative electrode. Then compare the measuring value with the on-line instrument and if necessary, enter the correct measuring value in the menu <Maintenance/Calibration/Process pH> of the on-line instrument.

The deviation of the measuring values is shown as offset in mV. Select [Save] and press [Enter] to save the correct measuring value.

**Example of  
Process pH  
Calibration**

|             |                   |
|-------------|-------------------|
| Maintenance | 3.1               |
| Calibration | ▶                 |
| Simulation  | ▶                 |
| Set Time    | 01.01.05 16:30:00 |

|                |       |
|----------------|-------|
| Calibration    | 3.1.1 |
| Process pH     | ▶     |
| Standard pH    | ▶     |
| Zero Trides    | ▶     |
| Process Trides | ▶     |

|               |         |
|---------------|---------|
| Process pH    | 3.1.1.1 |
| Current Value | 7.78 pH |
| Slope         | 0.00 mV |
| -----         |         |
| Process Value | 7.78 pH |
| Save          | <Enter> |

- 1 Navigate to menu  
<Maintenance>/<Calibration>.
- 2 Press [Enter]
- 3 Select Process pH

The following values are displayed:

- ♦ Current value
- ♦ Offset
- ♦ Process value

Current value and Process value are equal.

- 4 Press [Enter].

| Process pH    |          | 3.1.1.1 |
|---------------|----------|---------|
| Current Value | 7.78 pH  |         |
| Offset        | -8.15 mV |         |
| -----         |          |         |
| Process Value | 7.60 pH  |         |
| Save          | <Enter>  |         |

| Process pH             |         | 3.1.1.1 |
|------------------------|---------|---------|
| Current Value          | 7.60 pH |         |
| Offset                 | y mV    |         |
| -----                  |         |         |
| Calibration successful |         |         |

5 Enter the process value measured with the calibrated comparative electrode.

⇒ Use the [▲] or [▼] keys to increase or decrease the Process value.

6 Press [Enter] to confirm.

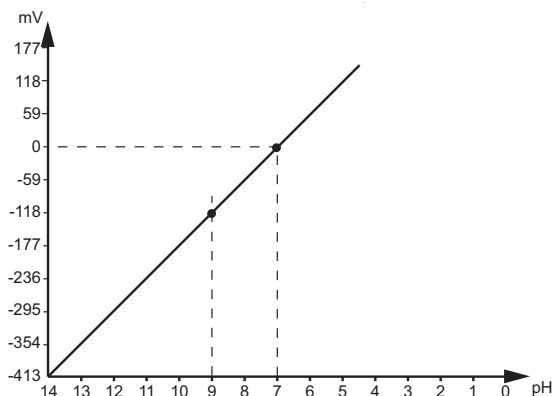
7 Press [Enter] to save.

The process value is saved and the new Offset in mV is displayed.

## 6.7.2 Standard pH

### Standard pH Calibration

The ideal pH electrode has an offset of 0 mV at pH 7 and a slope of 59.16 mV/pH unit. Real electrodes differ from this ideal. Therefore, pH electrodes are calibrated with two buffer solutions, of different pH values.



To perform a standard calibration navigate to menu <Maintenance> / <Calibration> and select <Standard pH>. Press [Enter] and follow the dialog on the screen.

### 6.7.3 Standard Redox

Our reference electrode system is Ag/AgCl. The measuring value is roughly 50 mV higher than the calomel reference system.

The slope of the ORP electrode is not defined. To compensate the offset of gel electrodes, a calibration can be done with one buffer solution. Because ORP electrodes are slow, it can take some time after calibration until the measuring value is stable again.

### 6.7.4 Zero Trides

If you measure concentrations > 0.1 ppm chlorine or 0.01 ppm ozone correct the instrument after 24 h running-in. A zero point calibration is not necessary.

Let the instrument run continuously for at least 5 days in normal operation before performing a zero point calibration!

Navigate to menu <Maintenance>/<Calibration> and select <Zero Trides>. The instrument guides you through the complete calibration process.

- 1 Close tap of the water inlet. Wait 30 min. (Timer counts down).
- 2 <Current Value> in ppm and <Offset> in  $\mu\text{A}$  as well as progress of <Zero Trides> are displayed
- 3 Open tap of the water inlet and regulate flow.

If you have completed the required action press [Enter] to proceed.

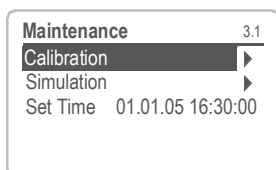
### 6.7.5 Process Trides

The standard method to correct the AMI Trides is the DPD photometric method. Use a high quality photometer to determine the reference value, e.g. Swan Chematest.

Take the sample from the grab sample outlet of the AMI Trides and perform 3 manual measurements. Then calculate the average value and use it to for comparison.

You need a certain amount of disinfectant in the water to be able to do a correction.

#### Example of Process pH Calibration



- 1 Navigate to menu <Maintenance>/<Calibration>.
- 2 Press [Enter]

| Calibration           | 3.1.1 |
|-----------------------|-------|
| Process pH            | ▶     |
| Standard pH           | ▶     |
| Zero Trides           | ▶     |
| <b>Process Trides</b> | ▶     |

- 1 Select Process Trides
- 2 Press [Enter]

| Process Trides       | 3.1.4.1         |
|----------------------|-----------------|
| Current Value        | 0.30 ppm        |
| Slope                | x $\mu$ A       |
| -----                |                 |
| <b>Process Value</b> | <b>0.30 ppm</b> |
| Save                 | <Enter>         |

The following values are displayed:

- ♦ Current value
- ♦ Slope
- ♦ Process value

Current value and Process value are equal.

| Process Trides | 3.1.4.1   |
|----------------|-----------|
| Current Value  | 0.30 ppm  |
| Slope          | x $\mu$ A |
| -----          |           |
| Process Value  | 0.45 ppm  |
| Save           | <Enter>   |

- 3 Press [Enter].
- 4 Enter the process value measured with the photometer.  
⇒ Use the [▲] or [▼] keys to increase or decrease the Process value.

- 5 Press [Enter] to confirm.

- 6 Press [Enter] to save.

The process value is saved and the new slope in  $\mu$ A is displayed.

| Process Trides                | 3.1.4.1   |
|-------------------------------|-----------|
| Current Value                 | 0.45 ppm  |
| Slope                         | x $\mu$ A |
| -----                         |           |
| <b>Calibration successful</b> |           |

**Possible error messages**

See [Troubleshooting List, p. 58](#)

## **6.8. Longer Stop of Operation**

Do not switch the instrument off if your operation is suspended for less than a week. Power consumption is very low, and the sensors remain ready for use.

If water hardness is very high, calcium may precipitate.

- 1** Close sample flow regulating valve first.
- 2** Stop the sample flow at the main tap before the sample inlet.
- 3** Wait until the rotor has stopped turning and no disinfectant is displayed any more.
- 4** Switch off power of the instrument and of all other connected devices.
- 5** Open the grab sample tap to empty the flow cell.
- 6** Unscrew and remove the filter vessel from the flow cell block, empty and dry it, then screw it onto the flow cell block again.
- 7** If installed, remove the pH/Redox electrode from the constant head, fill 3-molar KCl (if not available, water) in the protective cap and put it on the electrode tip.
- 8** Loosen the connector from the pH/Redox electrode and put the connector cap on the electrode plug. Store it dry and frost protected with tip pointing downwards.
- 9** Remove the reference electrode from the flow cell block, fill water in the protective cap and put the protective cap on the electrode tip.
- 10** Loosen the connector from the reference electrode and put the connector cap on the pH electrode plug. Store it dry and frost protected with tip pointing downwards.
- 11** Remove the BNC connector from the Trides sensor.
- 12** Unscrew and remove one of the two knurled nuts.
- 13** Hold the Trides sensor with one hand while unscrewing and removing the 2<sup>nd</sup> knurled nut.
- 14** Remove the Trides sensor from the flow cell.
- 15** Dry it with a soft, clean tissue, and store dry.

## 7. Troubleshooting

This chapter provides some hints to make trouble shooting easier. For any detailed information how to replace or clean parts please see chapter Maintenance.

Attention: The sample for the manual measurement (with DPD!) must be taken directly from the flow cell!

If you need further help please contact your dealer. Note serial number of instrument and all diagnostic values before.

### 7.1. Diagnostic Values

| Parameter                     | Unit   | Typical  | Limit    |
|-------------------------------|--------|----------|----------|
| Flow measurement              | rpm    | 320–380  | 270–500  |
| pH Zero                       | mV     | ± 30     | ± 60     |
| pH Slope                      | mV/pH  | 55–65    | 40–65    |
| Dis. Zero                     | µA     | 0–0.5    | 1.6      |
| Dis. Slope                    | µA/ppm | 8–15     | 5–40     |
| Ref. electrode                | mV     | 900–1100 | 800–1300 |
| Current Signal<br>0.1–1.0 ppm | µA     | 3–9      | 1–40     |
| Redox potential               | mV     | ± 30     | ± 200    |

## 7.2. Troubleshooting List

| Problem                                                           | Possible Reason                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “No sample flow or Current Value too low” during <Process Trides> | <ul style="list-style-type: none"> <li>♦ Insufficient or no sample flow.</li> <li>♦ pH too high<br/>The process value used for a calibration should be at least 0.15 ppm at a pH 7. The higher the pH, the lower the current available for calibration. If the pH is &gt; 8 a process value of higher than 0.5 ppm is necessary for calibration.</li> <li>♦ Contaminated sensor.<br/>Sensor does not provide enough current for the value measured with the DPD method. Clean sensor. In case of repeated sensor contamination, check for copper tubes and/or water treatment chemicals such as cyanuric acid and corrosion inhibitors.</li> <li>♦ Zero too high<br/>The last zero calibration was too high. Repeat the Zero Trides after min. 48 hours of uninterrupted operation or perform “Set defaults Calibration”. Attention: “Set defaults Calibration” deletes all previous calibration values!</li> </ul> |
| Unstable values                                                   | <ul style="list-style-type: none"> <li>♦ Sample taken too close to feeding line.</li> <li>♦ Sample flow too irregular or too low.</li> <li>♦ Electrode cable broken or wet.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Trides display  
higher than man-  
ual measurement

- ♦ Disinfectant free chlorine: Check pH value of sample, check programmed/ displayed value.
- ♦ Sand (or other abrasive material) in the sample. Stop sand addition remove remaining sand and wait until the sensor signal has come down.
- ♦ Check if displayed temperature sensor value is correct.
- ♦ Sensor has just been cleaned. Wait until sensor signal has come down.
- ♦ Wrong manual measurement or old chemicals have been used. Repeat

Trides display  
lower than man-  
ual measurement

- ♦ Disinfectant free chlorine: Check pH value of sample, check programmed/ displayed value.
- ♦ Wrong manual measurement or old chemicals have been used. Repeat.
- ♦ Check if displayed temperature sensor value is correct.
- ♦ Trides sensor contaminated. Find contamination source.
- ♦ Check sensor cable.

Gain of Trides  
continuously  
decreases

- ♦ Water treatment chemical contaminates the sensor. Find contamination source. If not possible or essential to the process contact your dealer.

## 7.3. Error List

### Error

Non-fatal Error. Indicates an alarm if a programmed value is exceeded.

Such Errors are marked **E0xx** (bold and black).

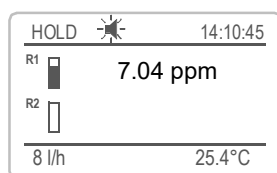
### Fatal Error (blinking symbol)

Control of dosing devices is interrupted.

The indicated measured values are possibly incorrect.

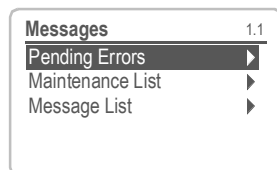
Fatal Errors are divided in the following two categories:

- ♦ Errors which disappear if correct measuring conditions are recovered (i.e. Sample Flow low).  
Such Errors are marked **E0xx** (bold and orange)
- ♦ Errors which indicate a hardware failure of the instrument.  
Such Errors are marked **E0xx** (bold and red)

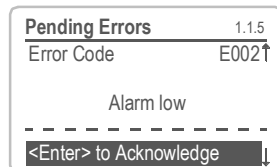


### Error or fatal Error

Error not yet acknowledged.  
Check **Pending Errors 1.1.5 \*** and  
take corrective action.  
Press [ENTER].



Navigate to menu <Messages>/  
<Pending Errors>.



Press [ENTER] to acknowledge the  
Pending Errors.

⇒ *The Error is reset and saved in  
the Message List.*

| Error       | Description         | Corrective action                                                                                                                                                                               |
|-------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E001</b> | DIS. Alarm high     | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.1, p. 77</a></li> </ul>                                                         |
| <b>E002</b> | DIS. Alarm low      | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.1, p. 77</a></li> </ul>                                                         |
| <b>E003</b> | pH/Redox Alarm high | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.2.1, p. 77</a></li> </ul>                                                       |
| <b>E004</b> | pH/Redox Alarm low  | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.2.25, p. 77</a></li> </ul>                                                      |
| <b>E007</b> | Sample Temp. high   | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.4, p. 78</a></li> </ul>                                                         |
| <b>E008</b> | Sample Temp. low    | <ul style="list-style-type: none"> <li>– check process</li> <li>– check programmed value, see <a href="#">5.3.1.4, p. 78</a></li> </ul>                                                         |
| <b>E009</b> | Sample flow high    | <ul style="list-style-type: none"> <li>– check sample inlet pressure</li> <li>– check programmed value, see <a href="#">5.3.1.3.2, p. 78</a></li> </ul>                                         |
| <b>E010</b> | Sample flow low     | <ul style="list-style-type: none"> <li>– check sample inlet pressure</li> <li>– Check flow regulating valve</li> <li>– check programmed value, see <a href="#">5.3.1.3.35, p. 78</a></li> </ul> |
| <b>E011</b> | Temp. shorted       | <ul style="list-style-type: none"> <li>– Check wiring of temperature sensor</li> <li>– Check temperature sensor</li> </ul>                                                                      |
| <b>E012</b> | Temp. disconnected  | <ul style="list-style-type: none"> <li>– Check wiring of temperature sensor</li> <li>– Check temperature sensor</li> </ul>                                                                      |
| <b>E013</b> | Case Temp. high     | <ul style="list-style-type: none"> <li>– check case/environment temperature</li> <li>– check programmed value, see <a href="#">5.3.1.5, p. 78</a></li> </ul>                                    |

| Error       | Description        | Corrective action                                                                                                                                                                                                                                                               |
|-------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E014</b> | Case Temp. low     | <ul style="list-style-type: none"> <li>– check case/environment temperature</li> <li>– check programmed value, see <a href="#">5.3.1.6, p. 79</a></li> </ul>                                                                                                                    |
| <b>E015</b> | TRIDES Reference   | <ul style="list-style-type: none"> <li>– Check if conductivity value of sample is &gt; 5 µS/cm.</li> <li>– Calculate: actual Trides signal / average value 3 DPD meas. = must be &gt;2 µA/ppm. If not, clean Trides sensor.</li> <li>– Exchange reference electrode.</li> </ul> |
| <b>E017</b> | Control Timeout    | <ul style="list-style-type: none"> <li>– check control device or programming in Installation, Relay contact, Relay 1 and 2, <a href="#">5.3.2 and 5.3.3, p. 79</a></li> </ul>                                                                                                   |
| <b>E024</b> | Input active       | <ul style="list-style-type: none"> <li>– See If Fault Yes is programmed in Menu see <a href="#">5.3.4, p. 83</a></li> </ul>                                                                                                                                                     |
| <b>E026</b> | IC LM75            | <ul style="list-style-type: none"> <li>– call service</li> </ul>                                                                                                                                                                                                                |
| <b>E028</b> | Signal output open | <ul style="list-style-type: none"> <li>– check wiring on signal outputs 1 and 2</li> </ul>                                                                                                                                                                                      |
| <b>E030</b> | EEProm Frontend    | <ul style="list-style-type: none"> <li>– call service</li> </ul>                                                                                                                                                                                                                |
| <b>E031</b> | Cal. Recout        | <ul style="list-style-type: none"> <li>– call service</li> </ul>                                                                                                                                                                                                                |
| <b>E032</b> | Wrong Frontend     | <ul style="list-style-type: none"> <li>– call service</li> </ul>                                                                                                                                                                                                                |
| <b>E033</b> | Power-on           | <ul style="list-style-type: none"> <li>– none, normal status</li> </ul>                                                                                                                                                                                                         |
| <b>E034</b> | Power-down         | <ul style="list-style-type: none"> <li>– none, normal status</li> </ul>                                                                                                                                                                                                         |

## 7.4. Replacing Fuses



### WARNING

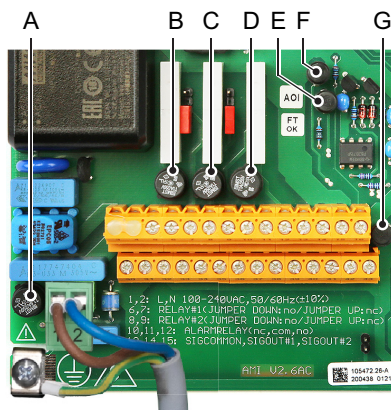
#### External Voltage.

External supplied devices connected to relay 1 or 2 or to the alarm relay can cause electrical shocks

- ♦ Make sure that the devices connected to the following contacts are disconnected from the power before resuming installation.
  - relay 1
  - relay 2
  - alarm relay

Find and remedy the cause for the short circuit before replacing the fuse.

Use tweezers or needle-nosed pliers to remove the defective fuse.  
Use original fuses provided by SWAN only.



- A** AC variant: 1.6 AT/250 V Instrument power supply  
DC variant: 3.15 AT/250 V Instrument power supply
- B** 1.0 AT/250V Relay 1
- C** 1.0 AT/250V Relay 2
- D** 1.0 AT/250V Alarm relay
- E** 1.0 AF/125V Signal output 2
- F** 1.0 AF/125V Signal output 1
- G** 1.0 AF/125V Signal output 3

## 8. Program Overview

For explanations about each parameter of the menus see [Program List and Explanations, p. 69](#)

- ♦ Menu 1 **Messages** informs about pending errors and maintenance tasks and shows the error history. Password protection possible. No settings can be modified.
- ♦ Menu 2 **Diagnostics** is always accessible for everybody. No password protection. No settings can be modified.
- ♦ Menu 3 **Maintenance** is for service: Calibration, simulation of outputs and set time/date. Please protect with password.
- ♦ Menu 4 **Operation** is for the user, allowing to set limits, alarm values, etc. The presetting is done in the menu Installation (only for the System engineer). Please protect with password.
- ♦ Menu 5 **Installation**: Defining assignment of all inputs and outputs, measuring parameters, interface, passwords, etc. Menu for the system engineer. Password strongly recommended.

### 8.1. Messages (Main Menu 1)

|                |                |        |                |
|----------------|----------------|--------|----------------|
| Pending Errors | Pending Errors | 1.1.5* | * Menu numbers |
| 1.1*           |                |        |                |
| Message List   | Number         | 1.2.1* |                |
| 1.2*           | Date, Time     |        |                |

### 8.2. Diagnostics (Main Menu 2)

|                |                |                                          |          |
|----------------|----------------|------------------------------------------|----------|
| Identification | Designation    | AMI Trides                               |          |
| 2.1*           | Version        | V6.20-06/16                              |          |
|                | Factory Test   | Instrument                               | 2.1.3.1* |
|                | 2.1.3*         | Instrument                               |          |
|                |                | Motherboard                              |          |
|                |                | Front End                                |          |
|                | Operating Time | Years / Days / Hours / Minutes / Seconds | 2.1.4.1* |
|                | 2.1.4*         |                                          |          |

|                   |                                                                  |                                                                                                                 |                                         |                             |
|-------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------|
| Sensors           | <b>Trides Sensor</b><br>2.2.1*                                   | Current Value ppm<br>(Raw value 1) µA<br>(Raw value 2) µA<br>Ref. Voltage mV<br><b>Cal. History</b><br>2.2.1.5* | 2.2.1*                                  | * Menu numbers              |
|                   |                                                                  |                                                                                                                 | Number<br>Date, Time<br>Offset<br>Slope | 2.2.1.5.1*                  |
|                   | <b>Electrode</b><br>2.2.2                                        | Measuring value<br>Raw value<br><b>Cal History</b><br>2.2.2.3*                                                  |                                         |                             |
|                   | <b>Miscellaneous</b><br>2.2.3*                                   | Case Temp.                                                                                                      | 2.2.3.1*                                |                             |
| Sample<br>2.3*    | Sample ID<br>Temperature<br>(NT5K)<br>Sample Flow<br>(Raw value) | 2.3.1*                                                                                                          |                                         |                             |
| I/O State<br>2.4* | Alarm Relay<br>Relay 1/2<br>Input<br>Signal Output 1/2           | 2.4.1*<br>2.4.2*                                                                                                |                                         |                             |
| Interface<br>2.5* | Protocol<br>Baud rate                                            | 2.5.1*                                                                                                          |                                         | (only with RS485 interface) |

8.3. Maintenance (Main Menu 3)

|                     |                             |                                                      |
|---------------------|-----------------------------|------------------------------------------------------|
| Calibration<br>3.1* | <b>Process pH</b><br>3.1.1* | Current Value<br>Offset<br>Process Value<br>Progress |
|                     | <b>Standard pH</b><br>3.1.2 | Progress                                             |
|                     | <b>Zero Trides</b><br>3.1.3 | Progress                                             |
|                     | <b>Process Trides</b>       | Current Value                                        |

|                    |                                                                                           |                                                |                |
|--------------------|-------------------------------------------------------------------------------------------|------------------------------------------------|----------------|
|                    | 3.1.4                                                                                     | Offset<br>Process Value                        | * Menu numbers |
| Simulation<br>3.3* | Alarm Relay<br>Relay 1<br>Relay 2<br>Signal Output 1<br>Signal Output 2<br>(Date), (Time) | 3.3.1*<br>3.3.2*<br>3.3.3*<br>3.3.4*<br>3.3.5* |                |
| Set Time<br>3.4*   |                                                                                           |                                                |                |

8.4. Operation (Main Menu 4)

|                        |                                                    |                                                                |                                                          |                                                         |
|------------------------|----------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Sensors<br>4.10*       | Filter Time Const.<br>Hold after Cal<br>Default pH | 4.10.1*<br>4.10.2*<br>4.10.3*                                  |                                                          |                                                         |
| Relay Contacts<br>4.2* | Alarm Relay<br>4.2.1*                              | Alarm DIS.<br>4.2.1.1*                                         | Alarm High<br>Alarm Low<br>Hysteresis<br>Delay           | 4.2.1.1.1*<br>4.2.1.1.25*<br>4.2.1.1.35*<br>4.2.1.1.45* |
|                        |                                                    | Alarm pH<br>4.2.1.2*                                           | Alarm High<br>Alarm Low<br>Hysteresis<br>Delay           | 4.2.1.1.2*<br>4.2.1.1.26*<br>4.2.1.1.36*<br>4.2.1.1.46* |
|                        | Relay 1/2<br>4.2.2*/4.2.3*                         | Setpoint<br>Hysteresis<br>Delay                                | 4.2.x.100*<br>4.2.x.200*<br>4.2.x.30*                    |                                                         |
|                        | Input<br>4.2.4*                                    | Active<br>Signal Outputs<br>Output / Control<br>Fault<br>Delay | 4.2.4.1*<br>4.2.4.2*<br>4.2.4.3*<br>4.2.4.4*<br>4.2.4.5* |                                                         |
| Logger<br>4.3*         | Log Interval<br>Clear Logger                       | 4.3.1*<br>4.3.2*                                               |                                                          |                                                         |

## 8.5. Installation (Main Menu 5)

| <b>Sensors</b>        | <i>Type of Electrodes</i> | 5.1.1*              | * Menu numbers         |                          |
|-----------------------|---------------------------|---------------------|------------------------|--------------------------|
| 5.1*                  | <i>pH Electrodes</i>      | 5.1.2*              |                        |                          |
|                       | <i>Disinf.</i>            | 5.1.3*              |                        |                          |
|                       | <i>Dimension</i>          | 5.1.4*              |                        |                          |
|                       | <b>Standards</b>          | <i>Standard 1</i>   | 5.1.5.1*               |                          |
| <b>Signal Outputs</b> | 5.1.5*                    | <i>Standard 2</i>   | 5.1.5.2*               |                          |
|                       | <b>Signal Output 1/2</b>  | <i>Parameter</i>    | 5.2.1.1 - 5.2.2.1*     |                          |
|                       | 5.2*                      | <i>Current Loop</i> | 5.2.1.2 - 5.2.2.2*     |                          |
|                       |                           | <i>Function</i>     | 5.2.1.3 - 5.2.2.3*     |                          |
|                       |                           | <b>Scaling</b>      | <i>Range Low</i>       | 5.2.x.40.10/10*          |
| <b>Relay Contacts</b> | <b>Alarm Relay</b>        | <b>Alarm DIS.</b>   | <i>Range High</i>      | 5.2.x.40.20/20*          |
|                       |                           |                     | <i>Alarm High</i>      | 5.3.1.1.1*               |
|                       | 5.3*                      | 5.3.1.1*            | <i>Alarm Low</i>       | 5.3.1.1.25               |
|                       |                           |                     | <i>Hysteresis</i>      | 5.3.1.1.35               |
|                       |                           |                     | <i>Delay</i>           | 5.3.1.1.45               |
|                       |                           |                     | <i>Alarm High</i>      | 5.3.1.2.1*               |
|                       | <b>Alarm pH</b>           | 5.3.1.2*            | <i>Alarm Low</i>       | 5.3.1.2.26               |
|                       |                           |                     | <i>Hysteresis</i>      | 5.3.1.2.36               |
|                       |                           |                     | <i>Delay</i>           | 5.3.1.2.46               |
|                       |                           |                     | <i>Flow Alarm</i>      | 5.3.1.3.1*               |
|                       | <b>Sample Flow</b>        | 5.3.1.3*            | <i>Alarm High</i>      | 5.3.1.3.2*               |
|                       |                           |                     | <i>Alarm Low</i>       | 5.3.1.3.35*              |
|                       |                           |                     | <i>Delay</i>           | 5.3.1.3.45*              |
|                       |                           |                     | <i>Alarm High</i>      | 5.3.1.4.1*               |
|                       | <b>Sample Temp.</b>       | 5.3.1.4*            | <i>Alarm Low</i>       | 5.3.1.4.25*              |
|                       |                           |                     | <i>Alarm High</i>      | 5.3.1.3.1*               |
|                       | <b>Alarm Conductivity</b> | 5.3.1.3*            | <i>Alarm Low</i>       | 5.3.1.3.26               |
|                       |                           |                     | <i>Hysteresis</i>      | 5.3.1.3.36               |
|                       |                           |                     | <i>Delay</i>           | 5.3.1.3.46               |
|                       |                           |                     | <i>Case Temp. high</i> | 5.3.1.4*                 |
|                       | <b>Relay 1/2</b>          | 5.3.2*/5.3.3*       | <i>Case Temp. low</i>  | 5.3.1.5*                 |
|                       |                           |                     | <i>Function</i>        | 5.3.2.1/5.3.3.1*         |
|                       |                           |                     | <i>Parameter</i>       | 5.3.2.20/5.3.3.20*       |
|                       |                           |                     | <i>Setpoint</i>        | 5.3.2.300/<br>5.3.3.300* |
|                       |                           |                     |                        |                          |

|               |                      |                |                          |                  |
|---------------|----------------------|----------------|--------------------------|------------------|
|               |                      | Hysteresis     | 5.3.2.400/<br>5.3.3.400* | * Menu numbers   |
|               |                      | Delay          | 5.3.2.50/ 5.3.3.50*      |                  |
|               | Input                | Active         | 5.3.4.1*                 |                  |
|               | 5.3.4*               | Signal Outputs | 5.3.4.2*                 |                  |
|               |                      | Output/Control | 5.3.4.3*                 |                  |
|               |                      | Fault          | 5.3.4.4*                 |                  |
|               |                      | Delay          | 5.3.4.5*                 |                  |
| Miscellaneous | Language             | 5.4.1*         |                          |                  |
| 5.4*          | Set defaults         | 5.4.2*         |                          |                  |
|               | Load Firmware        | 5.4.3*         |                          |                  |
|               | Password             | Messages       | 5.4.4.1*                 |                  |
|               | 5.4.4*               | Maintenance    | 5.4.4.2*                 |                  |
|               |                      | Operation      | 5.4.4.3*                 |                  |
|               |                      | Installation   | 5.4.4.4*                 |                  |
|               | Sample ID            | 5.4.5*         |                          |                  |
|               | Line Break Detection | 5.4.6*         |                          |                  |
| Interface     | Protocol             | 5.5.1*         |                          | (only with RS485 |
| 5.5*          | Device Address       | 5.5.21*        |                          | interface)       |
|               | Baud Rate            | 5.5.31*        |                          |                  |
|               | Parity               | 5.5.41*        |                          |                  |

## 9. Program List and Explanations

### 1 Messages

#### 1.1 Pending Errors

- 1.1.5 Provides the list of active errors with their status (active, acknowledged). If an active error is acknowledged, the alarm relay is active again. Cleared errors are moved to the Message list.

#### 1.2 Message List

- 1.2.1 Shows the error history: Error code, date / time of issue and status (active, acknowledged, cleared). 65 errors are memorized. Then the oldest error is cleared to save the newest error (circular buffer).

### 2 Diagnostics

In diagnostics mode, the values can only be viewed, not modified.

#### 2.1 Identification

**Desig.:** Designation of the instrument.

**Version:** Firmware of instrument (e.g. V6.20-06/16).

- 2.1.3 **Factory Test:** Test date of the Instrument and Motherboard.

- 2.1.4 **Operating Time:** Years / Days / Hours / Minutes / Seconds.

#### 2.2 Sensors

- 2.2.1 Trides Sensor:

*Current value:* Shows the current disinfectant measuring value in ppm

*Raw value 1:* Shows the actual sensor current in  $\mu\text{A}$ , without compensation of temperature (and pH).

*Raw value 2:* Shows the actual sensor current in  $\mu\text{A}$ , with compensation of temperature (and pH).

*Ref. voltage:* Shows the actual voltage of counter electrode (CE) in mV. Values for most applications are within 800 - 1300 mV.

- 2.2.1.5 *Cal. History:* Review the diagnostic values of the last calibrations. Number, Date, Time, Offset [ $\mu\text{A}$ ], Slope [ $\mu\text{A}$ ]

- 2.2.2 Electrode (only available if option pH/Redox is installed):

*Current value:* Shows the current pH value.

*Raw value:* Shows the current voltage of the pH electrode in mV.

- 2.2.3 **Miscellaneous:**

- 2.2.3.1 *Case Temp:* Shows the current temperature in [ $^{\circ}\text{C}$ ] inside the transmitter.

## 2.3 Sample

- 2.3.1** *Sample ID:* Shows the identification assigned to a sample. This identification is defined by the user to identify the location of the sample.  
*Temperature:* Shows the current temperature in °C and NT5K in Ohm.  
*Sample Flow:* Shows the current sample flow in rotations per minute (rpm)

## 2.4 I/O State

Shows current status of all in- and outputs.

### 2.4.1/2.4.2

- Alarm Relay:* Active or inactive  
*Relay 1 and 2:* Active or inactive  
*Input:* Open or closed  
*Signal Output 1 and 2:* Actual current in mA

## 2.5 Interface

Only available if optional interface is installed.  
Review programmed communication settings.

# 3 Maintenance

## 3.1 Calibration

- 3.1.1** *Process pH:* Only available if option pH is installed. The function Process pH is a calibration based on a comparative measurement of the current electrode with a calibrated comparative electrode. See [Process pH, p. 52](#).  
**3.1.2** *Standard pH:* Only available if option pH is installed. Performs a standard calibration (2-point calibration) with two standard solution of different pH. See [Standard pH, p. 53](#).  
**3.1.3** *Zero Trides:* Provides a zero adjustment of the Trides sensor. See [Zero Trides, p. 54](#).  
**3.1.4** *Process Trides:* The function Process Trides is a calibration based on a comparative measurement of the Trides sensor with a photometric measurement (eg. Swan Chematest). See [Process Trides, p. 54](#)

## 3.3 Simulation

To simulate a value or a relay state, select the

- ♦ alarm relay,
- ♦ relay 1 and 2
- ♦ signal output 1 and 2

with the [▲] or [▼] key.

Press the [Enter] key.  
Change the value or state of the selected item with the [▲] or [▼] key.  
Press the [Enter] key.  
⇒ *The value is simulated by the relay/signal output.*

|                               |                                               |
|-------------------------------|-----------------------------------------------|
| <i>Alarm Relay:</i>           | Active or inactive                            |
| <i>Relay 1 and 2:</i>         | Active or inactive                            |
| <i>Signal Output 1 and 2:</i> | Actual current in mA                          |
| <i>Signal Output 3:</i>       | Actual current in mA (if option is installed) |

At the absence of any key activities, the instrument will switch back to normal mode after 20 min. If you quit the menu, all simulated values will be reset.

### 3.4 Set Time

Adjust date and time.

## 4 Operation

### 4.10 Sensors

- 4.10.1 *Filter Time Constant:* Used to damp noisy signals. The higher the filter time constant, the slower the system reacts to changes of the measured value. Range: 5–300 Sec
- 4.10.2 *Hold after Cal.:* Delay permitting the instrument to stabilize again after calibration. During calibration plus hold-time, the signal outputs are frozen (held on last valid value), alarm values, limits are not active. Range: 0–6'000 Sec
- 4.10.3 *Default pH:* Used for pH compensation of free chlorine measurement if no pH electrode is connected and programmed. See chapter 2 for more details. For ozone, chlorine-dioxide, bromine, iodide, no pH compensation is necessary. Range: 0.00 - 14.00 pH

### 4.2 Relay Contacts

See [Relay Contacts, p. 31](#)

### 4.3 Logger

The instrument is equipped with an internal logger. The logger data can be copied to a PC with an USB stick if option USB interface is installed.

The logger can save approx. 1500 data records. The Records consists of: Date, time, alarms of all available measuring values.  
Range: 1 Second to 1 hour

- 4.4.1 *Log Interval:* Select a convenient log interval. Consult the table below to estimate the max logging time. When the logging buffer is full, the oldest data record is erased to make room for the newest one (circular buffer).

| Interval | 1 s    | 5 s | 1 min | 5 min | 10 min | 30 min | 1 h  |
|----------|--------|-----|-------|-------|--------|--------|------|
| Time     | 25 min | 2 h | 25 h  | 5 d   | 10 d   | 31 d   | 62 d |

- 4.4.2 *Clear Logger:* If confirmed with **yes**, the complete logger data is deleted. A new data series is started.

## 5 Installation

### 5.1 Sensors

- 5.1.1 *Type of Electrode:* If pH or Redox option is installed set the type of electrode according.
- 5.1.2 *pH Electrode:* If pH option is installed, set "pH Electrode" to <with>.
- 5.1.3 *Disinf.:* Set the disinfectant you want measure:
- ♦ Free chlorine
  - ♦ Hypochlorous acid
  - ♦ Ozone
  - ♦ Chlorine dioxide
  - ♦ Bromine
  - ♦ Iodine
  - ♦ Free + HOCl
- 5.1.4 *Dimension:* Set the dimension of the measured value either to ppm or mg/l.
- 5.1.5 **Standards:** If you want to use standard solutions different from the recommended SWAN standard solutions, enter the value of:
- 5.1.5.1 *Standard 1: Range: pH 1 to pH 13*
- 5.1.5.2 *Standard 2: Range: pH 1 to pH 13*

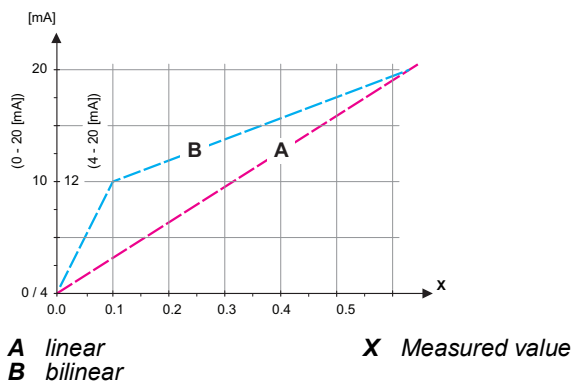
### 5.2 Signal Outputs

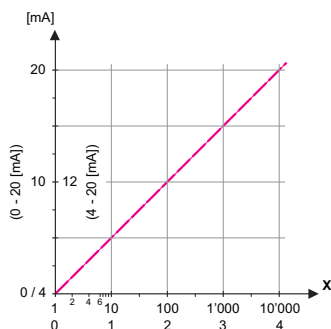
**Note:** The navigation in the menu <Signal Output 1> and <Signal Output 2> is equal. For reason of simplicity only the menu numbers of Signal Output 1 are used in the following.

5.2.1.1 **Parameter:** Assign one of the process values to the signal output.  
Available values:

- 5.2.1.2 **Current Loop:** Select the current range of the signal output. Make sure the connected device works with the same current range. Available ranges: 0–20 mA or 4–20 mA

- As process values** The process value can be represented in 3 ways: linear, bilinear or logarithmic. See graphs below.





**X** Measured value (logarithmic)

**5.2.1.40 Scaling:** Enter beginning and end point (Range low & high) of the linear or logarithmic scale. In addition, the midpoint for the bilinear scale.

**Parameter: DIS.**

Range low: 0.00–10.00 ppm

Range high: 0.00–10.00 ppm

**Parameter: pH/Redox**

Range low: -3.00 to + 15.00 pH

Range high: -3.00 to + 15.00 pH

**Parameter: Temperature**

Range low: -30 to + 120 °C

Range high: 30 to + 120 °C

**Parameter: Sample flow**

Range low: 0–600 rpm

Range high: 0–600 rpm

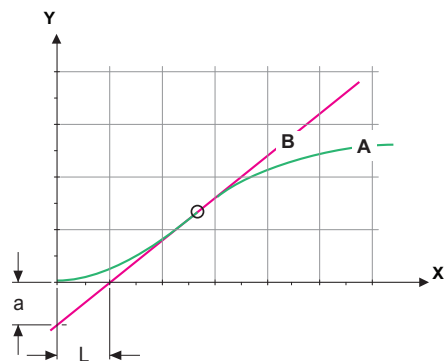
**As control output**

Signal outputs can be used for driving control units. We distinguish different kinds of controls:

- ♦ *P-controller*: The controller action is proportional to the deviation from the setpoint. The controller is characterized by the P-Band. In the steady-state, the setpoint will never be reached. The deviation is called steady-state error.  
Parameters: setpoint, P-Band
- ♦ *PI-controller*: The combination of a P-controller with an I-controller will minimize the steady-state error. If the reset time is set to zero, the I-controller is switched off.  
Parameters: setpoint, P-Band, reset time.
- ♦ *PD-controller*: The combination of a P-controller with a D-controller will minimize the response time to a fast change of the process value. If the derivative time is set to zero, the D-controller is switched off.  
Parameters: setpoint, P-Band, derivative time.
- ♦ *PID-controller*: The combination of a P-, an I- and a D-controller allows a proper control of the process.  
Parameters: setpoint, P-Band, reset time, derivative time.

Ziegler-Nichols method for the optimization of a PID controller:

**Parameters:** Setpoint, P-Band, Reset time, Derivative time



**A** Response to maximum control output     $X_p = 1.2/a$   
**B** Tangent on the inflection point         $T_n = 2L$   
**X** Time                                             $T_v = L/2$

The point of intersection of the tangent with the respective axis will result in the parameters a and L. Consult the manual of the control unit for connecting and programming details.

### Control upwards or downwards.

*Setpoint:* User defined precess value for the selected parameter.

*P-Band:* Range below (upwards control) or above (downwards control) the set-point, within which the dosing intensity is reduced from 100% to 0% to reach the set-point without overshooting.

- 5.2.1.43 Control Parameters:** if Parameter = DIS.
- 5.2.1.43.10 Setpoint:  
Range: 0.00 – 10.00 ppm
- 5.2.1.43.20 P-Band:  
Range: 0.00 – 10.00 ppm
- 5.2.1.43 Control Parameters:** if Parameter = pH/Redox
- 5.2.1.43.11 Setpoint:  
Range: -3.00 to + 15.00 pH
- 5.2.1.43.21 P-Band:  
Range: 0.00 – 2.00 pH
- 5.2.1.43 Control Parameters:** if Parameter = Temperature
- 5.2.1.43.12 Setpoint:  
Range: -30 to + 120 °C
- 5.2.1.43.22 P-Band:  
Range: 0.00 – 100 °C
- 5.2.1.43 Control Parameters:** if Parameter = Sample flow
- 5.2.1.43.13 Setpoint:  
Range: 0 – 600 rpm
- 5.2.1.43.23 P-Band:  
Range: 0 – 600 rpm

*Reset time:* The reset time is the time till the step response of a single I-controller will reach the same value as it will be suddenly reached by a P-controller.

Range: 0 – 9'000 sec

*Derivative time:* The derivative time is the time till the ramp response of a single P-controller will reach the same value as it will be suddenly reached by a D-controller.

Range: 0 – 9'000 sec

*Control timeout:* If a controller action (dosing intensity) is constantly over 90% during a defined period of time and the process value does not come closer to the setpoint, the dosing process will be stopped for safety reasons.

Range: 0 – 720 min

## 5.3 Relay Contacts

- 5.3.1 Alarm Relay:** The alarm relay is used as cumulative error indicator. Under normal operating conditions the contact is active.

The contact is inactive at:

- ♦ Power loss
- ♦ Detection of system faults like defective sensors or electronic parts
- ♦ High case temperature
- ♦ Process values out of programmed ranges.

Program alarm levels, hysteresis values and delay times for the following parameters:

- ♦ Alarm DIS.
- ♦ Alarm pH
- ♦ Sample Flow
- ♦ Sample Temp.
- ♦ Case Temperature high
- ♦ Case Temperature low

### **5.3.1.1 Alarm DIS.**

- 5.3.1.1.1 Alarm High:** If the measured value rises above the alarm high value, the alarm relay is activated and E001, is displayed in the message list.

Range: 0–10 ppm

- 5.3.1.1.25 Alarm Low:** If the measured value falls below the alarm low value, the alarm relay is activated and E002 is displayed in the message list.

Range: 0–10 ppm

- 5.3.1.1.35 Hysteresis:** Within the hyst. range, the relay does not switch. This prevents damage of relays contacts when the measured value fluctuates around the alarm value.

Range: 0–10 ppm

- 5.3.1.1.45 Delay:** Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.

Range: 0–28'800 Sec

### **5.3.1.2 Alarm pH**

- 5.3.1.2.1 Alarm High:** If the measured value rises above the alarm high value, the alarm relay is activated and E003, is displayed in the message list.

Range: -3.00 to + 15.00 pH

- 5.3.1.2.25 Alarm Low:** If the measured value falls below the alarm low value, the alarm relay is activated and E004 is displayed in the message list.

Range: -3.00 to + 15.00 pH

- 5.3.1.2.35 *Hysteresis*: Within the hyst. range, the relay does not switch. This prevents damage of relays contacts when the measured value fluctuates around the alarm value.  
Range: 0–2 pH
- 5.3.1.2.45 *Delay*: Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.  
Range: 0–28'800 Sec
- 5.3.1.3 Sample Flow**: Define at which sample flow an alarm should be issued.
- 5.3.1.3.1 *Flow Alarm*: Program if the alarm relay should be activated if there is a flow alarm. Choose between yes or no. The flow alarm will always be indicated in the display, pending error list, saved in the message list and the logger.  
Available values: Yes or no
- Note: Sufficient flow is essential for a correct measurement.  
We recommend to program yes.*
- 5.3.1.3.2 *Alarm High*: If the measuring values rises above the programmed value E009 will be issued.  
Range: 400–9000 rpm
- 5.3.1.3.35 *Alarm Low*: If the measuring values falls below the programmed value E010 will be issued.  
Range: 200–350 rpm
- 5.3.1.3.45 *Delay*: Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.  
Range: 0–28'800 Sec
- 5.3.1.4 Sample Temp**
- 5.3.1.4.1 *Alarm High*: If the measured value rises above the alarm high value, the alarm relay is activated and E003, is displayed in the message list.  
Range: 30–70 °C
- 5.3.1.4.25 *Alarm Low*: If the measured value falls below the alarm low value, the alarm relay is activated and E004 is displayed in the message list.  
Range: 0–20 °C
- 5.3.1.5 Case Temp. high**: Set the alarm high value for temperature of electronics housing. If the value rises above the programmed value E013 is issued.  
Range: 30–75 °C

- 5.3.1.6** *Case Temp. low:* Set the alarm low value for temperature of electronics housing. If the value falls below the programmed value E014 is issued.  
 Range: -10–20 °C

- 5.3.2 and 5.3.3** **Relay 1 and 2:** The contacts can be set as normally open or normally closed with a jumper, see [Relay 1 and 2, p. 32](#). The function of relay contacts 1 or 2 are defined by the user.

**Note:** *The navigation in the menu <Relay 1> and <Relay 2> is equal. For reason of simplicity only the menu numbers of Relay 1 are used in the following.*

- 1** First select the functions as:
  - Limit upper/lower,
  - Control upwards/downwards,
  - Timer
  - Fieldbus,
- 2** Then enter the necessary data depending on the selected function. The same values may also be entered in menu [4.2 Relay Contacts, p. 71](#)

- 5.3.2.1** Function = Limit upper/lower:

When the relays are used as upper or lower limit switches, program the following:

- 5.3.2.20** *Parameter:* choose one of the following process values
- ♦ DIS.
  - ♦ pH/Redox
  - ♦ Temperature
  - ♦ Sample Flow

- 5.3.2.300** *Setpoint:* If the measured value rises above respectively falls below the set-point, the relay is activated.

| Parameter   | Range              |
|-------------|--------------------|
| DIS         | 0.00–10 ppm        |
| pH/Redox    | -3.00 to +15.00 pH |
| Temperature | -30 °C to +120 °C  |
| Sample Flow | 0–600 rpm          |

- 5.3.2.400 *Hysteresis*: within the hysteresis range, the relay does not switch. This prevents damage of relay contacts when the measured value fluctuates around the alarm value.

| Parameter   | Range       |
|-------------|-------------|
| DIS         | 0.00–10 ppm |
| pH/Redox    | 0–2 pH      |
| Temperature | 0–120 °C    |
| Sample Flow | 0–600 rpm   |

- 5.3.2.50 *Delay*: Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.  
Range. 0–600 Sec

5.3.2.1 Function = Control upwards/downwards::

The relays may be used to drive control units such as solenoid valves, membrane dosing pumps or motor valves. When driving a motor valve both relays are needed, relay 1 to open and relay 2 to close the valve.

- 5.3.2.22 *Parameter*: choose one of the following process values
- ♦ DIS.
  - ♦ pH/Redox
  - ♦ Temperature
  - ♦ Sample Flow

5.3.2.32 **Settings**

Choose the respective actuator:

- ♦ Time proportional
- ♦ Frequency,
- ♦ Motor valve

Actuator = Time proportional

Examples of metering devices that are driven time proportional are solenoid valves, peristaltic pumps.

Dosing is controlled by the operating time.

- 5.3.2.32.20 *Cycle time*: duration of one control cycle (on/off change).  
Range: 0–600 sec.

- 5.3.2.32.30 *Response time*: Minimal time the metering device needs to react.  
Range: 0–240 sec.

**5.3.2.32.4 Control Parameters:**

Range for each Parameter same as [5.2.1.43, p. 76](#)

Actuator = Frequency

Examples of metering devices that are pulse frequency driven are the classic membrane pumps with a potential free triggering input. Dosing is controlled by the repetition speed of dosing shots.

5.3.2.32.21 *Pulse frequency:* Max. pulses per minute the device is able to respond to. Range: 20–300/min.

**5.3.2.32.31 Control Parameters:**

Range for each Parameter same as [5.2.1.43, p. 76](#)

Actuator = Motor valve

Dosing is controlled by the position of a motor driven mixing valve.

5.3.2.32.22 *Run time:* Time needed to open a completely closed valve  
 Range: 5–300 Sec.

5.3.2.32.32 *Neutral zone:* Minimal response time in % of the runtime. If the requested dosing output is smaller than the response time, no change will take place.  
 Range: 1–20 %

**5.3.2.32.4 Control Parameters:**

Range for each Parameter same as [5.2.1.43, p. 76](#)

5.3.2.1 Function = Timer

The relay will be activated repetitively depending on the programmed time scheme.

5.3.2.24 *Mode:* Operating mode (interval, daily, weekly)

5.3.2.24 *Interval*

5.3.2.340 *Interval:* The interval can be programmed within a range of 1–1'440 min.

5.3.2.44 *Run Time:* Enter the time the relay stays active.  
 Range: 5–32'400 Sec.

5.3.2.54 *Delay:* during run time plus the delay time the signal and control outputs are held in the operating mode programmed below.  
 Range: 0–6'000 Sec.

- 5.3.2.6 **Signal Outputs:** Select operating mode of the signal output:
- Cont.:* Signal outputs continue to issue the measured value.
- Hold:* Signal outputs hold the last valid measured value. Measurement is interrupted. Errors, except fatal errors, are not issued.
- Off:* Signal outputs are switched off (set to 0 or 4 mA). Errors, except fatal errors, are not issued.

- 5.3.2.7 **Output/Control:** Select operating mode of the controller output:
- Cont.:* Controller continues normally.
- Hold:* Controller continues based on the last valid value.
- Off:* Controller is switched off.

#### 5.3.2.24 **daily**

The relay contact can be activated daily, at any time of a day.

- 5.3.2.341 **Start time:** to set the start time proceed as follows:

- 1 Press [Enter], to set the hours.
- 2 Set the hour with the [▲] or [▼] keys.
- 3 Press [Enter], to set the minutes.
- 4 Set the minutes with the [▲] or [▼] keys.
- 5 Press [Enter], to set the seconds.
- 6 Set the seconds with the [▲] or [▼] keys.

Range: 00:00:00–23:59:59

- 5.3.2.44 **Run Time:** see Interval

- 5.3.2.54 **Delay:** see Interval

- 5.3.2.6 **Signal Outputs:** see Interval

- 5.3.2.7 **Output/Control:** see Interval

#### 5.3.2.24 **weekly**

The relay contact can be activated at one or several days, of a week. The daily starting time is valid for all days.

#### **5.3.2.342 Calendar:**

- 5.3.2.342.1 **Start time:** The programmed start time is valid for each of the programmed days. To set the start time see [5.3.2.341, p. 82](#).

Range: 00:00:00–23:59:59

5.3.2.342.2 *Monday*: Possible settings, on or off to

5.3.2.342.8 *Sunday*: Possible settings, on or off

5.3.2.44 *Run Time*: see Interval

5.3.2.54 *Delay*: see Interval

5.3.2.6 *Signal Outputs*: see Interval

5.3.2.7 *Output/Control*: see Interval

#### 5.3.2.1 Function = Fieldbus

The relay will be switched via the Profibus input. No further parameters are needed.

**5.3.4 Input:** The functions of the relays and signal outputs can be defined depending on the position of the input contact, i.e. no function, closed or open.

5.3.4.1 *Active*: Define when the input should be active:

*No*: Input is never active.

*When closed* Input is active if the input relay is closed

*When open*: Input is active if the input relay is open

5.3.4.2 *Signal Outputs*: Select the operation mode of the signal outputs when the relay is active:

*Cont.:* Signal outputs continue to issue the measured value.

*Hold*: Signal outputs issue the last valid measured value. Measurement is interrupted. Errors, except fatal errors, are not issued.

*Off*: Set to 0 or 4 mA respectively. Errors, except fatal errors, are not issued.

5.3.4.3 *Output/Control*: (relay or signal output):

*Cont.:* Controller continues normally.

*Hold*: Controller continues on the last valid value.

*Off*: Controller is switched off.

- 5.3.4.4 *Fault:*
- No:* No message is issued in pending error list and the alarm relay does not close when input is active. Message E024 is stored in the message list.
- Yes:* Message E024 is issued and stored in the message list. The Alarm relay closes when input is active.
- 5.3.4.5 *Delay:* Time which the instrument waits, after the input is deactivated, before returning to normal operation.  
Range: 0–6'000 Sec

## 5.4 Miscellaneous

- 5.4.1 *Language:* Set the desired language.  
Available settings: German /English/French/Spanish/Italian
- 5.4.2 *Set defaults:* Reset the instrument to factory default values in three different ways:
- ♦ **Calibration:** Sets calibration values back to default. All other values are kept in memory.
  - ♦ **In parts:** Communication parameters are kept in memory. All other values are set back to default values.
  - ♦ **Completely:** Sets back all values including communication parameters.
- 5.4.3 *Load Firmware:* Firmware updates should be done by instructed service personnel only.
- 5.4.4 **Password:** Select a password different from 0000 to prevent unauthorized access to the menus “Messages”, “Maintenance”, “Operation” and “Installation”.  
Each menu may be protected by a *different* password.  
If you forgot the passwords, contact the closest SWAN representative.
- 5.4.5 *Sample ID:* Identify the process value with any meaning full text, such as KKS number.
- 5.4.6 *Line Break Detection:* Define if message E028 should be issued in case of a line break on signal output 1 or 2.  
Choose between <Yes> or <No>.

## 5.5 Interface

Select one of the following communication protocols. Depending on your selection, different parameters must be defined.

### 5.5.1 *Protocol:* **Profibus**

- 5.5.20 Device address: Range: 0–126
- 5.5.30 ID-Nr.: Range: Analyzer; Manufacturer; Multivariable
- 5.5.40 Local operation: Range: Enabled, Disabled

### 5.5.1 *Protocol:* **Modbus RTU**

- 5.5.21 Device address: Range: 0–126
- 5.5.31 Baud Rate: Range: 1200–115 200 Baud
- 5.5.41 Parity: Range: none, even, odd

### 5.5.1 *Protocol:* **USB-Stick**

Only visible if an USB interface is installed. No further settings are possible.

### 5.5.1 *Protocol:* **HART**

- Device address: Range: 0–63

## 10. Material Safety Data sheets

### 10.1. Reagents

- ♦ Calibration Solution pH 4
- ♦ Calibration Solution pH 7
- ♦ Calibration Solution pH 9

**Download  
MSDS**

The current Material Safety Data Sheets (MSDS) for the above listed Reagents are available for downloading at **[www.swan.ch](http://www.swan.ch)**.

## 11. Default Values

### Operation:

|                |                           |                         |
|----------------|---------------------------|-------------------------|
| Sensors:       | Filter Time Const.: ..... | 30 s                    |
|                | Hold after Cal.: .....    | 300 s                   |
|                | Default pH: .....         | 7.00 pH                 |
| Relay Contacts | Alarm Relay .....         | same as in Installation |
|                | Relay 1/2 .....           | same as in Installation |
|                | Input: .....              | same as in Installation |
| Logger:        | Logger Interval: .....    | 30 min                  |
|                | Clear Logger: .....       | no                      |

### Installation:

|                 |                            |               |
|-----------------|----------------------------|---------------|
| Sensors         | Type of Electrode: .....   | pH            |
|                 | pH Electrode .....         | without       |
|                 | Disinf. ....               | Free chlorine |
|                 | Dimension: .....           | ppm           |
|                 | Standards:                 |               |
|                 | Standard 1 .....           | 7.00 pH       |
| Signal Output 1 | Standard 2 .....           | 9.00 pH       |
|                 | Parameter: .....           | DIS           |
|                 | Current loop: .....        | 4 – 20 mA     |
|                 | Function: .....            | linear        |
|                 | Scaling: Range low: .....  | 0.000 ppm     |
| Signal Output 2 | Scaling: Range high: ..... | 10.00 ppm     |
|                 | Parameter: .....           | Temperature   |
|                 | Current loop: .....        | 4 – 20 mA     |
|                 | Function: .....            | linear        |
|                 | Scaling: Range low: .....  | 0.0 °C        |
| Alarm Relay:    | Scaling: Range high: ..... | 50.0 °C       |
|                 | Alarm DIS:                 |               |
|                 | Alarm high: .....          | 10.00 ppm     |
|                 | Alarm low: .....           | 0.000 ppm     |
|                 | Hysteresis: .....          | 0.10 ppm      |
|                 | Delay: .....               | 5 s           |
|                 | Alarm pH:                  |               |
|                 | Alarm high: .....          | 14.00 pH      |
|                 | Alarm low: .....           | 0.00 pH       |
|                 | Hysteresis: .....          | 0.10 pH       |
|                 | Delay: .....               | 5 s           |

|           |                                                      |                         |
|-----------|------------------------------------------------------|-------------------------|
|           | Sample Flow:                                         |                         |
|           | Flow Alarm.....                                      | yes                     |
|           | Alarm high: .....                                    | 500 rpm                 |
|           | Alarm low: .....                                     | 290 rpm                 |
|           | Delay .....                                          | 5 s                     |
|           | Sample Temp:                                         |                         |
|           | Alarm High: .....                                    | 55 °C                   |
|           | Alarm Low: .....                                     | 5 °C                    |
|           | Case temp. high: .....                               | 65 °C                   |
|           | Case temp. low: .....                                | 0 °C                    |
| Relay 1/2 | Function: .....                                      | limit upper             |
|           | Parameter: .....                                     | DIS.                    |
|           | Setpoint: .....                                      | 5.00 ppm                |
|           | Hysteresis: .....                                    | 0.10 ppm                |
|           | Delay: .....                                         | 30 s                    |
|           | <b>If Function = Control upw. or dnw:</b>            |                         |
|           | Parameter: .....                                     | DIS.                    |
|           | Settings: Actuator: .....                            | Frequency               |
|           | Settings: Pulse Frequency: .....                     | 120/min                 |
|           | Settings: Control Parameters: Setpoint: .....        | 5.00 ppm                |
|           | Settings: Control Parameters: P-band: .....          | 0.10 ppm                |
|           | Settings: Control Parameters: Reset time: .....      | 0 s                     |
|           | Settings: Control Parameters: Derivative Time: ..... | 0 s                     |
|           | Settings: Control Parameters: Control Timeout: ..... | 0 min                   |
|           | Settings: Act. Time prop.: Cycle time: .....         | 60 s                    |
|           | Settings: Act. Time prop.: Response time: .....      | 10 s                    |
|           | Settings: Act. Motor valve: Run time: .....          | 60 s                    |
|           | Settings: Act. Motor valve: Neutral zone: .....      | 5%                      |
|           | <b>If Function = Timer:</b>                          |                         |
|           | Mode: Interval: .....                                | 1 min                   |
|           | Mode: daily/weekly: .....                            | Starting time: 00.00.00 |
|           | Run time: .....                                      | 10 s                    |
|           | Delay: .....                                         | 5 s                     |
|           | Signal output: .....                                 | cont.                   |
|           | Output/Control: .....                                | cont.                   |
| Input:    | Active: .....                                        | when closed             |
|           | Signal Outputs .....                                 | hold                    |
|           | Output/Control .....                                 | off                     |
|           | Fault: .....                                         | no                      |
|           | Delay .....                                          | 10 s                    |

---

|               |                            |                    |
|---------------|----------------------------|--------------------|
| Miscellaneous | Language:.....             | English            |
|               | Set default:.....          | no                 |
|               | Load firmware: .....       | no                 |
|               | Password: .....            | for all modes 0000 |
|               | Sample ID: .....           | - - - - -          |
|               | Line break detection ..... | no                 |



## 12. Index

|                                    |        |  |
|------------------------------------|--------|--|
| <b>A</b>                           |        |  |
| Alarm Relay . . . . .              | 12, 31 |  |
| Application . . . . .              | 11     |  |
| Application Range . . . . .        | 11     |  |
| <b>C</b>                           |        |  |
| Cable thicknesses . . . . .        | 27     |  |
| Calendar . . . . .                 | 82     |  |
| Changing values . . . . .          | 42     |  |
| Checklist . . . . .                | 20     |  |
| Cleaning                           |        |  |
| Flow Cell . . . . .                | 50     |  |
| pH Electrode . . . . .             | 49     |  |
| Reference Electrode . . . . .      | 48     |  |
| Trides protective filter . . . . . | 45     |  |
| Trides sensor . . . . .            | 46     |  |
| Clear Logger . . . . .             | 72     |  |
| Connect                            |        |  |
| Sample inlet. . . . .              | 21     |  |
| Waste . . . . .                    | 21     |  |
| Control timeout. . . . .           | 76     |  |
| <b>D</b>                           |        |  |
| Default pH . . . . .               | 71     |  |
| Default Values . . . . .           | 87     |  |
| Derivative time . . . . .          | 76     |  |
| <b>E</b>                           |        |  |
| Error List . . . . .               | 57     |  |
| <b>F</b>                           |        |  |
| Filter Time Constant. . . . .      | 71     |  |
| Flow . . . . .                     | 50     |  |
| Fluidics . . . . .                 | 15     |  |
| free chlorine . . . . .            | 13     |  |
| <b>G</b>                           |        |  |
| Grab sample. . . . .               | 14     |  |
| <b>H</b>                           |        |  |
| HART. . . . .                      | 36     |  |
| Hold after Cal . . . . .           | 71     |  |
| Hypochlorous acid . . . . .        | 14     |  |
| <b>I</b>                           |        |  |
| Input . . . . .                    | 12, 31 |  |
| Instrument Overview . . . . .      | 19     |  |
| Interface . . . . .                | 12     |  |
| HART . . . . .                     | 36     |  |
| Modbus . . . . .                   | 35     |  |
| Profibus. . . . .                  | 35     |  |
| USB . . . . .                      | 36     |  |
| <b>L</b>                           |        |  |
| Log Interval . . . . .             | 72     |  |
| <b>M</b>                           |        |  |
| Measuring principle. . . . .       | 13     |  |
| Modbus . . . . .                   | 35     |  |
| Mounting                           |        |  |
| Instrument panel. . . . .          | 21     |  |
| Mounting requirements . . . . .    | 21     |  |
| <b>O</b>                           |        |  |
| On-line operation . . . . .        | 14     |  |
| On-site requirements . . . . .     | 20     |  |
| <b>P</b>                           |        |  |
| P-Band . . . . .                   | 76     |  |
| Power Supply . . . . .             | 16, 30 |  |
| Profibus . . . . .                 | 36     |  |

|                                   |               |  |
|-----------------------------------|---------------|--|
| <b>R</b>                          |               |  |
| Relays . . . . .                  | 11            |  |
| Requirements, on-site . . . . .   | 16            |  |
| Reset time . . . . .              | 76            |  |
| <b>S</b>                          |               |  |
| Safety Features . . . . .         | 12            |  |
| Sample ID . . . . .               | 70            |  |
| Sample requirements . . . . .     | 16            |  |
| Set Time . . . . .                | 71            |  |
| Setpoint . . . . .                | 76            |  |
| Setup . . . . .                   | 37            |  |
| Signal Outputs . . . . .          | 11, 34        |  |
| Simulation . . . . .              | 70            |  |
| Software . . . . .                | 41            |  |
| Standard pH Calibration . . . . . | 53            |  |
| System, Description of . . . . .  | 11            |  |
| <b>T</b>                          |               |  |
| Technical Data . . . . .          | 17            |  |
| Terminals . . . . .               | 29, 31–32, 35 |  |
| Type of Electrode . . . . .       | 72            |  |
| <b>U</b>                          |               |  |
| USB Interface . . . . .           | 36            |  |
| <b>W</b>                          |               |  |
| Wire . . . . .                    | 27            |  |



## 13. Notes

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