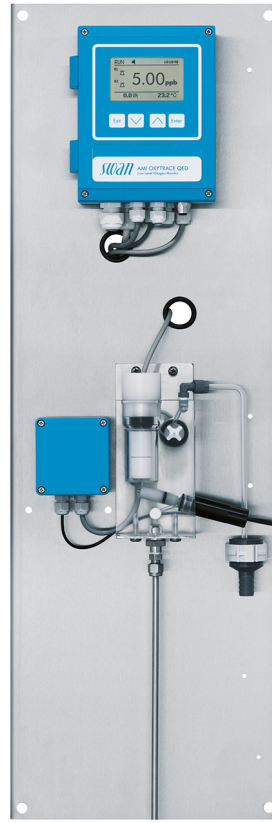
ANALYTICAL INSTRUMENTS

A-96.250.531 / 220121

Operator's Manual

Firmware V6.20 and higher



SWISS MADE

AMI Oxytrace

Customer Support

Swan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact your nearest Swan representative, or the manufacturer:

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01	Nov. 2008	Added AMI Oxytrace QED
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Table of Contents

AMI Oxytrace – Operator's Manual

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

1. Safety Instructions

General

The instructions included in this section explain the potential risks associated with instrument operation and provide important safety practices designed to minimize these risks.
If you carefully follow the information contained in this section, you can protect yourself from hazards and create a safer work environment.
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.

Target audience

Operator: Qualified person who uses the equipment for its intended purpose.
Instrument operation requires thorough knowledge of applications, instrument functions and software program as well as all applicable safety rules and regulations.

OM Location

Keep the AMI Operator's Manual in proximity of the instrument.

Qualification, Training

To be qualified for instrument installation and operation, you must:

- read and understand the instructions in this manual as well as the Material Safety Data Sheets.
- know the relevant safety rules and regulations.

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.

2. Product Description

This manual describes the functions of the following monitors

- AMI Oxytrace
- AMI Oxytrace QED

Both monitors are mainly identical except that AMI Oxytrace QED includes a faraday verification.

2.1. Description of the System

Application

AMI Oxytrace is used to measure low levels of oxygen in high-purity water. Especially in power plant water cycles (e.g. feedwater), a very low level of oxygen is needed to prevent corrosion.

Measuring principle

Clark principle:

The sensor consists of one noble metal electrode (e.g. platinum or gold), a reference electrode (mostly Ag/AgCl) and optionally a metal guard electrode.

The Clark-type electrode is the most widely used oxygen sensor for measuring oxygen dissolved in a liquid. The basic principle is that there is a cathode and an anode submersed in an electrolyte and a voltage is applied between the two parts. Oxygen enters the sensor through a permeable membrane by diffusion, and is reduced at the cathode according to

$O_2 + 4e^- + 2\ H_2O \dashrightarrow 4\ OH^-$

This reaction creates a measurable current. There is a linear correlation between the oxygen concentration and the electrical current.

The guard electrode is on the same voltage level as the cathode but there is no current measurement. Oxygen which diffuses from the electrolyte to the cathode is consumed by the guard electrode. As a consequence, residual oxygen in the electrolyte will no more disturb the measurement signal and the response time to low oxygen levels will be shorter.

Temperature compensation

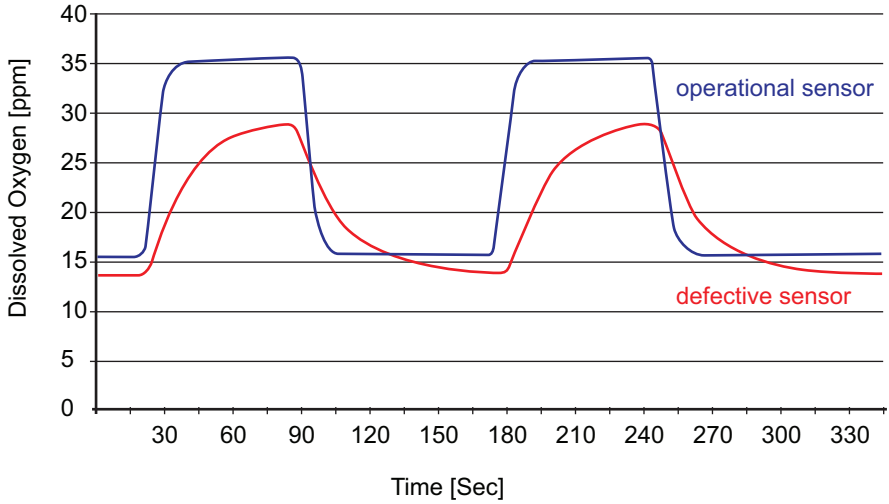
The measuring signal depends on temperature, but is automatically compensated to 25 °C. The sample temperature is determined continuously by a temperature sensor inside the oxygen electrode.

Faraday Verification

For AMI Oxytrace QED only.

When a direct current is passed through water by means of two electrodes, electrolysis of the liquid takes place, according to the laws of Michael Faraday. Water is converted to molecular oxygen and hydrogen.

Thus, by controlling the current, a fixed, known amount of oxygen, which is independent of temperature and pressure, may be generated. If the sample flow is known, an exact oxygen concentration increment can be generated at low levels. This increment is used to verify the flawless operation of the whole system. Thereby the response characteristics (incremental change and response time) of the sensor are taken into account. Sensor failures (loss of electrolyte etc.) can be detected very easily as shown in the plot below.



Unusual sensor performance is recognized immediately and gives also a maintenance indication to the operator/user. The faraday verification is therefore an excellent QA/QC tool.

Signal Outputs

Two signal outputs programmable for measured values (freely scaleable, linear or bilinear) or as continuous control output (control parameters programmable).

Current loop: 0/4–20 mA

Maximal burden: 510 Ω

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).

Relay

Two potential-free contacts programmable as limit switches for measuring values, controllers or timer for system cleaning with automatic hold function. Both contacts can be used as normally open or normally closed.

Maximum load: 1 A/250 VAC

Alarm Relay

One potential-free contact.

Alternatively:

- Open during normal operation, closed on error and loss of power.
- Closed during normal operation, open on error and loss of power.

Summary alarm indication for programmable alarm values and instrument faults.

Input

For potential-free contact to freeze the measuring value or to interrupt control in automated installations (hold function or remote-off)

Safety Features

No data loss after power failure. All data is saved in non-volatile memory. Over voltage protection of in- and outputs.Galvanic separation of measuring inputs and signal outputs.The analyzer is factory tested and ready for installation and operation.

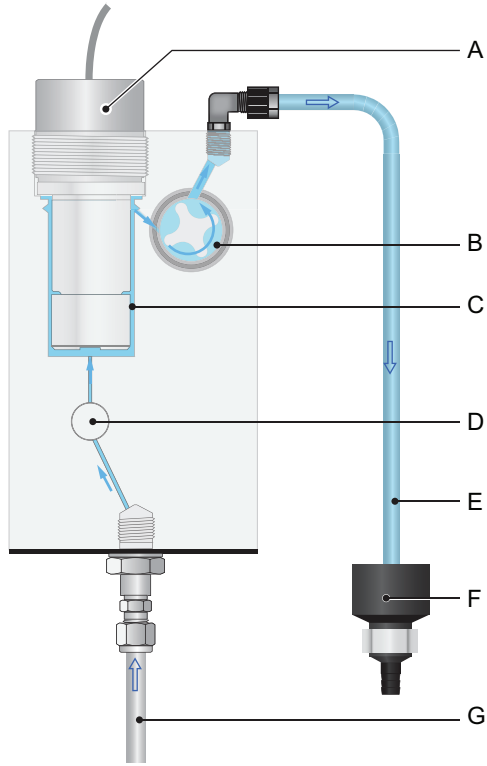
Communication Interface (optional)

- USB Interface for logger download
- Third signal output (can be used in parallel to the USB interface)
- RS485 with Fieldbus protocol Modbus or Profibus DP.
- HART interface

Fluidics AMI Oxytrace

Swansensor oxygen combined with QV-flow PMMA OTG flow cell. The sample flows via sample inlet [G] through the flow regulating valve [D], where the flow rate can be adjusted. Then the sample flows into the measuring cell [C] were the Oxygen concentration and temperature of the sample is measured.

The sample leaves the measuring cell via flow sensor [B] through the sample outlet [E] and the drain funnel [F].

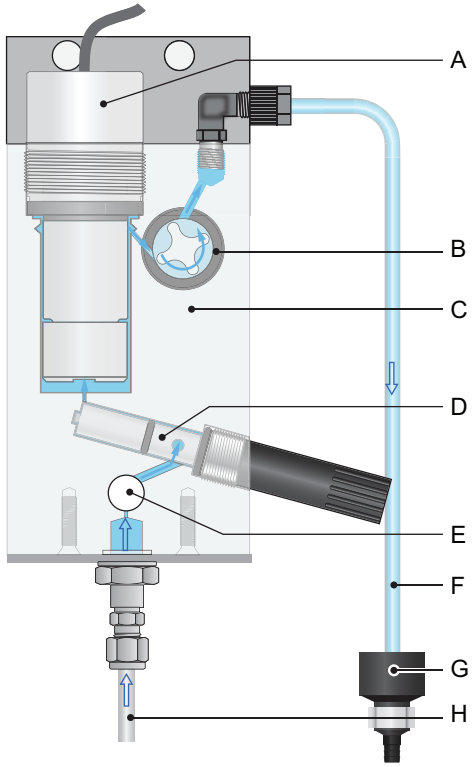


A *Oxygen sensor*
B *Flow sensor*
C *Flow cell*
D *Flow regulating valve*
E *Sample outlet*
F *Drain funnel*
G *Sample inlet*

Fluidics AMI Oxytrace QED

Swansensor oxygen combined with QV-flow PMMA OTG flow cell. The sample flows via sample inlet [H] through the flow regulating valve [E], where the flow rate can be adjusted. Then the sample flows through the faraday electrode [D] into the measuring cell [C] were the Oxygen concentration of the sample is measured.

The sample leaves the measuring cell via flow sensor [B] through the sample outlet [F] and the drain funnel [G].

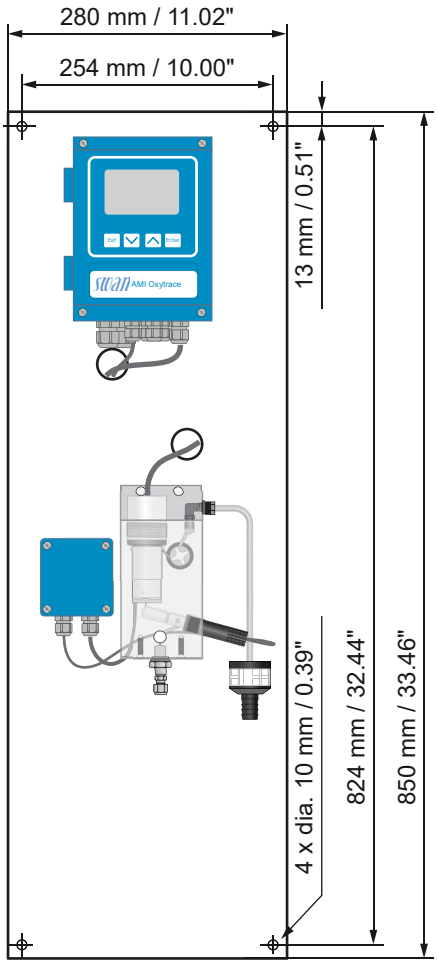


A *Oxygen sensor*
B *Flow sensor*
C *Flow cell*
D *Faraday electrode*
E *Flow regulating valve*
F *Sample outlet*
G *Drain funnel*
H *Sample inlet*

2.2. Technical Data

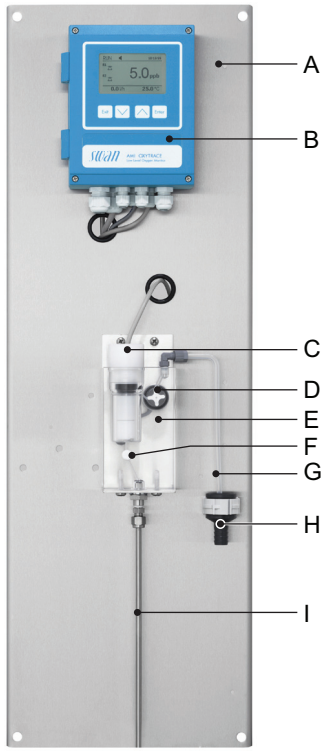
Power Supply	AC variant:	100–240 VAC (±10%) 50/60 Hz (±5%)
	DC variant:	10–36 VDC
	Power consumption:	max. 35 VA
Transmitter specifications	Aluminum with a protection degree of IP 66 / NEMA 4X	
	Ambient temperature:	-10 to +50 °C
	Storage and transport:	-30 to +85 °C
	Humidity:	10–90% rel., non condensing
	Display:	backlit LCD, 75 x 45 mm
Sample requirements	Flow rate:	8–25 l/h
	Temperature:	15–45 °C
	Inlet pressure:	0.2 to 1 bar
	Outlet pressure	pressure free
	pH:	not lower than pH 4
	Suspended solids:	less than 10 ppm
On-Site requirements	Sample inlet:	Swagelok connection for stainless steel tube 1/4”.
	Sample outlet:	15x20 mm (1/2”) hose nozzle which must end in a pressure free waste of sufficient capacity.
Accuracy	±1.5% of measured value or ±0.2 ppb	
Reproducibility	±1% of measured value or ±0.15 ppb	
Temperature Measurement Range	up to 60 °C Resolution: 0.1 °C	

Dimensions (Oxytrace and Oxytrace QED)	Panel:	Stainless steel
	Dimensions:	280x850x150 mm
	Screws:	8 mm diameter
	Weight:	12.0 kg



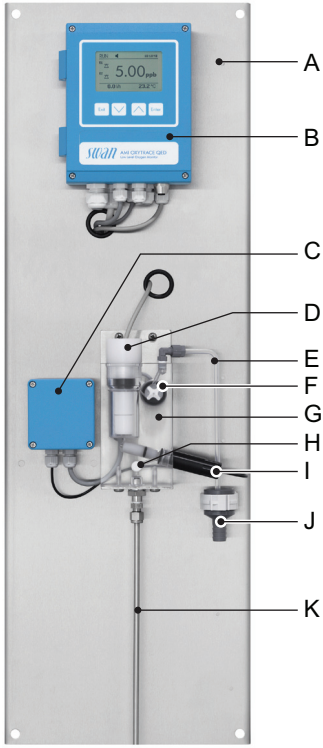
2.3. Instrument Overview

AMI Oxytrace



A *Panel*
B *AMI Transmitter*
C *Oxygen sensor*
D *Flow sensor*
E *Flow cell*
F *Flow regulating valve*
G *Sample outlet*
H *Drain funnel*
I *Sample inlet*

AMI Oxytrace QED

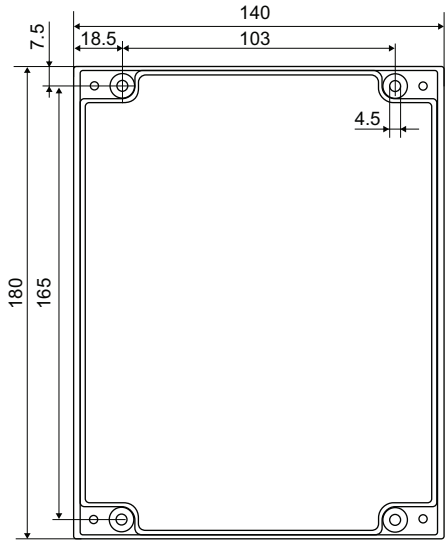


A *Panel*
B *AMI Transmitter*
C *Faraday control unit*
D *Oxygen sensor*
E *Sample outlet*
F *Flow sensor*
G *Flow cell*
H *Flow regulating valve*
I *Faraday electrode*
J *Drain funnel*
K *Sample inlet*

2.4. Single Components

2.4.1 AMI Oxytrace Transmitter

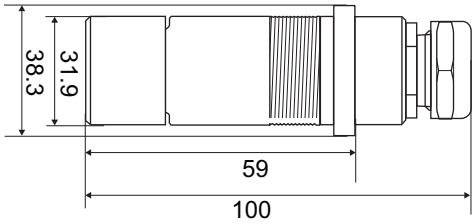
Electronic transmitter and controller for oxygen measurement.



Dimensions	Width:	140 mm
	Height:	180 mm
	Depth:	70 mm
	Weight:	1.5 kg
Specifications	Electronics case:	Cast aluminum
	Protection degree:	IP 66 / NEMA 4X
	Display:	backlit LCD, 75 x 45 mm
	Electrical connectors:	screw clamps

2.4.2 Sensor OXYTRACE G

Sensor for the measurement of dissolved oxygen in ultra pure water. Precise oxygen measuring cell with integrated temperature sensor and guard electrode for faster initial response time after maintenance.



Technical data : Clark oxygen electrode
Cathode gold, anode silver, guard silver
Zero current-free electrode system
Robust 25 µm fluoropolymer diaphragm

Measuring range : 0–20 ppm O_2 (25 °C)
Automatic range switching

Range	Resolution
0.1–9.99 ppb	0.01 ppb
10–199.9 ppb	0.1 ppb
200–1999 ppb	1.0 ppb
2–20 ppm	0.01 ppm
0 – 200% saturation	

Temp. sensor : NT5K

Accuracy : 0,3 % if calibration temperature = measuring temp.
1,5 % at ± 10 °C deviation to cal. temperature

Precision : ± 1 % of reading or ±0.15 ppb

Response time : t_{90} < 30 seconds (rising concentration)

Minimal flow : 50 cm/s Pressure resistance: 3 bar

Operating temp. : max. 50 °C

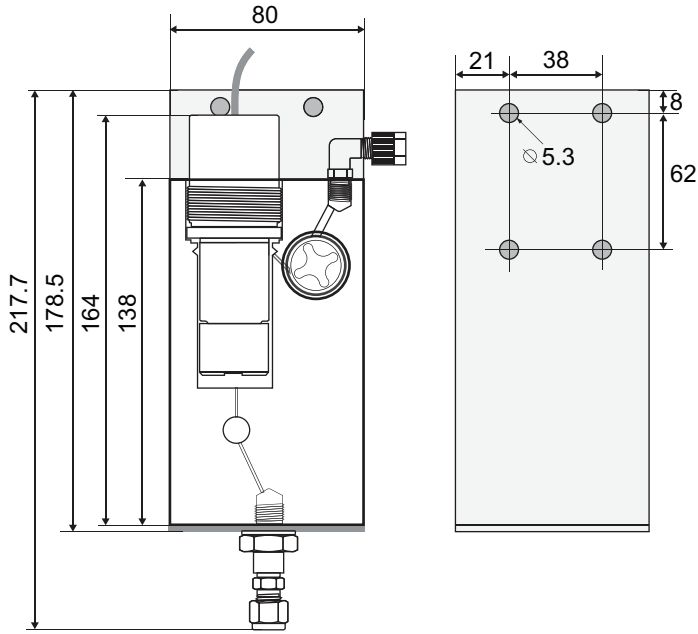
Material : shaft: polyacetal copolymer
cathode/anode/guard: gold/silver/silver
membrane: fluoropolymer

Protection : IP 68

Weight : 150 g

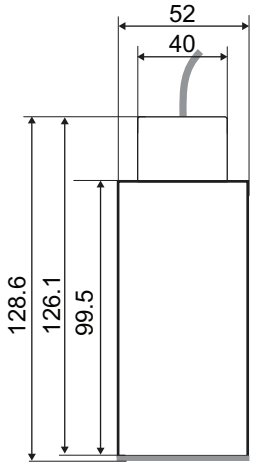
2.4.3 QV-Flow PMMA OTG

Flow cell	Flow cell made of acrylic glass with integrated flow sensor.
Sample temp.	max. 45 °C
Inlet pressure	max. 1 bar
Outlet pressure	Pressure free
Sample flow	6–25 l/h
Process connection inlet	Swagelok connection for 1/4” tube
Outlet	SERTO angle for 6 mm flexible tube
Dimensions	see picture below



2.4.4 B-Flow SS316L OTG

Flow cell	B-Flow SS316L OTG is made of stainless steel without flow sensor and can be used for higher operating pressures and temperatures.
Operating temp.	-10 to +130 °C
Sensor	max. 50 °C
Operating pressure	max. 5 bar at 130 °C
Sensor	max. 3 bar
Flow cell connection	2x female thread 1/8" ISO
Dimensions	see picture below



3. Installation

3.1. Installation Check List

On site requirements	AC variant: 100–240 VAC (±10%), 50/60 Hz (±5%) DC variant: 10–36 VDC Power consumption: 35 VA maximum Protective earth connection required Sample line with sufficient sample flow and pressure (see Technical Data, p. 13).
Installation	Mount the instrument in vertical position. The display should be at eye level. Connect the sample and waste line, see Connecting Sample Inlet and Outlet, p. 23.
Electrical Connections	Connect all external devices like limit switches, current loops and pumps, see Electrical Connections, p. 25. Connect the power cord, do not switch on power until all external devices are connected.
Swansensor Oxytrace G	The Swansensor Oxytrace G is delivered with prefilled electrolyte chamber. A transport protection cap filled with water keeps the sensor wet during transport and storage. Before installation, remove the transport protection cap and clean the sensor surfaces with water. Afterwards install the oxygen sensor and connect the cable. See Install the Swansensor Oxytrace G, p. 24.
Turn on power	Switch on power. First, the analyzer performs a self test, displays the firmware version and then starts normal operation
Run-in Period Calibration	Leave the sensor at the air. The sensor has to run-in for at least 30 min, better 1 h. During this time it has to be at air with a dry and clean membrane and has to be connected to the powered instrument. Calibrate the sensor after this time as described in Calibration, p. 46. and mount it into the flow cell afterwards.
Open Sample Flow	Open the flow regulating valve to allow sample flow into the flow cell and into the waste. Sample must always overflow into waste
Programming	Program all parameters for external devices (interface, etc.). Set all parameters for instrument operation (limits, alarms).

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:
  - 4 Screws 8x60 mm
  - 4 Dowels
  - 4 Washers 8.4/24 mm

Mounting requirements

The instrument is only intended for indoor installation.

3.3. Connecting Sample Inlet and Outlet

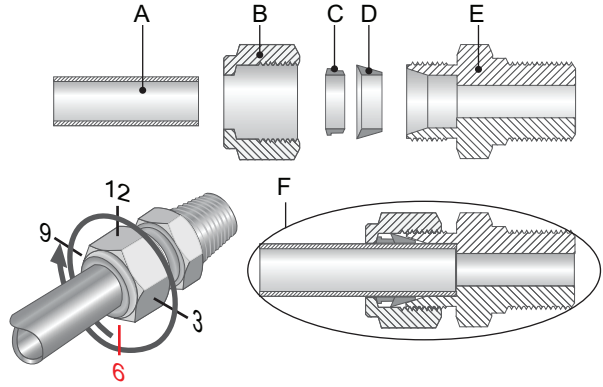
3.3.1 Swagelok Fitting Stainless Steel at Sample Inlet

Preparation

Cut the tube to length and deburr it. The tube must be straight and free from blemishes for approximately 1,5 x tube diameter from the end.
Lubrication with lubricating oil, MoS2, Teflon etc. is recommended for the assembly and reassembly of bigger sized unions (thread, compression cone).

Installation

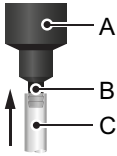
1. Insert the compression ferrule [C] and the compression cone [D] into the union nut [B].
2. Screw on the union nut onto the body, do not tighten it.
3. Push the stainless steel pipe through the union nut as far as it reaches the stop of the body.
4. Mark the union nut at 6 o'clock position.
5. While holding the fitting body steady, tighten the nut union 1¼ rotation using an open ended spanner.



A *Stainless steel tube*
B *Union nut*
C *Compression ferrule*
D *Compression cone*
E *Body*
F *Tightened connection*

3.3.2 FEP Tube at Sample Outlet

1/2” Tube at waste funnel.

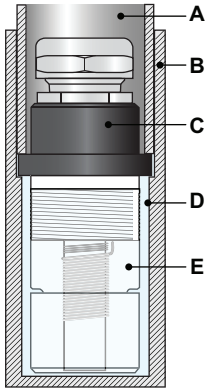


A *Waste funnel*
B *Hose nozzle*
C *1/2” tube*

Connect the 1/2” tube [C] to the hose nozzle [B] and place it into a drain with atmospheric pressure.

3.4 Install the Swansensor Oxytrace G

The Swansensor Oxytrace G is delivered with prefilled electrolyte chamber [E]. A transport protection cap [B] filled with water [D] keeps the sensor wet during transport and storage. To install the sensor proceed as follows:



A *Fixing sleeve*
B *Transport protection cap*
C *Swansensor Oxytrace G*
D *Water*
E *Sensor cap filled with electrolyte*

1. Unscrew the fixing sleeve [A].
2. Remove the transport protection cap [B].
3. Clean the Swansensor Oxytrace G [C] with water.
4. Install the Swansensor Oxytrace G into the flow cell
5. Connect the sensor cable to the transmitter, see Electrical Connection Diagram AMI Oxytrace, p. 27.

3.5. Electrical Connections

WARNING

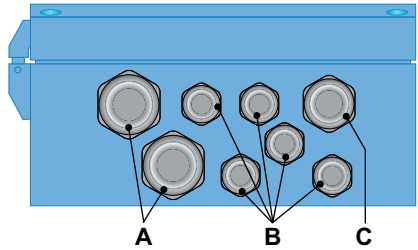
Risk of electrical shock.

Do not perform any work on electrical components if the transmitter is switched on. Failure to follow safety instructions can result in serious injury or death.

- 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 $Ø_{outer}$ 5–10 mm*
B *PG 7 cable gland: cable $Ø_{outer}$ 3–6.5 mm*
C *PG 9 cable gland: cable $Ø_{outer}$ 4–8 mm*

Note: *Protect unused cable glands*

Wire

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

WARNING

External Voltage.

Externally 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 power before resuming installation.
  - relay 1
  - relay 2
  - alarm relay

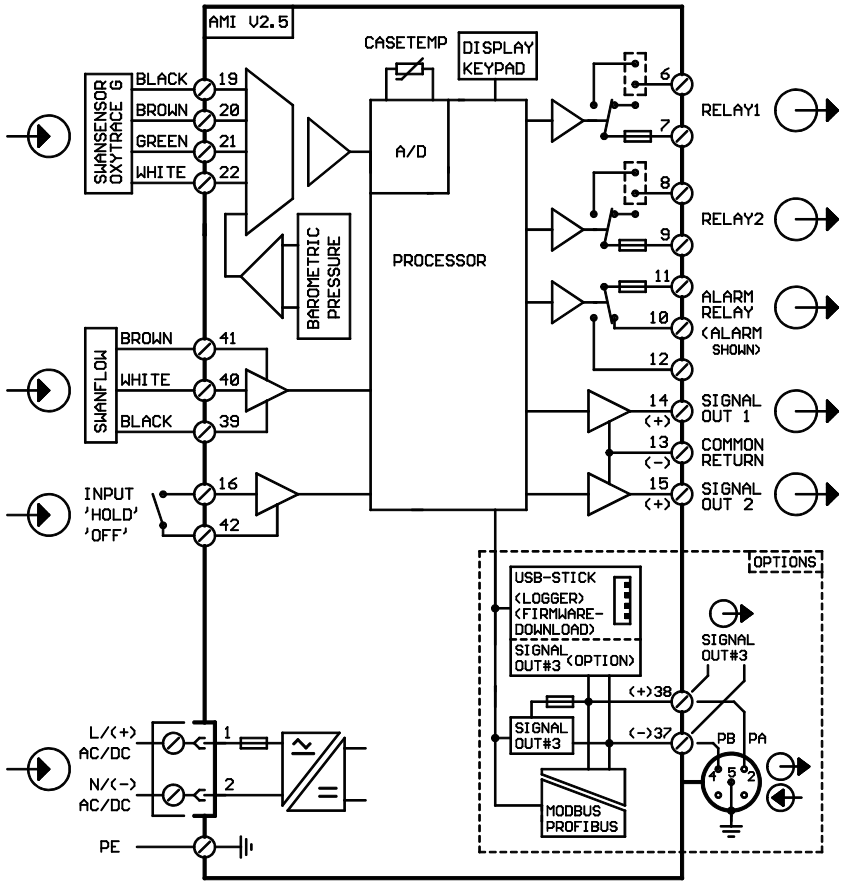
WARNING

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.

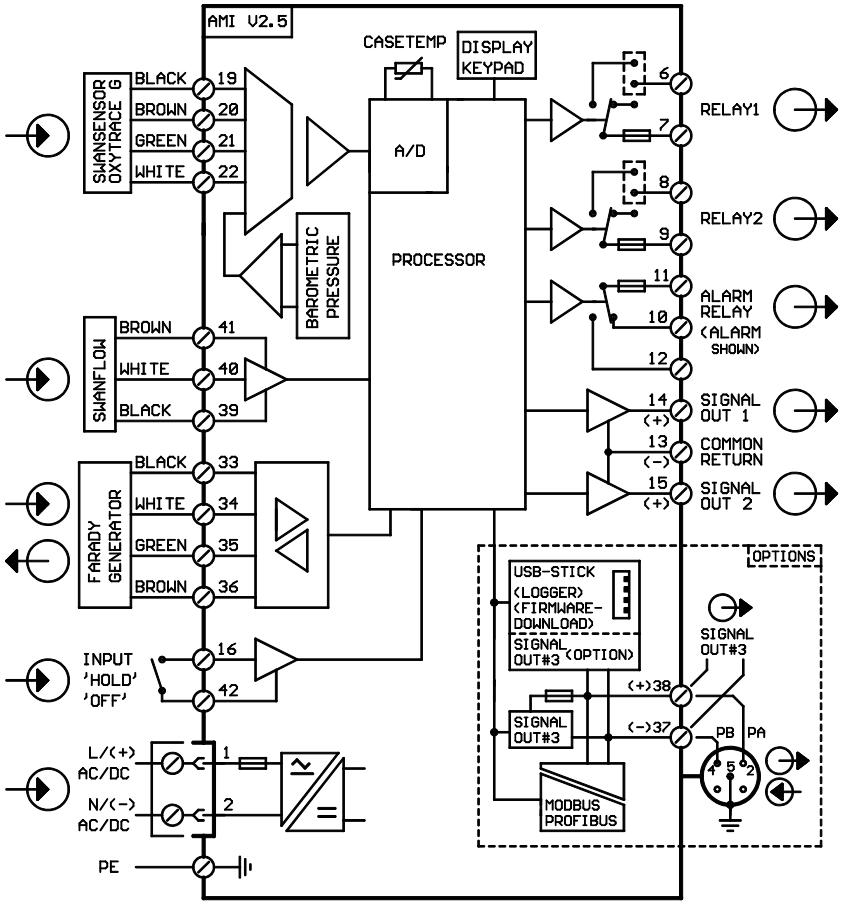
3.5.1 Electrical Connection Diagram AMI Oxytrace



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.

3.5.2 Electrical Connection Diagram AMI Oxytrace QED



CAUTION

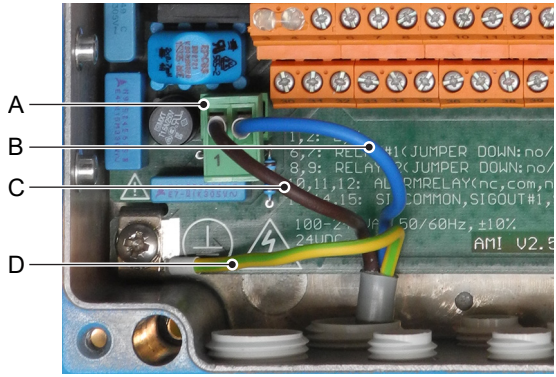
Use only the terminals shown in this diagram, and only for the mentioned purpose. Use of any other terminals will cause short circuits with possible corresponding consequences to material and personnel.

3.5.3 Power Supply

WARNING

Electrical shock hazard

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 Oxytrace

3.6. Relay Contacts

3.6.1 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 Ω.

Terminals 16 and 42

If the signal output is set to hold, the measurement is interrupted if input is active.

For programming see 5.3.4, p. 83.

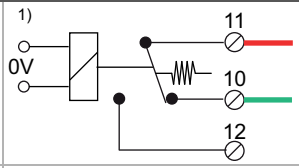
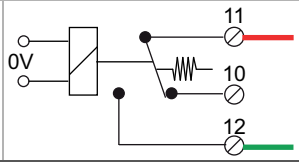
3.6.2 Alarm Relay

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

Alarm output for system errors.

Error codes see Troubleshooting, p. 56.

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
NC[1] Normally Closed	10/11	Active (opened) during normal operation. Inactive (closed) on error and loss of power.	
NO Normally Open	12/11	Active (closed) during normal operation. Inactive (opened) on error and loss of power.	

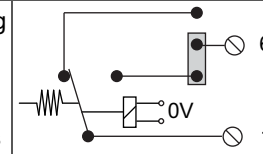
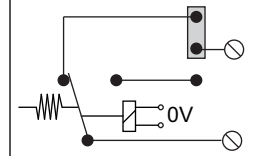
1) *usual use*

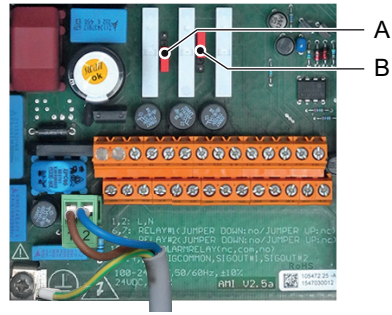
3.6.3 Relay 1 and 2

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 8/9: Relay 2		Inactive (opened) during normal operation and loss of power. Active (closed) when a programmed function is executed.	
Normally Closed	6/7: Relay 1 8/9: Relay 2		Inactive (closed) during normal operation and loss of power. 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 5.3.2 and 5.3.3, p. 79.

CAUTION

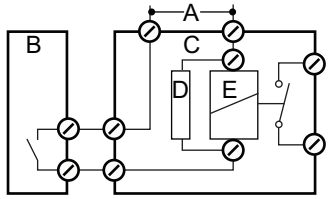
Risk of damage of the relays in the AMI Transmitter due to heavy inductive load.

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

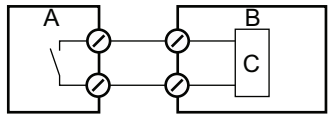
Small inductive loads (max 0.1 A) as for example the coil of a power relay can be switched directly. To avoid noise voltage in the AMI Transmitter it is mandatory to connect a snubber circuit in parallel to the load.
A snubber circuit is not necessary if an AMI relaybox is used.



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

Resistive load

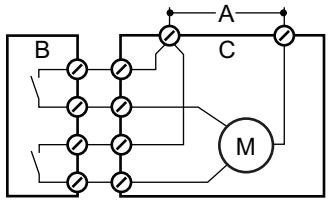
Resistive loads (max. 1 A) and control signals for PLC, impulse pumps and so on can be connected without further measures



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*

3.7. Signal Outputs

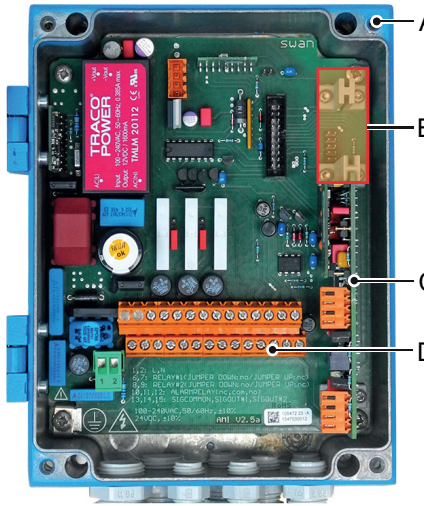
3.7.1 Signal output 1 and 2 (current outputs)

Note: *Max. burden 510 Ω.*
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 (-)

Programming see menu 5.2 Signal Outputs, p. 73.

3.8. Interface Options



A *AMI Transmitter*
B *Slot for interfaces*
C *Frontend PCB*
D *Screw terminals*

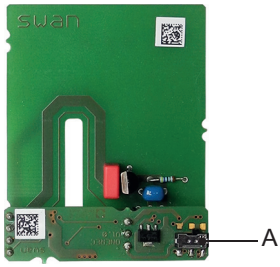
The slot for interfaces can be used to expand the functionality of the AMI instrument with either:

- an additional signal output
- a Profbus or Modbus connection
- a HART connection
- an USB Interface

3.8.1 Signal Output 3

Terminal 38 (+) and 37 (-).
Requires the additional board for the third signal output 0/4–20 mA PCB. 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 Ω.*



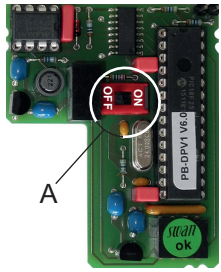
Third signal output 0/4 - 20 mA PCB

A Operating mode selector switch

3.8.2 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.*

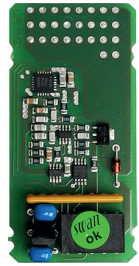


Profibus, Modbus Interface PCB (RS 485)

A On - OFF switch

3.8.3 HART Interface

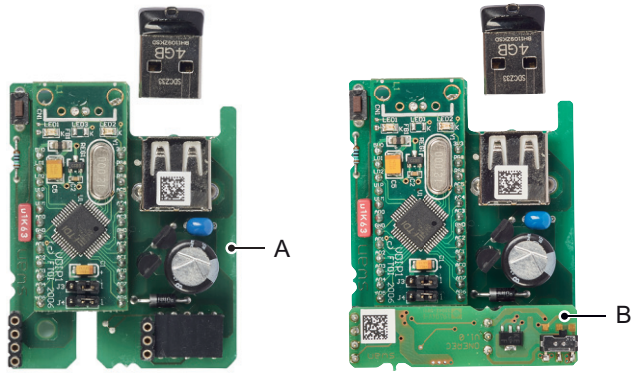
Terminals 38 (+) and 37 (-).
The HART interface PCB allows for communication via the HART protocol. For detailed information, consult the HART manual.



HART Interface PCB

3.8.4 USB Interface

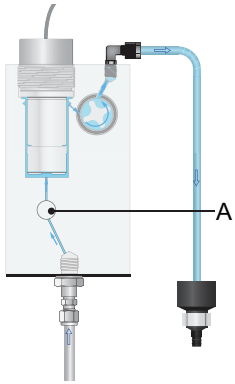
The USB Interface is used to store Logger data and for Firmware up load. For detailed information see the corresponding installation instruction.



USB Interface

4. Instrument Setup

4.1. Establish Sample Flow



1 Open the flow regulating valve [A] and wait until the flow cell is completely filled.

2 Switch on power.

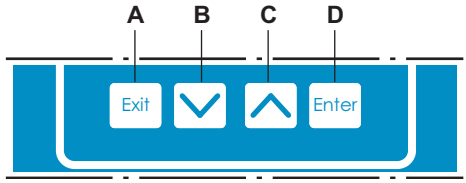
3 Adjust the sample flow to 8–25 l/h.

4.2. Programming

Program all parameters for external devices (interface, recorders, etc.) and for instrument operation (limits, alarms). See Program List and Explanations, S. 67 for details.

5. Operation

5.1. Keys



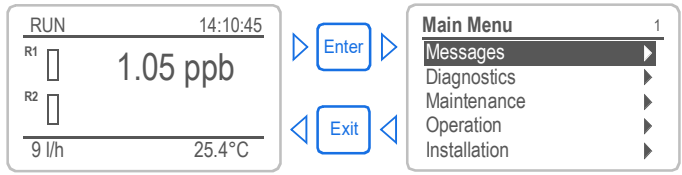
A to exit a menu or command (rejecting any changes)
to move back to the previous menu level

B to move DOWN in a menu list and to decrease digits

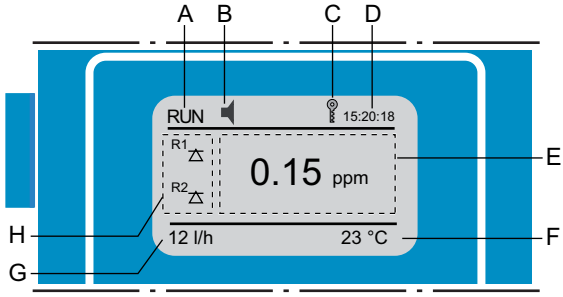
C to move UP in a menu list and to increase digits

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

F Sample Temperature

G Sample flow in i/h

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

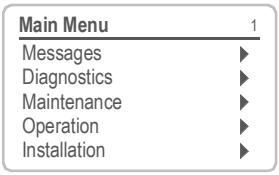
motor valve closed

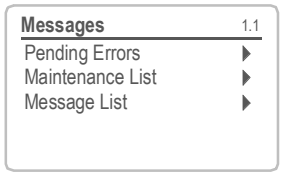
motor valve: open, dark bar indicates approx. position

timer

timer: timing active (hand rotating)

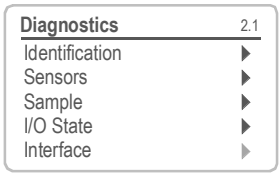
5.3. Software Structure





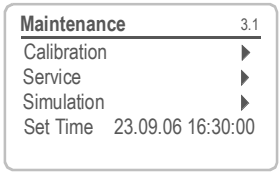
Menu **Messages 1**

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.



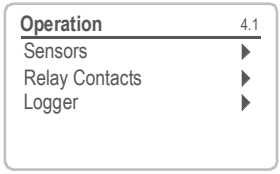
Menu **Diagnostics 2**

Provides user relevant instrument and sample data.



Menu **Maintenance 3**

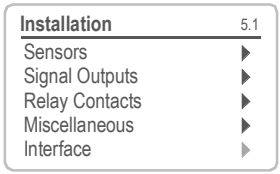
For instrument calibration, relay and signal output simulation, and to set the instrument time.
It is used by the service personnel.



Menu **Operation 4**

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.



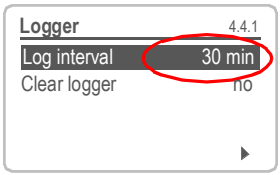
Menu **Installation 5**

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

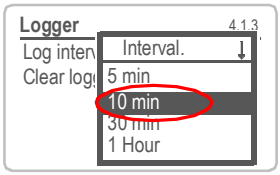
Changing parameters

The following example shows how to change the logger interval:



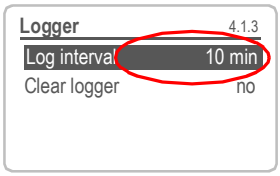
1 Select the parameter you want to change.

2 Press [Enter]



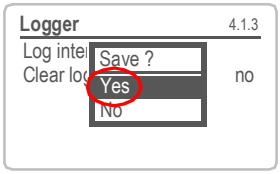
3 Press [▲] or [▼] key to highlight the required parameter.

4 Press [Enter] to confirm the selection or [Exit] to keep the previous parameter).



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

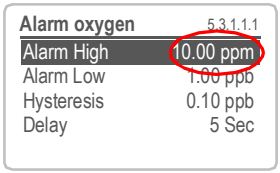
5 Press [Exit].



⇒ *Yes is highlighted.*

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

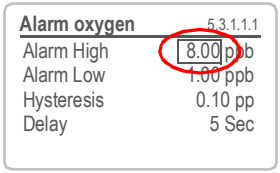
Changing values



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 Table

Weekly	◆ Check sample flow.
Monthly	◆ If necessary, perform an air calibration.
Half-yearly	◆ Clean the Oxytrace G membrane with a soft tissue. ◆ Clean the Faraday electrode.
Yearly	◆ If necessary, replace filling electrolyte. If the sensor is exposed to air frequently and during long time intervals, the electrolyte and membrane may have to be changed earlier (see below*). ◆ Clean flow cell and flow meter, if dirty.
Every 2nd year	◆ Replace Swansensor Oxytrace G membrane by using a new, pre-filled sensor cap.

*A change of membrane and electrolyte is recommended:

- if indicated in the maintenance list (remaining amount <10%)
- if the response of the sensor is slow
- if the sensor can not be calibrated any more and/or the instrument shows a corresponding error message
- if the sensor signal is very unstable

6.2. Stop of Operation for Maintenance

1. Shut off power of the instrument.
2. Stop sample flow by closing the flow regulating valve.

6.3. Maintenance of the Oxygen Sensor

WARNING

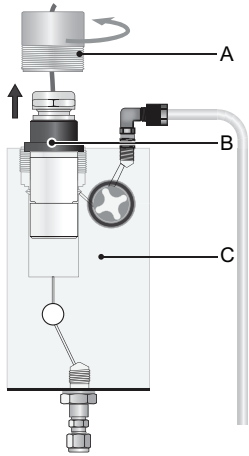
Etching Liquid

The electrolyte is alkaline and caustic. It contains less than 1 % of potassium hydroxide.

- Do not ingest. Wear protective goggles and gloves during handling. Avoid contact with clothes.
- In case of accidental contact with clear water and contact a physician. Show them the label of the bottle or this section of the manual.
- Short contact with the skin is harmless, nevertheless wash with plenty of water.

6.3.1 Electrolyte exchange

An electrolyte exchange is indicated in the maintenance list as soon as the remaining amount is below 10 %.

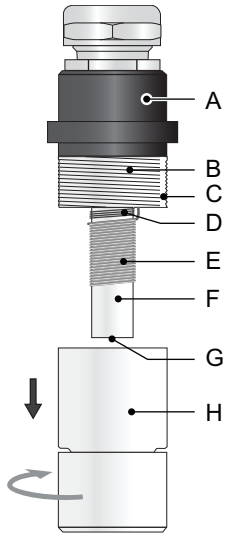


A *Fixing sleeve*
B *Sensor*
C *Flow cell*

1 Unscrew the fixing sleeve [A].

2 Remove the sensor from the flow cell.

Note: *A vacuum may form when the sensor is pulled out.*
Do not use force!
The sensor can be easily removed if the flow control valve is slightly opened.



A *Swansensor Oxytrace G*
B *Thread*
C *Groove*
D *Guard electrode*
E *Anode*
F *Measuring head*
G *Cathode*
H *Sensor cap with membrane*

3 Unscrew and remove the sensor cap [H] from the Swansensor Oxytrace G [A].

4 Empty the remaining electrolyte.

5 Refill the sensor cap with fresh electrolyte.

Note: *There is a groove [C] in the thread [B] of the sensor, where excessive air and electrolyte can escape while screwing the sensor cap onto the sensor. Hold the sensor in vertical position, measuring head pointing downwards.*

6 Slowly screw the sensor cap onto the sensor to allow the excess electrolyte to escape without building up too much pressure inside the electrode. Fasten sensor cap tightly.

7 Clean the sensor thoroughly and dry the sensing membrane with a soft tissue.

8 Switch on power.

9 Let the sensor run-in at air for at least 30 min, better 1 h.

10 Afterwards perform an air calibration.

11 Install the sensor into the flow cell.

12 Select “New Filling” to reset the counter for remaining electrolyte, see <Maintenance>/<Service> 3.2.1, S. 69).

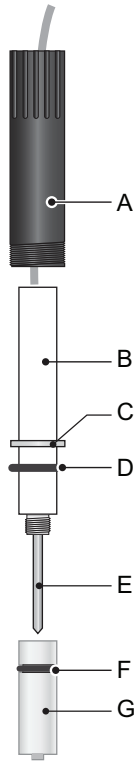
6.3.2 Clean Swansensor Oxytrace G and Flow Cell

Depending on the water quality, the Swansensor Oxytrace G and the flow cell will necessitate a cleaning.

Before cleaning, stop operation as described in Stop of Operation for Maintenance, S. 41.

1. Dismount the Swansensor Oxytrace G, see Electrolyte exchange, S. 42.
2. Clean the sensor with a soft tissue and rinse it with water afterwards.
3. Use a soft brush to remove the dirt which sticks on the walls of the flow cell.
4. Flush the flow cell with clean water.
5. Install the Swansensor Oxytrace G and start sample flow.

6.4. Maintenance of the Faraday electrode



A *Fixing sleeve*
B *Electrode body*
C *Washer*
D *O-ring*
E *Inner electrode*
F *O-ring*
G *Hollow electrode*

1 Switch off the instrument and close the flow regulating valve.

2 Open the faraday control unit.

3 Disconnect and remove the cable from the faraday control unit.

4 Unscrew and remove the fixing sleeve (A).

5 Remove the faraday electrode from the flow cell, do not pull on the cable.

6 Remove the washer (C) and the o-ring [D] from the electrode body (B).

7 Unscrew the electrode tip containing the hollow electrode (G).

8 Clean the inner electrode (E) with a tissue and the hollow electrode with a pipe cleaner.
⇒ *The electrode surfaces should be shining metallic after cleaning. Use a polishing detergent or a small amount of toothpaste.*

9 Rinse all parts well with water.

10 Replace the O-ring and the washer if necessary.

11 Screw the hollow electrode finger-tight onto the electrode body.

12 Insert the faraday electrode into flow cell.

13 Tighten fixing sleeve firmly.

14 Feed the electrode cable through the cable gland of the faraday control unit.

15 Connect the electrode cable to terminal 5 (green) and terminal 6 (white).

16 Switch the instrument on.

17 Open the flow regulating valve and adjust the sample flow between 8 and 25 l/h.

6.5. Calibration

The sensing part of the sensor must not be in direct contact with water!

In the wet flow cell, the atmosphere will be saturated with water vapor. This atmosphere will produce the most accurate calibration results.

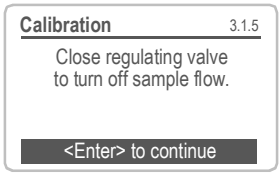
The required time for a calibration depends mainly on the difference between temperature and oxygen content in the sample and in the air. It can take 15 – 20 minutes. This is also the case if the electrolyte has been exchanged.

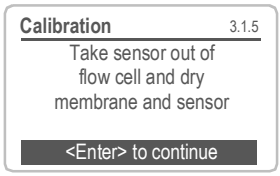
As soon as the reading is stable, the microprocessor will store the calibration data in the memory.The end of the calibration is indicated on the display.

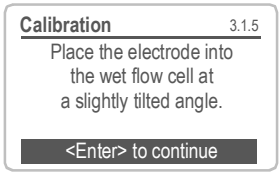
To perform a calibration proceed as follows:

1 Navigate to menu <Maintenance> /<Calibration>.

2 Press [Enter] to start the calibration and follow the dialog on the display.







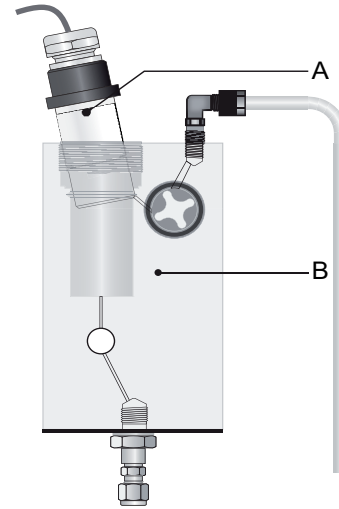
3 Stop the sample flow at with the flow regulating valve.

4 Unscrew and remove the threaded sleeve, see Electrolyte exchange, S. 42.

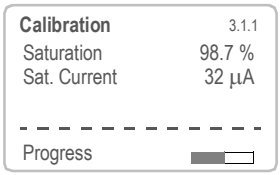
5 Remove the oxygen sensor from the flow cell.

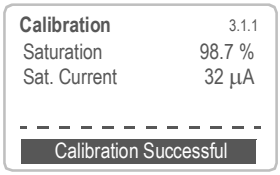
6 Dry the sensor membrane and the flow cell with a soft paper tissue.

7 Place the electrode slightly tilted into the flow cell, so that the sensor cap rests on the rim for the O-ring.



A *Tilted sensor*
B *Flow cell*





8 Press [Enter] to start the calibration measurement.
⇒ *The saturation should reach 100%, the saturation current should be about 22 µA to 33 µA. If the measuring values are not stable during the measuring period, the calibration will be discarded.*

9 Press [Enter] to confirm the calibration.

6.6. Zero-Verification

Swansensor Oxytrace G for the measurement of low oxygen content (< 1 ppb).

1 Calibrate the sensor according to chapter Calibration, S. 46.
2 Prepare a 5% sodium sulfite solution with demineralized water.
3 Put the electrode into the sodium sulfite solution afterwards. Assure that there are no air bubbles in front of the sensor.
4 The measured value should be <1 ppb.

Note: *Depending on the state of the electrode this process can take several hours. In case of an electrode-refill, it can take days until the measured value is lower than 1 ppb.*

6.7. Faraday Verification

The Faraday verification works only for oxygen concentrations below 200 ppb. If automatic Faraday verification is enabled, a periodic check of the system is performed. A manual verification can be started for test purposes.

Automatic Verification

By default the instrument performs an automatic Faraday verification every 3 hours. To change the settings for automatic verification go to menu <Faraday Parameter>/<Timer mode>.

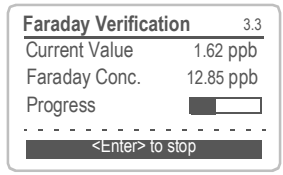
Possible settings are:

- off
- interval
- daily
- weekly

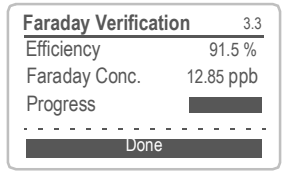
Manual Verification

To start a manual verification:

1 Navigate to menu 3.2.2 <Maintenance>/<Service>/<Faraday Verification>.



2 Press [Enter] to start the Faraday Verification.
⇒ *The verification starts immediately.*



3 Press [Enter] to confirm the Faraday Verification.

Results are saved in the Verification history (menu 2.2.1.5).

6.8. Quality Assurance of the Instrument

Every SWAN on-line instrument is equipped with integrated, autonomous quality assurance functions to survey the plausibility of each measurement.
For the AMI Oxytrace/AMI Oxytrace QED these are:

- continuous monitoring of sample flow
- continuous monitoring of the temperature inside the transmitter case
- periodic accuracy test with ultra high precision resistors

Further a manual, menu driven inspection procedure can be carried out using a certified reference instrument. Running at the same sampling point as an inspection equipment, the AMI Inspector Oxygen verifies the measuring results. After enabling the quality assurance procedure by defining the quality assurance level, the instrument reminds the user periodically to run the procedure and results are stored in a history for review.

Quality assurance level

Central feature of the quality assurance function is the assignment of the monitored process to a Quality assurance level.
There are three predefined levels plus a user level. Hereby the inspection interval, the deviation limits of temperature and measuring result between the inspection equipment and the monitoring instrument are defined.

- Level 1: **Trend;** Measurement used as an additional information to follow the process indicating trends.
- Level 2: **Standard;** Monitoring of several parameters of a process (e.g. oxygen, saturation). In case of instrument failure, other parameters can be used for process monitoring.
- Level 3: **Crucial;** Monitoring of critical processes, value is used for control of another part or subsystem (valve, dosing unit, etc.).

Additional level:

- Quality level 4: **User;** User defined inspection interval, maximal deviation of temperature and measuring result.

Quality Level	max. deviation temperature [°C][a)]	max. deviation result [%]	min. inspection interval
0: Off	**Off**	**Off**	Off
1: Trend	**0.5 °C**	**10 %**	annual
2: Standard	**0.4 °C**	**5 %**	quarterly
3: Crucial	**0.3 °C**	**5 %**	monthly
4: User	**0 - 2°C**	**0 - 20%**	annual, quarterly, monthly

a) sample temperature must have 25°C +/- 5°C.

Procedure The standard workflow contains following procedures:

1. Activate SWAN Quality assurance procedure
2. Pre-test
3. Connect instruments
4. Carry out comparison measurement
5. Completion of the measurement

Note: *The procedure should only be carried out through qualified personnel.*

Materials / Inspection equipment:

- Reference instrument: AMI INSPECTOR Oxygen
- Two tubes made of PA

6.8.1 Activate SWAN Quality assurance procedure

Enable quality assurance procedure at each instrument by selecting the quality level in menu 5.1.4.

This activates the corresponding sub menus.

Note: *The activation is necessary the first time only.*

6.8.2 Pre-test

- Reference instrument: AMI INSPECTOR Oxygen
  - Check certificate; reference instrument certificate not older than one year.
  - Check battery; the battery of the AMI INSPECTOR Oxygen should be completely charged. Remaining operating time on display minimum 20 hours.
  - Sensor is in working condition.
- On-line instrument: Monitor AMI Oxytrace QED
  - Good order and condition; Flow cell free of particles, Sensor surface free of deposits.
  - Check message list; Review the message list in menu 1.3 and check for frequently alarms (as for example flow alarms). If alarms occur frequently remove cause before starting the procedure.

6.8.3 Connect the sample lines

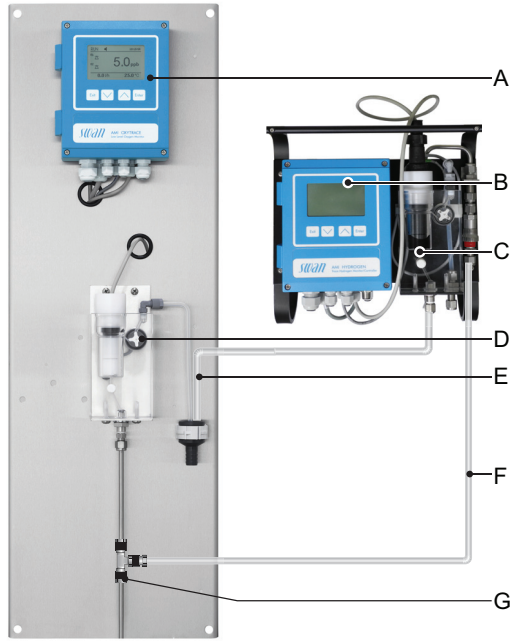
The choice of sampling depends strongly on local conditions on site. Possible sampling:

- via sample point,
- via T-fitting or
- via piggyback/downstream

Note:

- *avoid ingress of air, use screwed fitting,*
- *sample as near as possible to the process monitor,*
- *wait approx. 10 minutes, whilst measurement is running, until measurement value and temperature are stabilized.*

Example As an example following picture shows the connection of the reference instrument via T-fitting to the process monitor.



A *Monitor AMI Oxytrace*
B *AMI INSPECTOR Oxygen*
C *Reference flow cell*
D *On-line flow cell*
E *Sample outlet*
F *Sample inlet*
G *T-fitting*

1 Stop sample flow to the monitor AMI Oxytrace by closing the appropriate valve, e.g. back pressure regulator, sample preparation or flow regulating valve at flow cell.

2 Connect sample line of the monitor AMI Oxytrace [A] with the sample inlet of the reference instrument AMI INSPECTOR Oxygen [B]. Use the supplied tube made of PA.

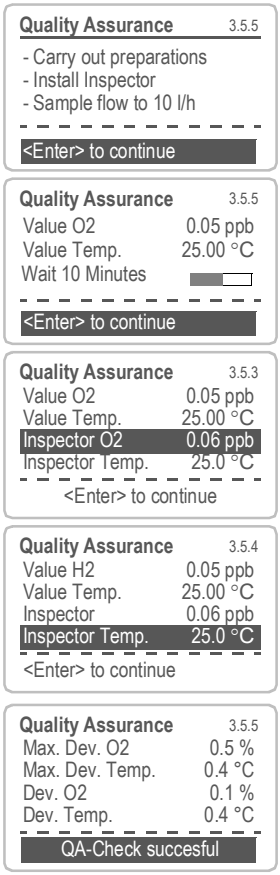
3 Connect sample outlet of the reference instrument AMI INSPECTOR Oxygen to the sample outlet funnel of the monitor.

4 Switch on the AMI INSPECTOR Oxygen. Open the flow regulating valve and regulate the sample flow to 10 l/h.

6.8.4 Carry out comparison measurement

The comparison measurement is menu-driven. Start by selecting Quality Assurance in menu 3.5 of the monitor AMI Oxytrace.

1 Navigate to menu Maintenance / Quality Assurance.
2 Press [Enter].
3 Follow the dialog on the Display.



4 Carry out pre test preparations Connect instruments.
Regulate sample flow to 10 l/h using the appropriate valve.

5 Wait 10 minutes whilst measurement is running.
Press [Enter] to continue.

6 Read the ppb value of the reference instrument and enter under “Inspector” by using the [▲] or [▼] keys.

7 Press [Enter] to confirm.

8 Read temperature value of the reference instrument and enter under “Inspector Temp.” by using the [▲] or [▼] keys.

9 Press [Enter] to confirm.

10 Press [Enter] to continue.
⇒*The results are saved in QA-History regardless if successful or not*

6.8.5 Completion of the measurement

1. Stop the sample flow to the AMI Oxytrace QED by closing the appropriate valve, e.g. back pressure regulator, sample preparation or flow regulating valve at flow cell again.
2. Close flow regulating valve of the AMI Inspector.
3. Disconnect the AMI Inspector by removing the tubes and connect the sample outlet of the Monitor AMI Oxytrace QED to the sample outlet funnel again.
4. Start sample flow again and regulate sample flow.
5. Shut down the AMI INSPECTOR Oxygen.

6.9. Longer Stop of Operation

1. Shut off power of the instrument.
2. Stop sample flow.
3. Remove the Swansensor Oxytrace G.
4. Clean the sensor with a soft tissue and rinse it with water afterwards.
5. Use a soft brush to remove the dirt which sticks on the walls of the flow cell.
6. Fill the flow cell with water.
7. Install the Swansensor Oxytrace G.

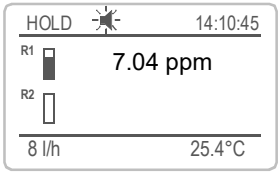
7. Troubleshooting

7.1. Error List

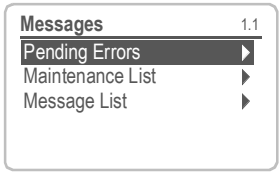
Error
Non-fatal Error. Indicates an alarm if a programmed value is exceeded.
Such Errors are marked **E0xx** (bold and black).

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:

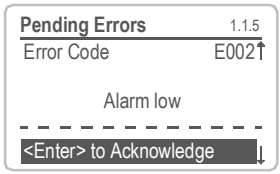
- Errors which disappear if correct measuring conditions are recovered (i.e. Sample Flow low).
  Such Errors are marked **E0xx** (bold and orange)
- Errors which indicate a hardware failure of the instrument.
  Such Errors are marked **E0xx** (bold and red).



Error or fatal Error
Error not yet acknowledged.
Check **Pending Errors 1.1.5** and take corrective action.



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
E001	Oxygen Alarm high	– check process – check programmed value, see 5.3.1.1.1, S. 77
E002	Oxygen Alarm low	– check process – check programmed value, see 5.3.1.1.25, S. 77
E003	Saturation Alarm high	– check process – check programmed value, see 5.3.1.4, S. 78
E004	Saturation Alarm low	– check process – check programmed value, see 5.3.1.4, S. 78
E007	Sample Temp. high	– check process – check programmed value, see 5.3.1.3.1, S. 78
E008	Sample Temp. low	– check process – check programmed value, see 5.3.1.3.25, S. 78
E009	Sample Flow high	– check sample flow – check programmed value, see 5.3.1.2.2, S. 78
E010	Sample Flow low	– establish sample flow – clean instrument – check programmed value, see 5.3.1.2.35, S. 78
E011	Temp. shorted	– Check wiring of sensor – Check sensor
E012	Temp. disconnected	– Check wiring of sensor – Check sensor

Error	Description	Corrective action
E013	Case Temp. high	– check case/environment temperature – check programmed value, see 5.3.1.5.1, S. 78
E014	Case Temp. low	– check case/environment temperature – check programmed value, see 5.3.1.5.2, S. 78
E017	Control Timeout	– check control device or programming in Installation, Relay contact, Relay 1/2 see 5.3.2 and 5.3.3, S. 79
E018	Faraday Efficiency	– clean Faraday electrode, see Maintenance of the Faraday electrode, S. 45 – perform an air calibration, see Calibration, S. 46 – perform maintenance of the oxygen sensor, see Maintenance of the Oxygen Sensor, S. 42
E019	Quality Assurance	– Perform QA Procedure using a reference instrument, e.g. AMI Inspector
E024	Input active	– See If Fault Yes is programmed in Menu see 5.3.4, S. 83
E026	IC LM75	– call service
E028	Signal output open	– check wiring on signal outputs 1 and 2
E030	EEProm Frontend	– call service
E031	Calibration Recout	– call service

Error	Description	Corrective action
E032	Wrong Frontend	– call service
E033	Power-on	– none, normal status
E034	Power-down	– none, normal status
E065	Electrolyte depleted	– Refill electrolyte, see Electrolyte exchange, S. 42

7.2. Replacing Fuses

WARNING

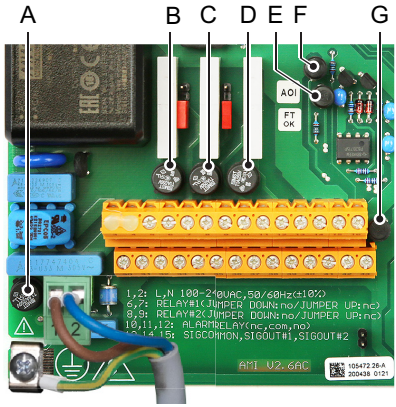
External Voltage

Externally 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 continuing the installation.
  - relay 1
  - relay 2
  - alarm relay

When a fuse has blown, find out the cause and fix it before replacing it with a new one.

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



A *AC variant: 1.6 AT/250V 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, S. 67.

- 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 1.1*	*Pending Errors*	1.1.5*	* Menu numbers
Maintenance List 1.2*	Maintenance List	1.2.5*	
Message List 1.3*	*Number*	1.3.1*	
	Date, Time		

8.2. Diagnostics (Main Menu 2)

Identification	Desig.	AMI Oxytrace		* Menu numbers
2.1*	Version	6.20-06/16		
	Factory Test	*Instrument*	2.1.3.1*	
	2.1.3*	*Motherboard*		
		Front End		
	Operating Time	*Years / Days / Hours / Minutes / Seconds*		2.1.4.1*
	2.1.4*			
Sensors	**Oxytrace G**	*Current Value*		
2.2*	2.2.1*	*(Raw value tc)*		
		Saturation		
		Cal. History	*Number*	2.2.1.5.1*
		2.2.1.5*	*Date, Time*	
			Sat. Current	
			Air pressure	
	Miscellaneous	*Case Temp.*	*2.2.2.1**	
	2.2.2*	*Air pressure*		
	QA History	*QA History*	*2.2.3.1**	
	2.2.3*			
Sample	*Sample ID*	2.3.1*		
2.3*	*Temperature °C*			
	Nt5K Ohm			
I/O State	*Alarm Relay*	2.4.1*		
2.4*	*Relay 1/2*	2.4.2*		
	Input			
	Signal Output 1/2			
Interface	*Protocol*	2.5.1*		
2.5*	*USB Stick*			

8.3. Maintenance (Main Menu 3)

Calibration	*Calibration*	3.1.5		* Menu numbers
3.1*				
Service	**Electrolyte**	*Last filling*		
3.2*	3.2.1*	*Remaining amount*		
		Remaining time		
		New Filling	3.2.1.5*	
	Faraday Verification	*Current Value*		
	3.2.2	*Faraday Conc.*		
		Progress		
Simulation	*Alarm Relay*	3.2.1*		
3.3*	*Relay 1*	3.2.2*		
	Relay 2	3.2.3*		
	Signal Output 1	3.2.4*		
	Signal Output 2	3.2.5*		
Set Time	*(Date), (Time)*			
3.4*				
Quality Assurance	Quality Assurance	3.5.5*		
3.5*				

8.4. Operation (Main Menu 4)

Sensors	*Filter Time Const.*	4.1.1*		* Menu numbers
4.1*	*Hold after Cal.*	4.1.2*		
	Faraday Parameter	*Mode*	4.1.3.1*	
	4.1.3*	*Interval*	4.1.3.20*	
		Delay	4.1.3.3*	
		Signal Outputs	4.1.3.4*	
		Output/Control	4.1.3.5*	
Relay Contacts	**Alarm Relay**	**Alarm oxygene**	*Alarm High*	4.2.1.1.1*
4.2*	4.2.1*	4.2.1.1*	*Alarm Low*	4.2.1.1.25*
			Hysteresis	4.2.1.1.35*
			Delay	4.2.1.1.45*
		Alarm Saturation	*Alarm High*	4.2.1.2.1*
		4.2.1.2*	*Alarm Low*	4.2.1.2.25*
			Hysteresis	4.2.1.2.35*
			Delay	4.2.1.2.45*
	Relay 1/2	*Setpoint*	4.2.x.100*	
	4.2.2* - 4.2.3*	*Hysteresis*	4.2.x.200*	
		Delay	4.2.x.30*	
	Input	*Active*	4.2.4.1*	
	4.2.4*	*Signal Outputs*	4.2.4.2*	
		Output / Control	4.2.4.3*	
		Fault	4.2.4.4*	
		Delay	4.2.4.5*	
Logger	*Log Interval*	4.3.1*		
4.3*	*Clear Logger*	4.3.2*		
	Eject USB Stick	4.3.3*		

8.5. Installation (Main Menu 5)

Sensors	**Miscellaneous**	*Flow*	5.1.1.1*	* Menu numbers
5.1*	5.1.1*	*Offset*	5.1.1.2*	
	Quality Assurance	*Level*	5.1.2.1*	
	5.1.2*			
Signal Outputs	**Signal Output 1/2**	*Parameter*	5.2.1.1 - 5.2.2.1*	
5.2*	5.2.1* - 5.2.2*	*Current Loop*	5.2.1.2 - 5.2.2.2*	
		Function	5.2.1.3 - 5.2.2.3*	
		Scaling	*Range Low*	5.2.x.40.10/11*
		5.2.x.40	*Range High*	5.2.x.40.20/21*
Relay Contacts	**Alarm Relay**	**Alarm oxygen**	*Alarm High*	5.3.1.1.1*
5.3*	5.3.1*	5.3.1.1*	*Alarm Low*	5.3.1.1.25
			Hysteresis	5.3.1.1.35
			Delay	5.3.1.1.45
		Sample Flow	*Flow Alarm*	5.3.1.2.1
		5.3.1.2*	*Alarm High*	5.3.1.2.2*
			Alarm Low	5.3.1.2.35*
		Sample Temp.	*Alarm High*	5.3.1.3.1*
		5.3.1.3*	*Alarm Low*	5.3.1.3.25*
		Alarm Saturation	*Alarm High*	5.3.1.4.1*
		5.3.1.4*	*Alarm Low*	5.3.1.4.25
			Hysteresis	5.3.1.4.35
			Delay	5.3.1.4.45
		Case Temp.	*Case Temp. high*	5.3.1.5.1*
		5.3.1.5*	*Case Temp. low*	5.3.1.5.2*
	Relay 1 and 2	*Function*	5.3.2.1–5.3.3.1*	
	5.3.2* and 5.3.3*	*Parameter*	5.3.2.20–5.3.3.20*	
		Setpoint	5.3.2.300–5.3.3.301*	
		Hysteresis	5.3.2.400–5.3.3.401*	
		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*		* Menu numbers
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 Maintenance List

1.2.5 Provides the list of necessary maintenance. Cleared maintenance messages are moved to the Message list.

1.3 Message List

1.3.1 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. 6.20-06/16)

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

2.1.4 **Operating Time:** Shows the operating time in Years, Days, Hours, Minutes and Seconds.

2.2 Sensors

2.2.1 **Oxytrace G**

Current value:	Shows the actual measuring value in ppb.
Raw value tc:	Shows the actual temperature compensated measuring value in mA.
Saturation	Shows the actual saturation in %

2.2.1.4 **Cal. History**
Review the diagnostic values of the last calibration of the oxygen sensor. Max. 64 data records are memorized.

- *Number*: Calibration counter.
- *Date, Time*: Date and time of the calibration.
- *Sat. Current*: Saturation current at that time of calibration.
- *Air pressure*: Air pressure at that time of calibration.

2.2.2 **Miscellaneous**:

2.2.2.1 *Case Temp:* Shows the actual temperature in °C inside the transmitter.

Air pressure: Shows the actual air pressure in hPa

2.2.3 **QA History**
Review QA values (Number, Date, Time, Deviation oxygen, Deviation Temperature, Status of QA check) of the last quality assurance procedures.

2.3 Sample

2.3.301

- *Sample ID*: Shows the assigned sample identification. This identification is defined by the user to identify the location of the sample
- *Temperature:* Shows temperature in °C.
- *(Nt5K)*: Shows raw value of the temperature in Ω.
- *Sample Flow*: Shows the sample flow in l/h
- *(Raw value)* Shows the sample flow in Hz

2.4 I/O State

Shows actual status of all in- and outputs.

2.4.1

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
Signal Output 3:	Actual current in mA (if option is installed)

2.5 Interface

2.5.1 Only available if optional interface is installed.
Shows the programmed communication settings.

3 Maintenance

3.1 Calibration

3.1.1 Start a calibration and follow the instructions on the screen. Displayed values are saturation in % and the saturation current in mA. The indication bar shows the progress. Detailed explanation see Calibration, p. 46.

3.2 Service

3.2.1 Electrolyte

- *Last Filling*: Shows the date of the last filling of electrolyte.
- *Remaining Amount*: Remaining amount of electrolyte in %.
- *Remaining Time*: Remaining time in days until electrolyte exchange recommended.

3.2.1.5 *New Filling*: Select “Yes” after electrolyte exchange to reset the counter.

3.2.2 Faraday Verification

Start a manual faraday verification. Displayed values are current value in ppb and the faraday concentration in %.

- *Current value*: Measuring value in ppb
- *Faraday conc.*: Oxygen concentration in % after activating the faraday verification.
- *Progress*: The progress bar shows the progress of the faraday verification.

3.3 Simulation

In this menu the following relays and signal outputs can be tested:

- Alarm relay
- Relay 1 and 2
- Signal output 1 and 2
- Signal output 3 (if option is installed)

Select a relay or signal output with the [▲] or [▼] keys, press the [Enter]> key to confirm. Then change the value with the [▲] or [▼] keys. After confirming the setting with the [Enter] key, the value is simulated by the relay/signal output.

Alarm Relay:	Active or inactive.
Relay 1 and 2:	Active or inactive.
Input:	Open or closed.
Signal Output 1 and 2*:*	Current in mA
Signal Output 3:	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.

3.5 Quality Assurance

Performs the quality assurance procedure according to your settings. Follow the commands on the screen. For detailed explanations see Quality Assurance of the Instrument, p. 50.

4 Operation

4.1 Sensors

4.1.1 *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

4.1.2 *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

4.1.3 Faraday Parameter

4.1.3.1 *Mode*: Can be set to Interval, daily, weekly or off. If Mode is set to “Off”, no further settings are available. The Faraday Verification has to be started manually.

4.1.3.20 *Interval*: The interval can be set between 1h and 12h

4.1.3.21 *Start Time*: Start time appears if Mode is set to daily.

4.1.3.22 **Calendar**: Calendar appears if Mode is set to weekly.

4.1.3.3 *Delay*: during Faraday Verification plus the delay time the signal and control outputs are held in the operating mode programmed below.
Range: 0–6’000 Sec.

4.1.3.4 *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.

4.1.3.5 *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.

4.2 Relay Contacts

See Relay Contacts, p. 30

4.3 Logger

The instrument is equipped with an internal logger. The data can be copied to the USB stick installed in the transmitter.
The logger can save approx. 1500 data records. The Records consists of: Date, time, alarms, measuring values, raw values, case temperature, flow.

4.3.1 *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).
Range: 1 Second to 1 hour

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

4.3.2 *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 Miscellaneous

5.1.1.1 *Flow***:** If a flow cell without flow measurement (e.g. B-Flow) is used, choose none. With flow measurement select Q-Flow

5.1.1.2 *O2 Offset*: Manual, small correction of the offset.
Range -5 to 5 ppb

5.1.2 Quality Assurance: Switch the Quality Assurance on or off.

5.1.2.1 *Level*: Select quality level:

- Level 0: Off
  Quality assurance procedure switched off. Any additional QA menus are hidden.
- Level 1: Trend
- Level 2: Standard
- Level 3: Crucial
- Level 4: User

Edit user specific limits in menu 5.1.2.2

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 and 5.2.2 **Signal Output 1 and 2:** Assign process value, the current loop range and a function to each signal output.

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

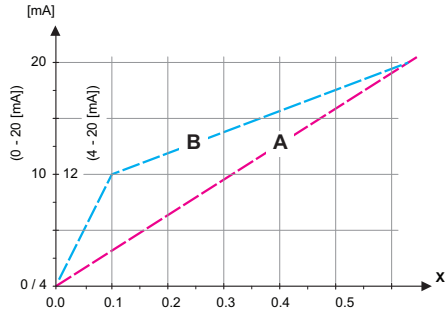
- Oxygen
- Temperature
- Sample Flow (if a flow sensor is selected)
- Saturation

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

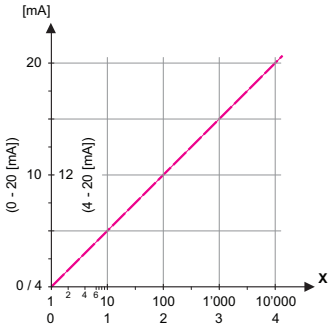
5.2.1.3 *Function:* Define if the signal output is used to transmit a process value or to drive a control unit. Available functions are:

- Linear, bilinear or logarithmic for process values. See As process values, p. 73
- Control upwards or control downwards for controllers. See As control output, p. 75

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



A *linear*
B *bilinear*
X *Measured value*



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: Oxygen.

Range low: 0.00 ppb – 20.00 ppm
Range high: 0.00 ppb – 20.00 ppm

Parameter: Temperature

Range low: -30 to + 130 °C
Range high: -30 to + 130 °C

Parameter: Sample flow

Range low: 0 – 50 l/h
Range high: 0 – 50 l/h

Parameter: Saturation

Range low: 0 – 200 %
Range high: 0 – 200 %

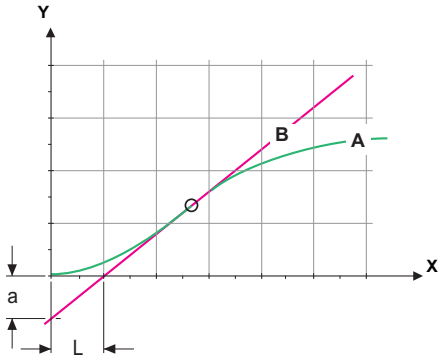
As control output

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* ***Xp*** *= 1.2/a*
B *Tangent on the inflection point* ***Tn*** *= 2L*
X *Time* ***Tv*** *= 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. Choose 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 = Oxygen
5.2.1.43.10 Setopint:
Range: 0.00 ppb – 20.00 ppm
5.2.1.43.20 P-Band:
Range: 0.00 ppb – 20.00 ppm

5.2.1.43 **Control Parameters**: if Parameter = Temperature
5.2.1.43.11 Setopint:
Range: -30 to + 130 °C
5.2.1.43.21 P-Band:
Range: 0 to + 100 °C

5.2.1.43 **Control Parameters**: if Parameter = Sample flow
5.2.1.43.12 Setopint:
Range: 0 – 50 l/h
5.2.1.43.22 P-Band:
Range: 0 – 50 l/h

5.2.1.43 **Control Parameters**: if Parameter = Saturation
5.2.1.43.13 Setopint:
Range: 0 – 200 %
5.2.1.43.23 P-Band:
Range: 0 – 200 %

5.2.1.43.3 *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

5.2.1.43.4 *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

5.2.1.43.5 *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 for the following parameters:

- Oxygen
- Temperature
- Sample Flow
- Case Temperature high
- Case Temperature low

5.3.1.1 Alarm oxygen

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: 0.00 ppb – 20.00 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: 0.00 ppb – 20.00 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. 0.00 ppb – 20.00 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 **Sample Flow:** Define at which sample flow a flow alarm should be issued.

5.3.1.2.1 *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.*

5.3.1.2.2 *Alarm High:* If the measuring values rises above the programmed value E009 will be issued.
Range: 12–50 l/h

5.3.1.2.35 *Alarm Low:* If the measuring values falls below the programmed value E010 will be issued.
Range: 8–11 l/h

5.3.1.3 Sample Temp.: Define at which sample temperature an alarm should be issued.

5.3.1.3.1 *Alarm High:* If the measured value rises above the alarm high value, the alarm relay is activated and E007 is issued.
Range: 30–100 °C

5.3.1.3.25 *Alarm Low:* If the measured value rises above the alarm high value, the alarm relay is activated and E008 is issued.
Range: -10 to + 20 °C

5.3.1.4 Alarm Saturation

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: 0.00–200 %

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: 0.00–200 %

5.3.1.4.35 *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. 0.00–200 %

5.3.1.4.45 *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

5.3.1.5 Case Temp.

5.3.1.5.1 *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

5.3.1.5.2 *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 to + 20 °C

5.3.2 and 5.3.3 **Relay 1 and 2:** 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
- Oxygen
- Temperature
- Sample Flow
- Saturation

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

Parameter	Range
Oxygen	0.00 ppb – 20.00 ppm
Temperature	-30 to + 130 °C
Sample flow	0 – 50 l/h
Saturation	0 – 200 %

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
Oxygen	0.00 ppb – 20.00 ppm
Temperature	0 – 100 °C
Sample flow	0 – 50 l/h
Saturation	0 – 200 %

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

- Oxygen
- Temperature
- Sample Flow
- Saturation

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

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:* If activated, error message E028 is shown in case of line break on signal outputs 1 and 2.

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: 1200–115200 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**	
5.5.24	Device address:	Range: 0–63

10. Material Safety Data sheets

10.1. Reagents

Catalogue No.:	102751.10
Product name:	Filling solution 1ALK
	Part of: A-87.290.060

Download MSDS The current Material Safety Data Sheets (MSDS) for the above listed Reagents are available for downloading at **www.swan.ch**.

11. Default Values

Operation:

Sensors:	Filter Time Const.: 10 s
	Hold after Cal.: 300 s
	Faraday Parameter:
	Mode: Interval
	Interval: 3 hours
	Delay 60 s
	Signal Outputs hold
	Output/Control hold
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	Miscellaneous:
	Flow: Q-Flow
	O2 Offset: 0.0 ppb
	Quality Assurance:
	Level: 0: Off
Signal Output 1	Parameter: Oxygen
	Current loop: 4 –20 mA
	Function: linear
	Scaling: Range low: 0.00 ppb
	Scaling: Range high: 10.00 ppm
Signal Output 2	Parameter: Temperature
	Current loop: 4 –20 mA
	Function: linear
	Scaling: Range low: 0.0 °C
	Scaling: Range high: 50.0 °C
Alarm Relay:	Alarm oxygen; Alarm high: 10.00 ppm
	Alarm oxygen; Alarm low: 0.00 ppb
	Alarm oxygen; Hysteresis: 100 ppb
	Alarm oxygen; Delay: 5 s
	Sample Flow, Flow Alarm: yes
	Sample Flow, Alarm high: 25.0 l/h
	Sample Flow, Alarm low: 8.0 l/h

Sample Temp., Alarm High: ..... 50 °C
Sample Temp., Alarm Low: ..... 0 °C
Alarm Saturation; Alarm high ..... 120 %
Alarm Saturation; Alarm low ..... 0.0 %
Alarm Saturation; Hysteresis ..... 2 %
Alarm Saturation; Delay ..... 5 s

Case temp. high: ..... 65 °C
Case temp. low: ..... 0 °C

Relay 1
Function: ..... limit upper
Parameter: ..... Oxygen
Setpoint: ..... 10.00 ppm
Hysteresis: ..... 100 ppb
Delay: ..... 30 s

Relay 2
Function: ..... limit upper
Parameter: ..... Temperature
Setpoint: ..... 50.0 °C
Hysteresis: ..... 1.0 °C
Delay: ..... 30 s

If Function = Control upw. or dnw:

Parameter: ..... Oxygen
Settings: Actuator: ..... Frequency
Settings: Pulse Frequency: 120/min
Settings: Control Parameters: Setpoint: ..... 10.00 ppm
Settings: Control Parameters: P-band: ..... 100.0 ppb
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%

If Function = Timer:

Mode: ..... Interval
Interval: ..... 1 min
Mode: ..... daily
Start time: 00.00.00
Mode: ..... weekly
Calendar; Start time: 00.00.00
Calendar; Monday to Sunday: ..... Off
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

13. Notes

swan
ANALYTICAL INSTRUMENTS

A-96.250.531 / 220121

Swan Products - Analytical Instruments for:

Swan is represented worldwide by subsidiary companies and distributors and cooperates with independent representatives all over the world. For contact information, please scan the QR code.

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SWISS MADE

AMI Oxytrace