swan
ANALYTICAL INSTRUMENTS

AMI INSPECTOR
Resistivity

Version 6.00 and higher

Operator's Manual

A-96.250.781 / 170719

Customer Support
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01	Feb. 2015	Update to Firmware rev. 5.30, new mainboard V2.4
02	Jan. 2016	AMI Inspector Version 2-A (with AMIAKKU mainboard) and Firmware version 6.00

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Table of Contents

AMI INSPECTOR Resistivity - 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

The AMI Operator's Manual shall be kept 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 significance:

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 can be the consequence if such warnings are ignored.

- Follow the prevention instructions carefully.

Mandatory Signs

The importance of the mandatory signs in this manual.

Safety goggles

Safety gloves

Warning Signs

The importance of the warning signs in this manual.

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

Risk of Electrical Shock

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 chapter contains technical data, requirements and performance data.

2.1. Description of the System

The portable AMI INSPECTOR instrument is a complete monitoring system mounted on a small panel with supporting stand and a rechargeable battery for stand-alone operation (>24h), designed as an inspection equipment for quality assurance of online process monitors.

Features

General Features of AMI INSPECTORs are:

- Battery life after full charge:
  - >24h at full load (use of 3 relays, USB, signal output, logger)
  - >36h at minimum load (use of logger only)
- Charging time: approx. 6 hours
- Controlled shut-down if battery is empty.
- Display of remaining battery life in hours.
- For longer battery life the back light of the LC Display is disabled.
- Continuous operation using power adapter. The battery should be discharged at least once a month (normal usage until the monitor automatically shuts down).

Battery

The Li-Ion battery is located in the housing of the AMI transmitter.

See chapter Power Supply, p. 16 regarding power supply and charging of the battery.

Sensor

Swansensor RC-U high precision two-wire electrode made of stainless steel with integrated NTC temperature probe.

Application Range

The resistivity is a parameter for the total quantity of ions present in the solution. It can be used for the controlling of:

- the condition of waters
- water purification
- water hardness
- completeness of ion analysis

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.

USB interface

Built-in USB interface for logger download. Use the USB stick supplied by Swan only (other USB sticks can dramatically reduce battery life).

Signal Output

One signal output 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

Relay

Two potential-free contacts programmable as limit switches for measuring values, controllers or timer for system cleaning with automatic hold function.

Maximum load: 100 mA/50 V

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

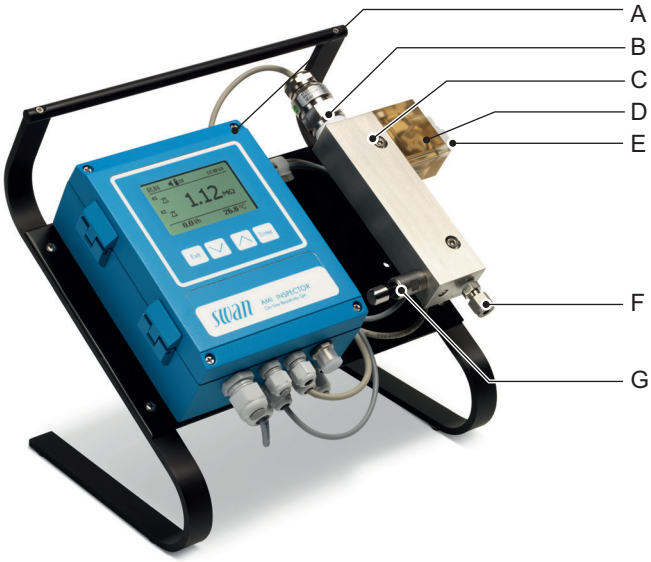
For potential-free contact to freeze the measuring value or to interrupt control in automated installations (hold function or remote-off)

Measuring Principle

The resistivity of high purity water is determined with a sensor consisting of two metal electrodes. The characteristics of each sensor is expressed as cell constant. An alternating voltage (to minimize polarization effects) is applied to two electrodes. Depending on the concentration of ions in the sample, a signal results between the electrodes which is proportional to the resistivity of the water.

The measuring result is indicated as resistivity.

2.2. Instrument Overview



A *AMI Transmitter*
B *Swansensor RC-U*
C *Flow cell QV-HFlow*
D *High-temperature flow meter*
E *Sample outlet*
F *Sample inlet*
G *Flow regulating valve*

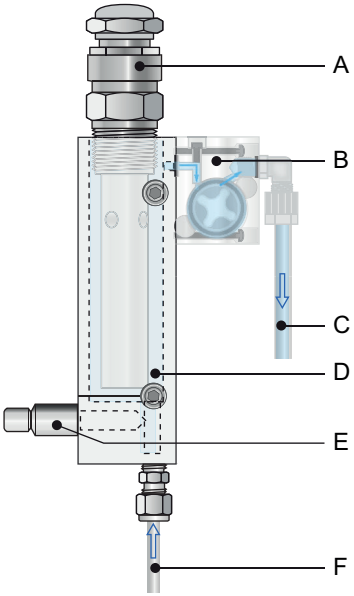
Fluidics

The flow cell (QV-Hflow) consists of the flow cell block [D], the flow sensor [B] and the flow regulating valve [E].

The conductivity sensor RC-U [A] with integrated temperature sensor is screwed into the flow cell block [D].

The sample enters at the sample inlet [F]. It flows through the flow regulating valve [E], where the flow rate can be adjusted. Then the sample flows through the flow cell block [D] were the conductivity of the sample is measured.

The sample leaves the flow cell block via flow meter through the sample outlet [C].



A *Sensor RC-U*
B *Flow sensor*
C *Sample outlet*
D *Flow cell block*
E *Flow regulating valve*
F *Sample inlet*

2.3. Technical Data

Power Supply	Battery	
	Use original, supplied power adapter only.	
	Voltage:	85–265 VAC, 50/60 Hz
	Power consumption:	max. 20 VA
	Charging time:	6h
	Battery type:	Li-Ion
	During charging protect from heat impact and keep splash-proof (not IP66).	
Operating time	Stand-alone (Battery):	> 24h
	Connected adapter:	continuous
	Controlled shut-down when battery is empty, remaining time is displayed.	
Electronics housing	Aluminium with a protection degree of IP 66 / NEMA 4X	
	Ambient temperature:	-10 to +50 °C
	Humidity:	10–90% rel., non condensing
	Display:	backlit LCD, 75 x 45 mm
	Dimensions:	180×140×70
	Weight:	1.5 kg
Sample requirements	Flow rate:	70–100 l/h
	Temperature:	up to 95 °C
	Inlet pressure 25°C):	up to 2 bar
	Outlet pressure:	pressure free
	Sample inlet:	1/4” Swagelok tube adapter
	Sample outlet:	flexible tube 8x6 mm
Measuring Range	Resistivity:	0.01–18.18 MΩ-cm
	Resolution:	0.01 MΩ-cm

3. Installation

3.1. Installation Check List

Check	◆ Instrument's specification must conform to your AC power ratings. See External power adapter, p. 17. ◆ See if the battery is fully charged.
Installation	◆ Connect the sample and waste line.
Power-up	◆ Turn on sample flow ◆ Switch on power
Instrument Setup	◆ Program all sensor specific parameters (cell constant, temp. correction, cable length). ◆ Program all parameters for external devices (interface, recorders, etc.). ◆ Program all parameters for instrument operation (USP mode and setpoint, limits, alarms).
Run-in period	◆ Let the instrument run continuously for 1 h.

3.2. Connecting Sample Inlet and Outlet

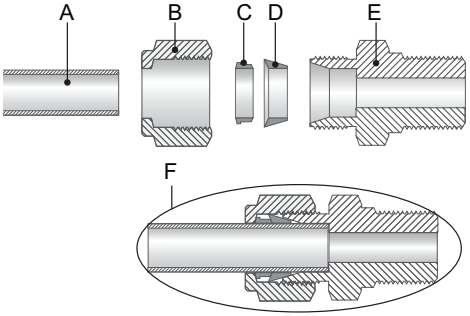
3.2.1 Sample Inlet

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

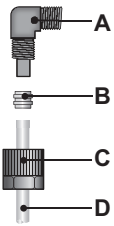
1. Insert the compression ferrule [C] and the compression cone [D] into the union nut [B].
2. Screw on the union nut onto the body, do not tighten it.
3. Push the stainless steel pipe through the union nut as far as it reaches the stop of the body
4. Tighten down the union nut 1¾ rotation using an open ended spanner. Hold Body from turning with a second wrench.



A *Tube*
B *Union nut*
C *Compression ferrule*
D *Compression cone*
E *Body*
F *Tightened connection*

3.2.2 Sample Outlet

FEP flexible tube 8x6 mm. Connect the tube to the serto elbow union and Insert it into an atmospheric drain of sufficient capacity.



A Elbow union
B Compression ferrule
C Knurled nut
D Flexible tube

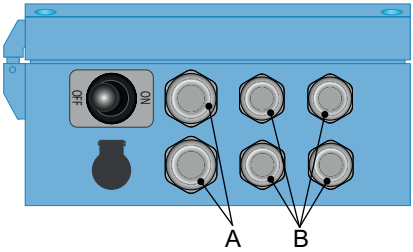
3.3. Electrical Connections

WARNING

Always turn off DC power before manipulating electric parts. 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 9 cable gland: cable $Ø_{outer}$ 4–8 mm*

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

NOTICE: *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.

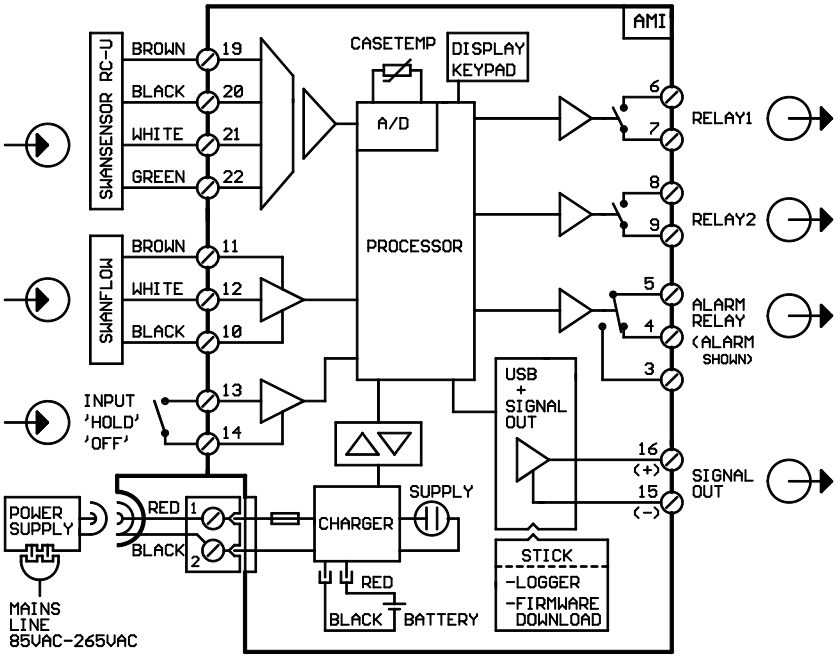
WARNING

External Voltage.

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

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

3.3.1 Connection Diagram



CAUTION

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

3.3.2 Power Supply

Contrary to all other Swan online process monitors the AMI INSPECTOR transmitter is supplied with power by battery only. The rechargeable battery (Li-Ion) enables a stand-alone operation for at least 24 hours.

WARNING

Do not provide power directly to the transmitter as this will destroy the motherboard. All AMI INSPECTOR transmitters are supplied with power by battery only.

Charging

Use the original supplied power adapter to charge AMI INSPECTOR only. Charging time: approx 6h.

Fully charged a stand-alone operating time of at least 24h is guaranteed:

- >24h at full load (use of 3 relays, USB, signal outputs, logger)
- >36h at minimal load (use of logger only)

In case that the battery is discharged completely the firmware will automatically shut down.

Switch Power ON - OFF

Switch the instrument ON or OFF using the toggle switch on the transmitter.

Continuous operation

For continuous operation use the power adapter as well.

CAUTION

- If the AMI powers ON and then immediately shuts OFF, the battery is empty. Do not hold the toggle switch in ON position, as this can damage the battery.

CAUTION

- During charging protect from heat impact and keep splash-proof (plug of power adapter is not IP66).
- Do not supply external devices, e.g. pumps, magnetic valves or any other current consumers with AMI INSPECTOR

CAUTION

- Use the original supplied power adapter to charge AMI INSPECTOR only. Use of any other power adapter can damage the battery or cause malfunction

External power adapter

- Universal input range 85 - 265 VAC
- Continuous short circuit protection
- Over voltage protection
- LED indicator for power on
- 2-pin AC inlet (IEC 320-C8) for country-specific power cord

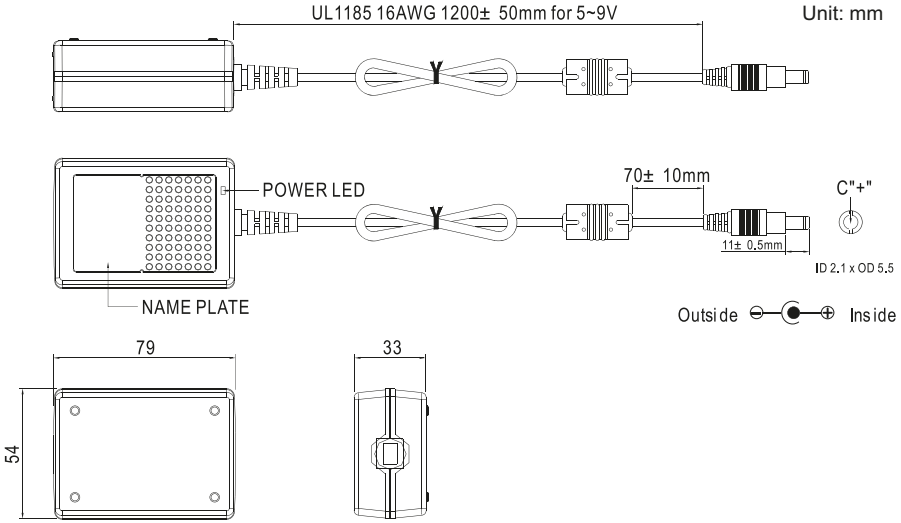
Power cords

Two different power cords are supplied:

- Power cord with type C plug (Europlug)
- Power cord with type A plug (NEMA-1)

If a different plug type is needed, please purchase a suitable power cord from your local supplier.

Dimensions



3.4. Relay Contacts

Programming of the relay contacts see 5.3 Relay Contacts, p. 49

3.4.1 Input

NOTICE: *Use only potential-free (dry) contacts.*

Terminals 13/14

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

For programming see menu 5.3.4, p. 55

3.4.2 Alarm Relay

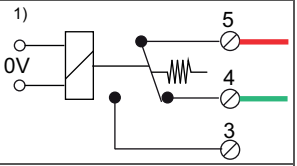
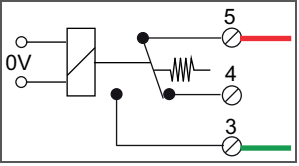
NOTICE: *For resistive loads only; do not use with capacitive or inductive loads. Max. load 1 A / 250 VAC*

Alarm output for system errors.

Error codes see Error List, p. 32

Programming see menu 5.3.1, p. 49

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

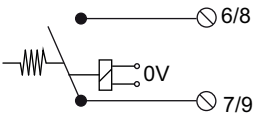
	Terminals	Description	Relay connection
NC[1] Normally Closed	5/4	Active (opened) during normal operation. Inactive (closed) on error and loss of power.	
NO Normally Open	5/3	Active (closed) during normal operation. Inactive (opened) on error and loss of power.	

1) *usual use*

3.4.3 Relay Contacts 1 and 2

NOTICE: *For resistive loads only; do not use with capacitive or inductive loads. Rated load 100 mA / 50 V.*

For programming see Menu Installation 5.3.2 and 5.3.3, p. 51

	Terminals	Description	Relay connection
NO 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.	

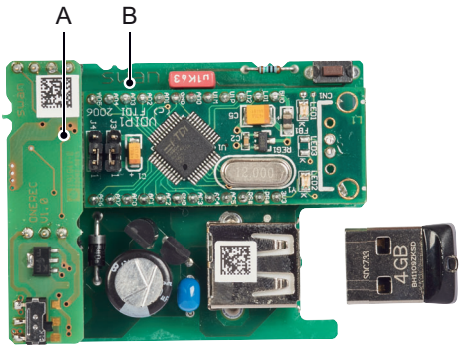
3.5. Signal Output

The signal output 0/4–20 mA PCB is plugged onto the USB interface PCB.

NOTICE: *Max. burden 510 Ω*

Terminals 16 (+) and 15 (-).

For programming see menu 5.2 Signal Outputs, p. 45



A *Signal output 0/4–20 mA PCB*
B *USB interface*

4. Instrument Setup

4.1. Establish Sample Flow

1 Open the flow regulating valve.
2 Wait until the flow cell is completely filled.
3 Switch on power.

NOTICE: *To allow a precise measurement in the range between 18–18.18 MΩ, set the sample flow to 70–100 l/h.*

4.2. Programming

Set all necessary parameters in menu 5 <Installation>, further information about sensor parameters see 5.1.1, p. 44

- Flow measurement
- Measuring Mode
- USP Operating Mode
- Sensor parameters
- Temperature compensation
- Program all parameters for external devices (interface, recorders, etc.). Program all parameters for instrument operation (limits, alarms). See Program Overview, p. 35 and for explanations, see Program List and Explanations, p. 40.

Flow Measurement
Menu 5.1.1
The AMI Inspector is delivered with a Q-HFlow flow cell. In the menu <Flow Measurement> select the flow cell Q-HFlow.

Meas. Mode
Menu 5.1.2
Select Resistivity.

USP Operating Mode

Menu 5.1.3

The USP Operating Mode implemented in the firmware of the AMI INSPECTOR Resistivity transmitter allows the measurement of pharmaceutical water according to the USP <645>.

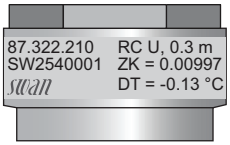
If the USP Operating Mode is set to <off> conductivity or resistivity standard measurement is performed.

If the USP Operating Mode is set to <on>, the uncompensated measuring values are compared with the values of an implemented table defined by USP. If the deviation is too high, the Error 15 (USP Error) is issued.

Sensor Parameters

Menu 5.1.4:

Enter the following parameters printed on the sensor label.



- Cell constant ZK
- Temperature correction DT
- Sensor cable length.If the sensor cable length is 0.3 m, set the cable length to 0 m.

Temp. Compensation

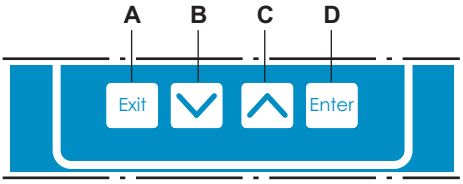
Menu 5.1.5

Choose between:

- none
- coefficient
- neutral salts
- high purity water
- strong acids
- strong bases
- ammonia, ethanolamine
- morpholine

5. Operation

5.1. Keys



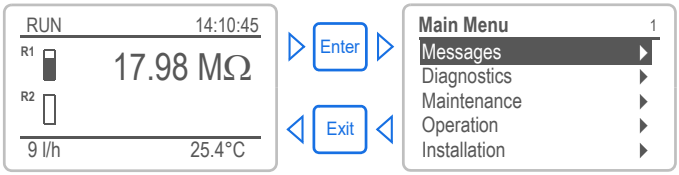
A to exit a menu or command (rejecting any changes)
to move back to the previous menu level

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

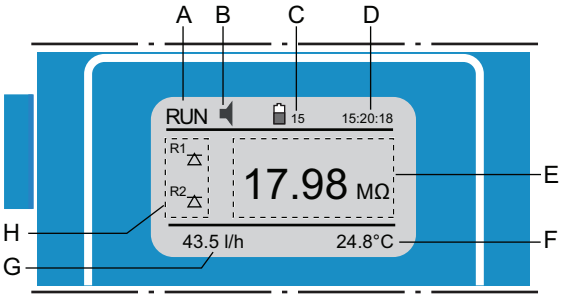
C to move UP in a menu list and to increase digits

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 Battery status (remaining operating time in h)

D Time

E Process values

F Sample temperature

G Sample flow

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

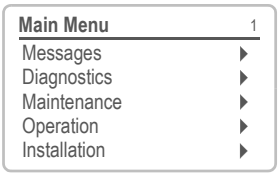
motor valve closed

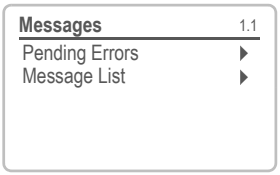
motor valve: open, dark bar indicates approx. position

timer

timer: timing active (hand rotating)

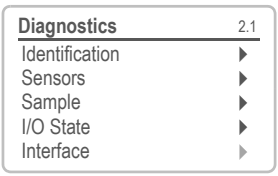
5.3. Software Structure





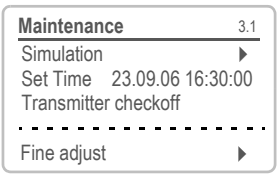
Menu **Messages 1**

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.



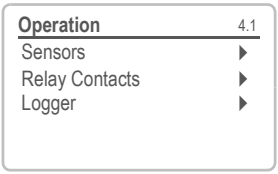
Menu **Diagnostics 2**

Provides user relevant instrument and sample data.



Menu **Maintenance 3**

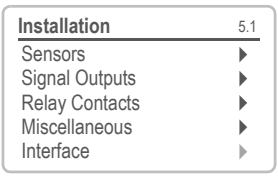
For instrument calibration, relay and signal output simulation, and to set the instrument time.
It is used by the service personnel.



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.



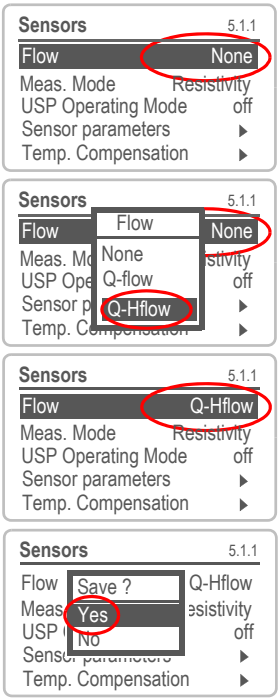
Menu **Installation 5**

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 set the Q-Hflow sensor:



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).

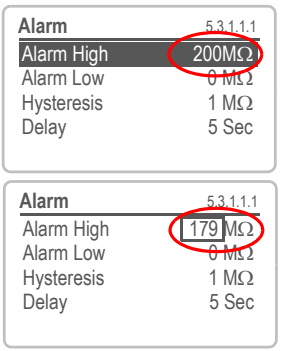
⇒ *The selected parameter is indicated (but not saved yet).*

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

If necessary	Clean sensor
According to USP regulations	Perform a transmitter check

6.2. Stop of Operation for Maintenance

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

6.3. Maintenance of Sensor

6.3.1 Clean Sensor

The Swansensor RC-U is largely maintenance free. However, depending on the application, it can be contaminated, which may cause problems.

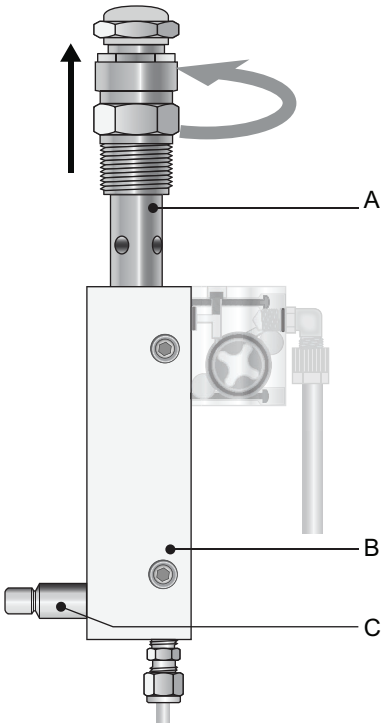
NOTICE: *Sensor with fix installed cable*

- *To avoid damage of the sensor cable due to torsion when screwing the sensor out of the flow cell, disconnect the cable from the terminals in the AMI transmitter.*

To remove the sensor from the flow cell proceed as follows:

Remove the sensor

1. Switch off the AMI Inspector.
2. Open the transmitter housing.
3. Disconnect the sensor cable from the terminals.
4. Remove the sensor cable from the transmitter housing.
5. Unscrew and remove the sensor [A] from the flow cell block [B], use a monkey spanner.
6. Remove the teflon tape from the sensor thread.
7. Clean the sensor with soap water.
8. Rinse the sensor well with high purity water.

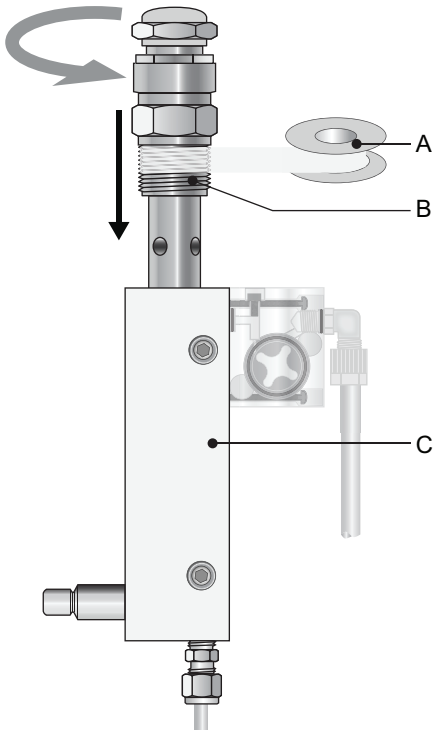


A Sensor
B Flow cell
C Flow regulating valve

Install the sensor

To install the sensor RC-U into the flow cell proceed as follows:

1. Wrap 7 turns of teflon tape around the sensor thread.
2. Screw the sensor into the flow cell and tighten it well.
3. Feed the sensor cable into the transmitter housing.
4. Connect the sensor cable to the terminals of the AMI transmitter, see Connection Diagram, p. 15.
5. Close the transmitter housing.
6. Open the flow regulating valve [C].
7. Switch on power.



A Teflon tape
B Sensor thread
C Flow cell

6.4. Fine Adjust

The function fine adjust is only available if the AMI INSPECTOR Resistivity is set to the measuring mode resistivity.

The function “Fine Adjust” is performed automatically every night at 00:30 h.

It is also possible to start the function “Fine Adjust” manually in the menu <Maintenance/Fine adjust>.

6.5. Replacing Fuses

WARNING

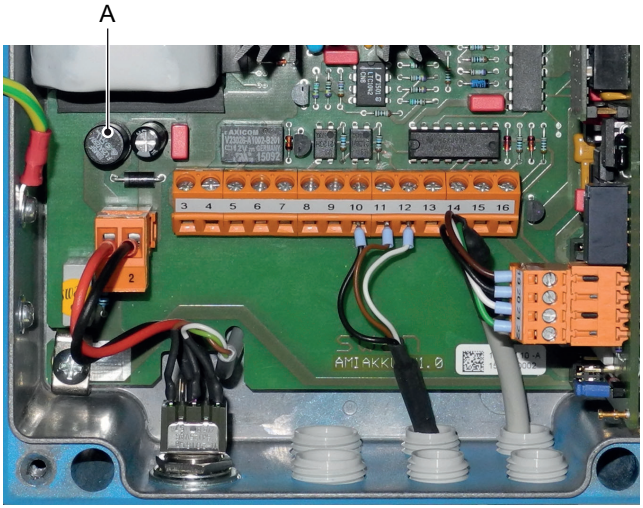
External Voltage.

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

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

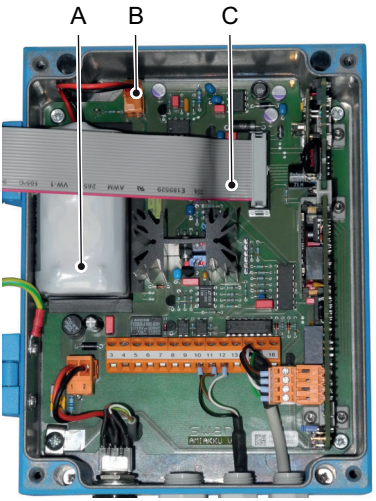
Find and repair the cause for the short circuit before replacing the fuse. Use tweezers or needle-nosed pliers to remove the defective fuse.

Use original fuses provided by SWAN only.



A *1.25 AF/250V Instrument power supply*

6.6. Replacing the Battery



A Battery
B Battery plug
C Ribbon cable

1. Switch the AMI Inspector off.
2. If connected, disconnect the power adapter from the power jack.
3. Open the transmitter housing.
4. Pull out the ribbon cable [C] from the mainboard.
5. Disconnect battery plug [B] and replace the battery.

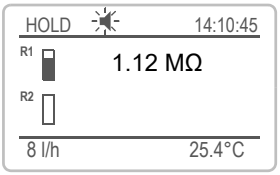
6.7. Longer Stop of Operation

1. Stop sample flow.
2. Shut off power of the instrument.
3. Unscrew and remove the sensor.
4. Empty and dry the flow cell
5. Reinstall the sensor.

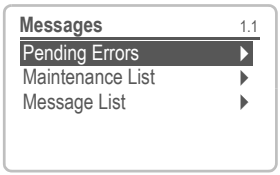
7. Error List

Error
Non-fatal Error. Indicates an alarm if a programmed value is exceeded.
Such Errors are marked **E0xx** (bold and black).
Fatal Error (blinking symbol)
Control of dosing devices is interrupted.
The indicated measured values are possibly incorrect.
Fatal Errors are divided in the following two categories:

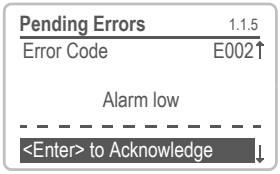
- Errors which disappear if correct measuring conditions are recovered (i.e. Sample Flow low).
  Such Errors are marked **E0xx** (bold and orange)
- Errors which indicate a hardware failure of the instrument.
  Such Errors are marked **E0xx** (bold and red)



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



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



Press [ENTER] to acknowledge the Pending Errors. The Error is reset and saved in the Message List.

Error	Description	Corrective action
E001	Alarm high	– check process – check programmed value, see 5.3.1.1.1, p. 49
E002	Alarm low	– check process – check programmed value, see 5.3.1.1.25, p. 49
E007	Sample Temp. high	– check process – check programmed value, see 5.3.1.1.1, p. 49
E008	Sample Temp. low	– check process – check programmed value, see 5.3.1.1.25, p. 49
E009	Sample Flow high	– check sample flow – check programmed value, see 5.3.1.2.2, p. 50
E010	Sample Flow low	– establish sample flow – clean instrument – check programmed value, see 5.3.1.2.36, p. 50
E011	Temp. shorted	– Check wiring of sensor – Check sensor
E012	Temp. disconnected	– Check wiring of sensor – Check sensor
E013	Case Temp. high	– check case/environment temperature – check programmed value, see 5.3.1.4, p. 50
E014	Case Temp. low	– check case/environment temperature – check programmed value, see 5.3.1.5, p. 50

Error	Description	Corrective action
E015	USP Error	– check process
E017	Control Timeout	– check control device or programming in Installation, Relay contact, Relay 1/2 see 5.3.2 and 5.3.3, p. 51
E019	Sensor shorted	– Check wiring of sensor – Check sensor
E020	Sensor interrupted	– Check wiring of sensor – Check sensor
E024	Input active	– See If Fault Yes is programmed in Menu see 5.3.4, p. 55
E026	IC LM75	– call service
E030	EEProm Frontend	– call service
E031	Calibration Recout	– call service
E032	Wrong Frontend	– call service
E033	Power-on	– none, normal status
E034	Power-down	– none, normal status
E065	Transmitter check	– none

8. Program Overview

For explanations about each parameter of the menus see Program List and Explanations, p. 40.

- 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
Message List 1.2*	*Number*	1.2.1*	
	Date, Time		

8.2. Diagnostics (Main Menu 2)

Identification	Desig.	AMI Rescon		* Menu numbers
2.1*	Version	V6.00-12/15		
	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	Cond. Sensor	*Current Value MOhm*		
2.2*	2.2.1*	*(Raw value) MOhm*		
		Cell Constant		
		Cal. History	*Number*	2.2.1.5.1*
		2.2.1.5*	*Date, Time*	
			RSlo (KOhm)	
	Miscellaneous	*Case Temp.*	2.2.2.1*	
	2.2.2*			
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 3			
Interface	*Protocol*	2.5.1*		
2.5*	*USB stick*			

8.3. Maintenance (Main Menu 3)

Simulation	*Alarm Relay*	3.1.1*	* Menu numbers
3.1*	*Relay 1*	3.1.2*	
	Relay 2	3.1.3*	
	Signal Output 3	3.1.4*	
Set Time	*(Date), (Time)*		
3.2*			
Transmitter check			
3.3*			
Fine adjust	*Current Value*	3.5.1*	
3.5*	*RSlo*		

8.4. Operation (Main Menu 4)

Sensors	*Filter Time Const.*	4.1.1*		* Menu numbers
4.1*	*Hold after Cal.*	4.1.2*		
Relay Contacts	**Alarm Relay**	**Alarm**	*Alarm High*	4.2.1.1.1*
4.2*	4.2.1*	4.2.1.1*	*Alarm Low*	4.2.1.1.22*
			Hysteresis	4.2.1.1.32*
			Delay	4.2.1.1.44*
	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*		

8.5. Installation (Main Menu 5)

Sensors	*Flow*			* Menu numbers
5.1*	5.1.1*			
	Meas. Mode			
	5.1.2*			
	USP Operating Mode			
	5.1.3			
	Sensor Parameters	*Cell Constant*		
	5.1.4	*Temp. Corr.*		
		Cable length		
	Temp. Compendation	*Comp.*	5.1.5.1	
	5.1.5*			
Signal Outputs	**Signal Output 3**	*Parameter*	5.2.1.1*	
5.2*	5.2.1*	*Current Loop*	5.2.1.2*	
		Function	5.2.1.3*	
		Scaling	*Range Low*	5.2.1.40.10*
		5.2.1.40	*Range High*	5.2.1.40.20*
Relay Contacts	**Alarm Relay**	**Alarm**	*Alarm High*	5.3.1.1.1*
5.3*	5.3.1*	5.3.1.1*	*Alarm Low*	5.3.1.1.22
			Hysteresis	5.3.1.1.32
			Delay	5.3.1.1.42
		Sample Flow	*Flow Alarm*	5.3.1.2.1
		5.3.1.2*	*Alarm High*	5.3.1.2.2*
			Alarm Low	5.3.1.2.32*
		Sample Temp.	*Alarm High*	5.3.1.3.1*
		5.3.1.3*	*Alarm Low*	5.3.1.3.22*
		Case Temp. high	5.3.1.4*	
		Case Temp. low	5.3.1.5*	
	Relay 1/2	*Function*	5.3.2.1–5.3.3.1*	
	5.3.2* - 5.3.3*	*Parameter*	5.3.2.20–5.3.3.20*	
		Setpoint	5.3.2.300–5.3.3.300*	
		Hysteresis	5.3.2.400–5.3.3.400*	
		Delay	5.3.2.50–5.3.3.50*	

	Input	*Active*	5.3.4.1*
	5.3.4*	*Signal Outputs*	5.3.4.2*
		Output/Control	5.3.4.3*
		Fault	5.3.4.4*
		Delay	5.3.4.5*
Miscellaneous	*Language*	5.4.1*	
5.4*	*Set defaults*	5.4.2*	
	Load Firmware	5.4.3*	
	Password	*Messages*	5.4.4.1*
	5.4.4*	*Maintenance*	5.4.4.2*
		Operation	5.4.4.3*
		Installation	5.4.4.4*
	Sample ID	5.4.5*	
Interface	*Protocol*	5.5.1*	
5.5*	*USB Stick*		

* Menu numbers

9. Program List and Explanations

1 Messages

1.1 Pending Errors

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

1.2 Message List

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

2 Diagnostics

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

2.1 Identification

Desig.: Designation of the instrument.
Version: Firmware of instrument (e.g. V6.00-12/15)

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 Cond.Sensor:

- *Current value*: Shows the actual measuring value in MΩ or µS.
- *Raw value*: Shows the actual measuring value in MΩ or µS.
- *Cell Constant*: Shows the cell constant.

2.2.1.5 **Cal. History:** Only visible in resistivity mode. Shows the values of the last fine adjust.

- *Number*: Calibration counter
- *Date, Time*: Date and time of calibration
- *RSlo*: Measured resistance

Max. 64 data records are memorized.

2.2.2 **Miscellaneous**:

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

2.3 Sample

2.3.1 *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.

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 3*: Actual current in mA

2.5 Interface

2.5.1 Protocol USB Stick.

3 Maintenance

3.1 Simulation

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

- Alarm relay
- Relay 1and 2
- Signal output 3 (signal outputs 1 and 2 are deactivated)

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.

3.4.1	*Alarm Relay:*	Active or inactive
3.4.2	*Relay 1:*	Active or inactive
3.4.3	*Relay 2*	Active or inactive
3.4.4	*Signal Output 3*	Actual current in mA

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.

3.2 Set Time

Adjust date and time.

3.3 Transmitter check

The AMI INSPECTOR Resistivity is delivered with a Swansensor RC U with integrated cable. Therefore the Transmitter check is not applicable with the AMI INSPECTOR Resistivity.

3.5 Fine adjust

The function “Fine Adjust” is only available if the AMI INSPECTOR Resistivity is set to the measuring mode resistivity.

The function “Fine Adjust” is used to compensate a possible drift of the electronic components. It is performed automatically every night at 00:30 h.

It is also possible to start the function “Fine Adjust” manually in the menu <Maintenance>/<Fine adjust>.

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

4.2 Relay Contacts

See Relay Contacts 1 and 2, p. 19

4.3 Logger

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

The Records consists of: Date, time, alarms, measuring value, raw value (MΩ), 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.

4.3.3 *Eject USB Stick:* With this function all logger data are copied to the USB stick before the USB stick is deactivated.

5 Installation

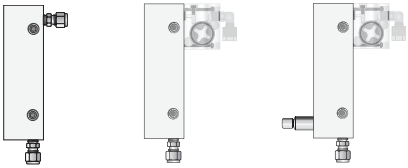
5.1 Sensors

5.1.1 **Flow:** A QV-Hflow flow cell is supplied with the AMI Inspector as standard.

From the following possibilities select the flow cell Q-Hflow.

Mode
None
Q-flow
Q-Hflow

B-Flow Q-Flow QV-flow



Selection of the suitable flow cell.

Mode	**Flow cell type**
None	B-Flow
Q-flow	Q-Flow or QV-Flow
Q-Hflow	Q-Hflow or QV-Hflow

5.1.2 Meas. Mode: The two measuring modes Conductivity or Resistivity are available.

5.1.3 **USP Operating Mode:** Switch the USP Operating Mode on or off.

5.1.4 Sensor parameters:

5.1.4.1 *Cell Constant*: Enter the cell constant ZK printed on the label of the sensor (see Sensor Parameters, p. 21).

5.1.4.2 *Temp. Corr*: Enter the temperature correction value DT printed on the label of the sensor (see Sensor Parameters, p. 21).

5.1.4.3 *Cable length*: Enter the cable length of the sensor. If the flow cell is installed on the monitor, set the cable length to 0 m

5.1.5 **Temp. Compensation:** Choose between

- none
- coefficient
- neutral salts
- high purity water
- strong acids
- strong bases
- ammonia, ethanolamine
- morpholine

5.2 Signal Outputs

5.2.1 Signal Output 3 (signal outputs 1 and 2 are deactivated)

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

Resistivity	Conductivity
Meas. Value	Meas. Value
Temperature	Temperature
Sample Flow	Sample Flow
Meas. uc	

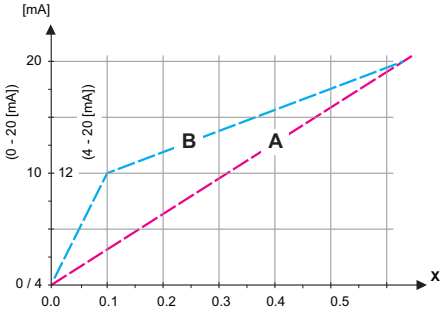
5.2.1.2 *Current Loop:* Select the current range of the signal output. Make sure the connected device works with the same current range.
Available ranges: 0–20 mA or 4–20 mA

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:

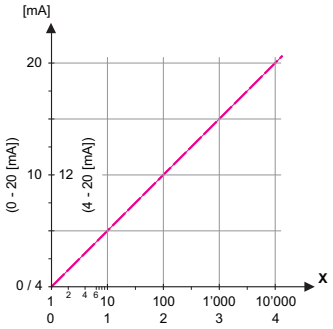
- Linear, bilinear or logarithmic for process values.
  See As process values, p. 45
- Control upwards or control downwards for controllers.
  See As control output, p. 47

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.

If Parameter = **Meas. Value**

5.2.1.40.10 Range low: 0.00–200 MΩ or 0.000–2000 µS

5.2.1.40.20 Range high: 0.00–200 MΩ or 0.000–2000 µS

If Parameter = **Temperature**

5.2.1.40.11 Range low: -30.0 to 130 °C

5.2.1.40.21 Range high: -30.0 to 130 °C

If Parameter = **Sample flow**

5.2.1.40.12 Range low: 0–200 l/h

5.2.1.40.22 Range high: 0–200 l/h

If Parameter = **Meas. uc**

5.2.1.40.13 Range low: 0.00–200 MΩ or 0.000–2000 µS

5.2.1.40.23 Range high: 0.00–200 MΩ or 0.000–2000 µS

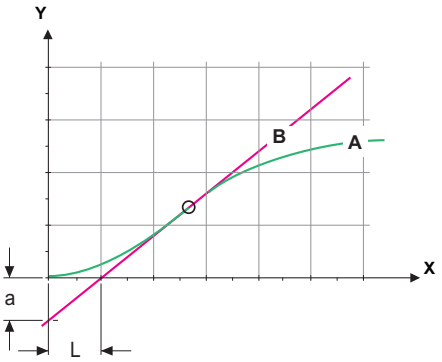
As control output

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.

If Control upwards or Control downwards is active
Setpoint: User-defined process value (Measured value or flow)
P-Band: Range below (upwards control) or above (downwards control) the set-point, within the dosing intensity is reduced from 100% to 0% to reach the set-point without overshooting.

5.2.1.43 **Control Parameters:** if Parameter = Meas. value
5.2.1.43.10 *Setpoint*: 0.00–200 MΩ or 0.000–2000 µS
5.2.1.43.20 *P-Band*: 0.00–200 MΩ or 0.000–2000 µSI

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

5.2.1.43 **Control Parameters:** if Parameter = Sample Flow
5.2.1.43.12 *Setpoint*: 0–200 l/h
5.2.1.43.22 *P-Band*: 0–200 l/h

5.2.1.43 **Control Parameters:** if Parameter = Meas. uc
5.2.1.43.13 *Setpoint*: 0.00–200 MΩ or 0.000–2000 µS
5.2.1.43.23 *P-Band*: 0.00–200 MΩ or 0.000–2000 µS

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:

- Meas. Value
- Temperature
- Sample Flow (if a flow sensor is selected)
- Case Temperature high
- Case Temperature low

5.3.1.1 **Alarm**

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: 0.000–2000 µS or 0.00–200 MΩ

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: 0.000–2000 µS or 0.00–200 MΩ

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. 0.000–2000 µS or 0.00–200 MΩ

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

NOTICE: *Sufficient flow is essential for a correct measurement. We recommend to program yes.*

5.3.1.2.2 *Alarm High:* If the measuring value rises above the programmed value E009 will be issued.
Range: 0–200 l/h

5.3.1.2.36 *Alarm Low:* If the measuring value falls below the programmed value E010 will be issued.
Range: 0–200 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 to +160 °C

5.3.1.3.26 *Alarm Low:* If the measured value rises above the alarm high value, the alarm relay is activated and E008 is issued.
Range: -30 to +130 °C

5.3.1.4 *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 *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.

NOTICE: *The navigation in the menu <Relay 1> and <Relay 2> is identical. 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.

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*: select a process value

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

Parameter	Range
Meas. Value	0.00–200 MΩ or 0.000–2000 µS
Temperature	-30 to + 130 °C
Sample flow	0–200 l/h
Meas. uc (uncompensated)	0.00–200 MΩ or 0.000–2000 µS

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
Meas. Value	0.00–200 MΩ or 0.000–2000 µS
Temperature	0–100 °C
Sample flow	0–200 l/h
Meas. uc (uncompensated)	0.00–200 MΩ or 0.000–2000 µS

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*: select a process value (Meas. Value, Temperature, Sample flow, Meas. uc)

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. 48

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. 48

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. 48

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

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. 54.
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:

Continuous:	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):

Continuous:	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.
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.

Language
German
English
French
Spanish

5.4.2 *Set defaults:* Reset the instrument to factory default values in three different ways:

Set defaults
no
Calibration
In parts
Completely

- **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.

Load Firmware
no
yes

5.4.4 Password: Select a password different from 0000 to prevent unauthorized access to the following menus:

5.4.4.1 Messages

5.4.4.2 Maintenance

5.4.4.3 Operation

5.4.4.4 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.

5.5 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: 1 200–115 200 Baud

5.5.41 Parity: Range: none, even, odd

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

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

10. Default Values

NOTICE: *The Inspector AMI Rescon has two different measuring modes (Resistivity or Conductivity) which can be set in menu <Installation>/<Sensors>/<Meas. Mode>. The instrument remains in the selected operating mode even after the <Default Values> are reset completely. Therefore this default value list is divided in the two parts Resistivity and Conductivity where necessary.*

Operation:

Sensors:	Filter Time Const.: ..... 10 s
	Hold after Cal.: ..... 300 s
Alarm Relay	..... same as in Installation
Relay 1 and 2	..... same as in Installation
Input	..... same as in Installation
Logger:	Logger Interval: ..... 30 min
	Clear Logger: ..... no

Installation:

Sensors	Flow: ..... None
	Meas. Mode: ..... remains as set, Resistivity or Conductivity
	USP Operating Mode: ..... Off
	Sensor parameters
	Cell Constant: ..... 0.01000 cm^{-1}
	Temp. Corr. ..... 0.00 °C
	Cable length ..... 0.0 m
	Temp. Compensation
	Comp. ..... None
Signal Output 3	Parameter: ..... Meas. Value
	Current loop: ..... 4 –20 mA
	Function: ..... linear
Resistivity	Scaling: Range low: ..... 0.00 MΩ
	Scaling: Range high: ..... 20.00 MΩ
Conductivity	Scaling: Range low: ..... 0.000 µS
	Scaling: Range high: ..... 1000 µS

Alarm Relay:	Alarm:	
Resistivity	Alarm high:	200 MΩ
	Alarm low:	0.00 MΩ
	Hysteresis:	1.00 MΩ
Conductivity	Alarm high:	2000 µS
	Alarm low:	0.000 µS
	Hysteresis:	10.00 µS
	Delay:	5 s
	Sample Flow; Flow Alarm	yes
	Sample Flow; Alarm high	120 l/h
	Sample Flow; Alarm low	5 l/h
	Sample Temp; Alarm high:	90 °C
	Sample Temp; Alarm low:	0 °C
	Case temp. high:	65 °C
	Case temp. low:	0 °C
Relay 1 and 2	Function:	limit upper
	Parameter:	Meas. Value
Resistivity	Setpoint:	200 MΩ
	Hysteresis:	1 MΩ
Conductivity	Setpoint:	1000 µS
	Hysteresis:	10.00 µS
	Delay:	30 s
	If Function = Control upw. or dnw:	
	Parameter:	**Meas. Value**
	Settings: Actuator:	Frequency
	Settings: Pulse Frequency:	120/min
Resistivity	Settings: Control Parameters: Setpoint:	200 MΩ
	Settings: Control Parameters: P-band:	1 MΩ
Conductivity	Settings: Control Parameters: Setpoint:	1000 µS
	Settings: Control Parameters: P-band:	10.00 µS
	Parameter:	**Temperature**
	Settings: Actuator:	Frequency
	Settings: Pulse Frequency:	120/min
	Settings: Control Parameters: Setpoint:	50 °C
	Settings: Control Parameters: P-band:	1 °C
	Parameter:	**Sample flow**
	Settings: Actuator:	Frequency
	Settings: Pulse Frequency:	120/min
	Settings: Control Parameters: Setpoint:	25.0 l/h
	Settings: Control Parameters: P-band:	1 l/h

Common settings

Settings: Control Parameters: Reset time: ..... 0 s
Settings: Control Parameters: Derivative Time: ..... 0 s
Settings: Control Parameters: Control Timeout: ..... 0 min
Settings: Actuator: ..... Time proportional
Cycle time: ..... 60 s
Response time: ..... 10 s
Settings: Actuator ..... Motor valve
Run time: ..... 60 s
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: ..... - - - - - - - -

Interface: Protocol: ..... USB Stick

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12. Notes

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