swan
ANALYTICAL INSTRUMENTS

AMI Hydrazine

Version 6.20 and higher

Operator's Manual

A-96.250.501 / 020720

Customer Support
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Document Status

Title:	AMI Hydrazine Operator's Manual	
ID:	A-96.250.501	
Revision	**Issue**	
00	June 2007	First Edition
01	April 2015	Update to Rev. 5.40, mainboard V2.4
02	July 2017	Update to Rev. 6.10, mainboard V2.5
03	July 2020	Mainboard V2.6

Table of Content

AMI Hydrazine–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

Electrical Shock Hazard

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

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

WARNING

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

WARNING

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

1.3. Restrictions for use

Alcalizing Reagent

Correct the pH of the sample with Diisopropylamine only, however, Diisopropylamine is not included in delivery. Please buy it from your local supplier: E.g. VWR 6x 1l: 8.03646.1000, or SIGMA 38290-1L-F.

Sample Requirements

No sand (or other polishing material) or oil are allowed in the sample.
The instrument is specified for a max. pressure of 2 bar (28 psi). If the sample pressure exceeds 2 bar, please mount a pressure reduction in front of the instrument inlet.
Phosphates may interfere with the hydrazine measurement.
The pH value of the sample must be equal or higher than pH 7.

Flow Interruption

High concentrations of Diisopropylamine reagent may attack the acrylic material of the flow cell. This can cause cracks and render the flow cell completely unusable. This will not happen during normal operation. However, if the sample flow is stopped, undiluted diisoproylamine will diffuse through the diffusion tube and can cause damage. Therefore, the following rules should be observed if the sample flow is stopped for more than one day:

Remove diisopropylamine bottle and close it. Keep it in a safe place for further use.

WARNING

Diisopropylamine is corrosive.

- Read the Safety Data Sheets (SDS) first.
- Wear suitable protective clothing, gloves and eye/face protection.
- Avoid inhalation of DIPA vapor.
- In case of contact with eyes, rinse immediately with plenty of water eyelid wide open for at least 10 min, summon medical advice. In case of accident or if you feel unwell, summon medical advice immediately (show the label where possible).
- Screw an empty reagent bottle on the holder.
- Let the sample flow for another 30 minutes to rinse out the Diisopropylamine dissolved in the diffusion tubing material.
- Stop sample flow.

2. Product Description

2.1. Description of the System

Microprocessor controlled system for the determination and control of hydrazine or carbohydrazide used as boiler feedwater oxygen scavengers.

Application

Hydrazine is used in power plants as an oxygen scavenger. It helps to remove oxygen, which may cause corrosion in the power plant. The reaction of hydrazine with oxygen produces nitrogen and water.

Signal Outputs

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

Current loop: 0/4–20 mA
Maximal burden: 510 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).

Relays

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

One input for potential-free contact to freeze the measuring value or to interrupt control in automated installations. Programmable as HOLD or OFF function.

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

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.

Reagent consumption

Reagent consumption (at 25 °C):
< 1 l of diisopropylamine per month

Measuring principle

3-electrode amperometry:

The sensor consists of two platinum electrodes and a reference electrode. A voltage is applied to the platinum electrodes and kept on a optimum level by the reference electrode. The hydrazine in the sample generates a small current on the platinum pin electrode, which is proportional to the hydrazine concentration.

For an optimal sensitivity and stability, a rotor continuously cleans the surfaces of the platinum electrodes (hydrodynamic cleaning). To ensure a sufficient sample flow, a Hall-Sensor detects the rotations of the rotor. If the rotation speed falls below a certain value, a flow Alarm is triggered.

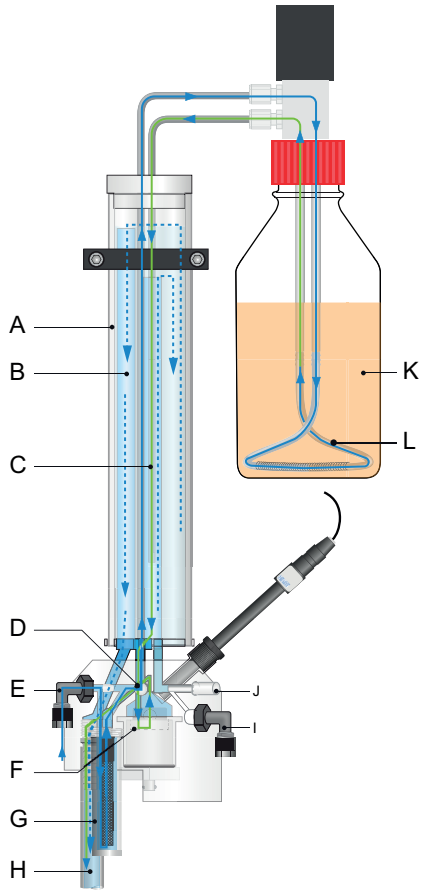
The signal of amperometric systems depends on flow rate. The constant head guarantees a constant flow if the sample always overflows into the longer constant head tube.

Temperature compensation is done automatically.

Fluidics

The measurement of hydrazine requires a high pH of the sample. The AMI Hydrazine buffers the pH to pH>10.5 by adding diisopropylamine. The diisopropylamine is dissolved in the water while flowing through a diffusion tube.

The sample enters at the sample inlet [E], passes the filter [G] and the flow regulating valve [D], where the sample flow can be adjusted. From there it flows through the diffusion tube [L] in the diisopropylamine bottle [K], picking up diisopropylamine and reaching pH>10.5. Afterwards, the sample is led directly into the shorter overflow tube [C]. From there it flows through the hydrazine sensor [F] and leaves the flow cell via sample outlet [H]. Excess sample overflows from the shorter overflow tube into the constant head [A], fills it until the sample overflows into the longer overflow tube. Sample must always overflow into the longer overflow tube to ensure constant flow and pressure at the hydrazine sensor. The sample leaves the flow cell via sample outlet [H].

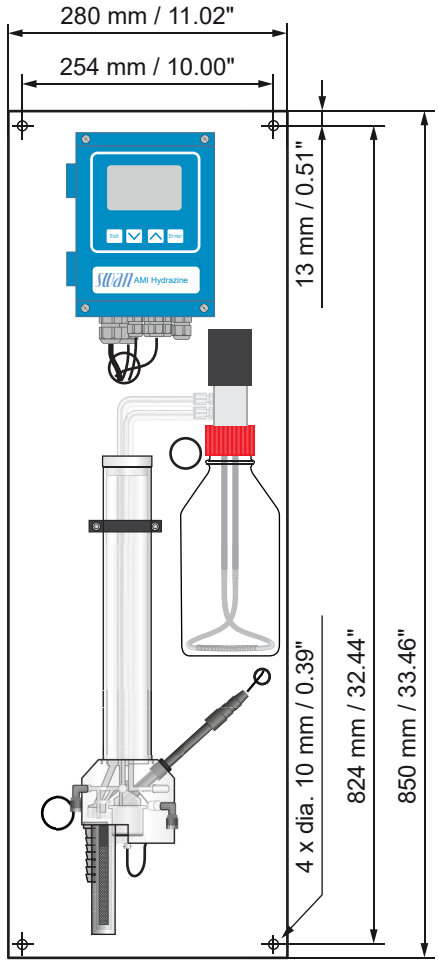


A	*Constant head*	***G***	*Filter vessel*
B	*Overflow tube to waste (long)*	***H***	*Sample outlet*
C	*Overflow tube to sensor (short)*	***I***	*Garb sample outlet*
D	*Flow regulating valve*	***J***	*Grab sample valve*
E	*Sample inlet*	***K***	*Diisopropylamine*
F	*Hydrazine sensor*	***L***	*Diffusion tube*

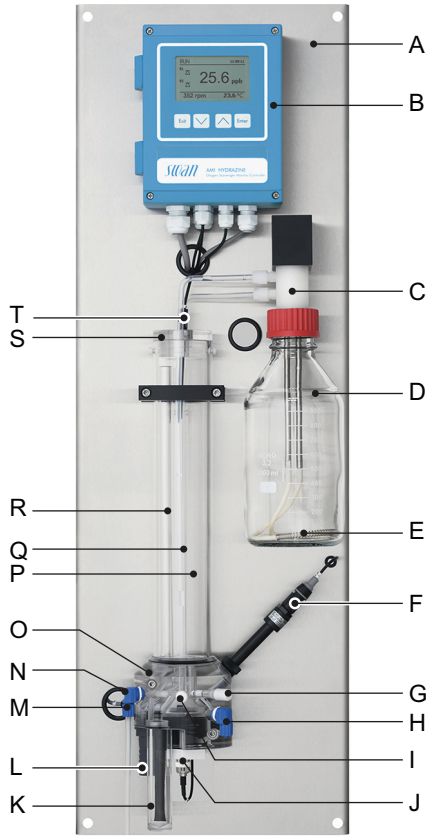
2.2. Instrument Specification

Power Supply	AC variant:	100–240 VAC (± 10%) 50/60 Hz (± 5%)
	DC variant	10–36 VDC
	Power consumption:	max. 35 VA
Transmitter specifications	Housing:	aluminum, with a protection degree of IP 66 / NEMA 4X
	Ambient temperature:	−10 to +50 °C
	Storage and transport:	−30 to +85 °C
	Humidity:	10–90% rel., non condensing
	Display:	backlit LCD, 75 x 45 mm
Measuring range Hydrazine	Range:	0.1–600 ppb
	Accuracy:	5% of reading up to 200 ppb ± 15% up to 600 ppb or ± 2 ppb (whichever is greater).
	Stability:	±5% of reading per month, or ±2ppb per month
	Response time:	90% of change in 60 sec after the sample entered the flow cell.
Measuring range temperature	Measuring range:	up to 60°C
	Resolution:	0.1 °C
Sample requirements	Flow rate:	approx. 15 l/h
	Temperature:	15 to 45 °C
	Sample inlet pressure:	0.15–2 bar
	Sample outlet pressure:	pressure free
	pH value:	equal or higher than pH 7.0
On-site requirements	The analyzer site must permit connections to:	
	Sample inlet:	Serto 4x6 mm
	Sample outlet:	Tube adapter 15x20 mm

Dimensions	Panel:	280x850x180 mm, stainless steel
	Mounting hole distance	254x824
	Screws:	8 mm diameter
	Weight:	12.0 kg



2.3. Instrument Overview



A *Panel*
B *Transmitter*
C *Bottle holder*
D *Diisoproylamine bottle*
E *Diffusion tube*
F *Reference electrode*
G *Grab sample valve*
H *Grab sample outlet*
I *Flow regulating valve*
J *Hydrazine sensor*
K *Filter vessel*
L *Sample outlet*
M *Sample inlet*
N *Hall sensor (not visible)*
O *Flow cell block*
P *Constant head*
Q *Overflow tube to sensor (short)*
R *Overflow tube to waste (long)*
S *Constant head cover*
T *Temperature sensor*

3. Installation

3.1. Installation Checklist Monitors

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 Instrument Specification, p. 11).
Installation	Mounting of Instrument Panel, p. 15. Connecting Sample and Waste, p. 15.
Electrodes	Install the Reference Electrode, p. 16. Install the Temperature Sensor, p. 17.
Diisopropylamine	Install the Diisopropylamine Bottle, p. 28.
Electrical wiring	Connect all external devices like limit switches, current loops and pumps, see Connection Diagram, p. 20. Connect the power cord, see Power Supply, p. 21.
Power-up	Establish Sample Flow, p. 29. Switch on power. Adjust sample flow according to flow cell specifications.
Instrument set-up	Program all necessary parameters see Programming, p. 29. Program all parameters for external devices (interface, recorders, etc.). Program all parameters for instrument operation (limits, alarms).
Run-in period	Let the instrument run-in for approximately 30 min continuous operation. See Run in period, p. 29.

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.

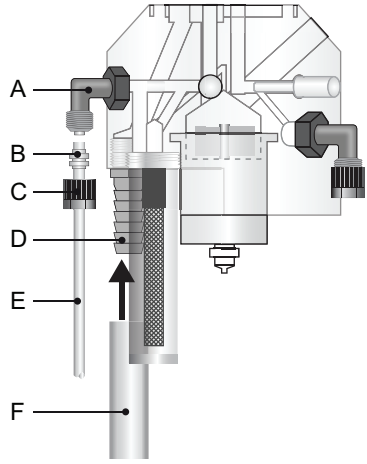
3.3. Connecting Sample and Waste

Sample inlet

Slide the knurled nut [C] and the compression ferrule [B] over the 4x6 plastic tube [E]. Push it into the serto fitting [A] and tighten the knurled nut.

Waste

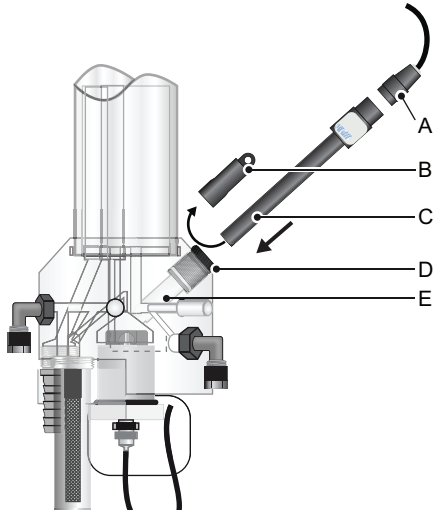
Connect the 1/2” tube [F] to the hose nozzle [D] and place it into a pressure free drain.



A *Serto fitting at sample inlet*
B *Compression ferrule*
C *Knurled nut*
D *Hose nozzle at sample outlet*
E *Plastic tube 4x6*
F *1/2” tube*

3.4. Install the Reference Electrode

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



A *Connector*
B *Protective cap*
C *Reference sensor*
D *Union nut*
E *Flow cell block*

To install the reference electrode proceed as follows:

1 Loosen the union nut [D].

2 Remove the protective cap [B] from the reference electrode [C].

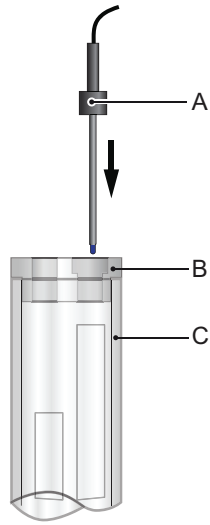
3 Push the reference electrode through the union nut [D] into the bore of the flow cell block [E] as far as it will go.

4 Tighten the union nut.

5 Remove the connector [A] from the panel and screw it onto the reference electrode.

3.5. Install the Temperature Sensor

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



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

To install the temperature sensor proceed as follows:

1 Remove the temperature sensor [A] from the panel.

2 Put the temperature sensor in the designated hole of the constant head cover [B].

3 Push it into the hole as far as it will go.

3.6. Electrical Connections

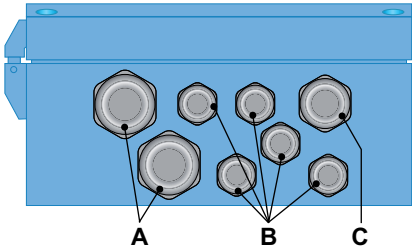
WARNING

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*

NOTICE: *Protect unused cable glands*

Wire

- For Power and 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 resuming installation.
  - relay 1
  - relay 2
  - alarm relay

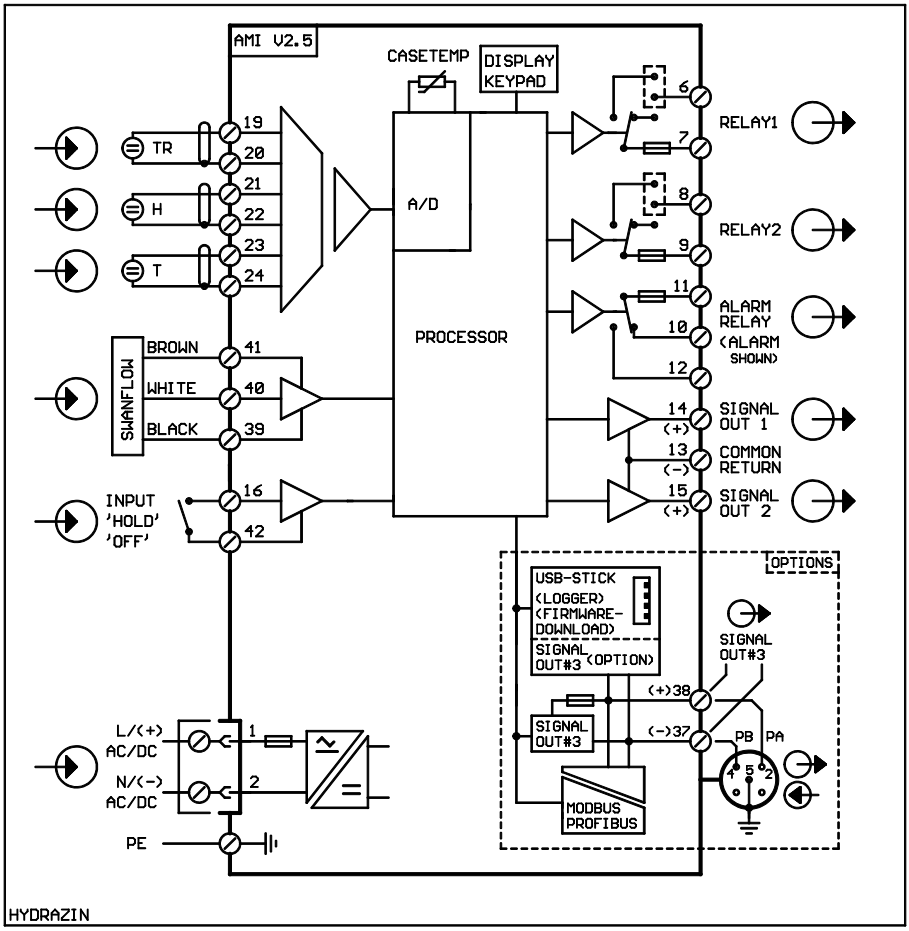
WARNING

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

WARNING

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

3.6.1 Connection Diagram



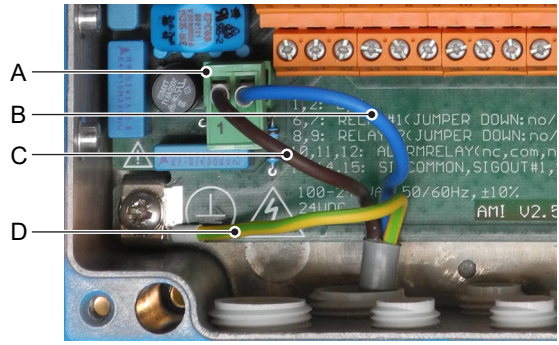
CAUTION

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.

3.6.2 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*

NOTICE: *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 Hydrazine

3.7. Relay Contacts

Programming of the relay contacts see 5.3 Relay Contacts, p. 67

3.7.1 Input

NOTICE: *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.*

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

For programming see menu 5.3.4, p. 73

3.7.2 Alarm Relay

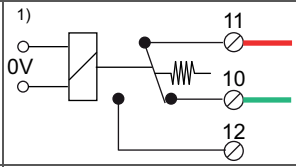
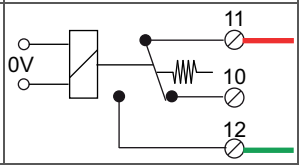
NOTICE: *Max. load 1 AT / 250 VAC*

Alarm output for system errors.

Error codes see Troubleshooting, p. 50

Programming see menu 5.3.1, p. 67

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	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.	

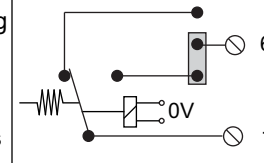
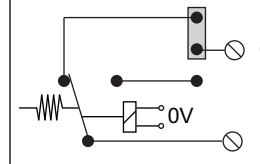
1) *usual use*

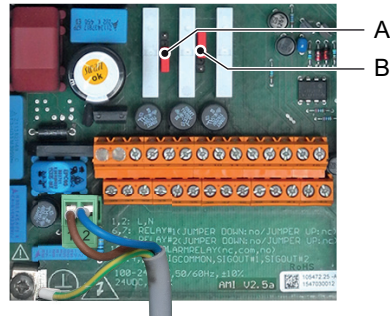
3.7.3 Relay Contacts 1 and 2

NOTICE: *Rated load 1 AT / 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.

NOTICE: *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 Menu Installation 5.3.2 and 5.3.3, p. 69

CAUTION

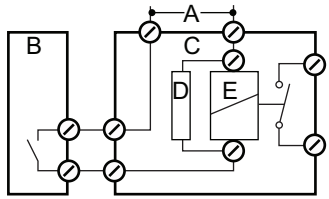
Risk of damage of the relays in the AMI Transmitter due to heavy inductive load.

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

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

Inductive load

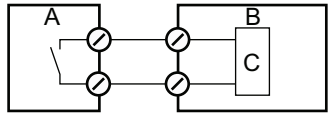
Small inductive loads (max 0.1 A) as for example the coil of a power relay can be switched directly. To avoid noise voltage in the AMI Transmitter it is mandatory to connect a snubber circuit in parallel to the load. A snubber is not necessary if an AMI relaybox is used.



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

Resistive load

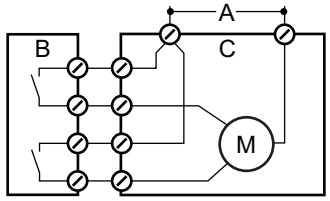
Resistive loads (max. 1 A) and control signals for PLC, impulse pumps and so on can be connected without further measures



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

Actuators

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



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

3.8. Signal Outputs

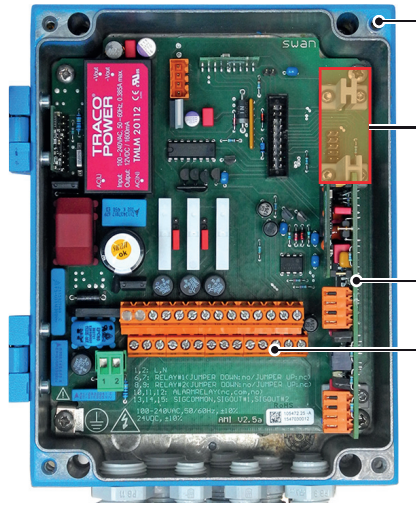
3.8.1 Signal Output 1 and 2 (current outputs)

NOTICE: *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 (-)

For programming see Chapter 9, 5.2 Signal Outputs, p. 64, Menu Installation

3.9. 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:

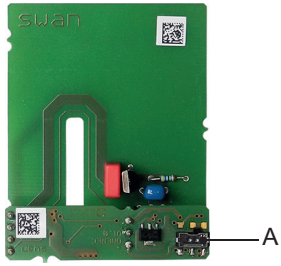
- Third signal output
- a Profibus or Modbus connection
- an USB Interface
- a HART interface

3.9.1 Signal Output 3

Terminals 38 (+) and 37 (-).

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

NOTICE: *Max. burden 510 Ω.*



Third signal output 0/4 - 20 mA PCB

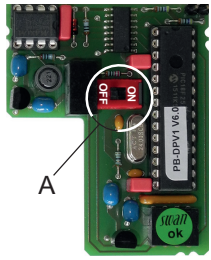
A Operating mode selector switch

3.9.2 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.

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



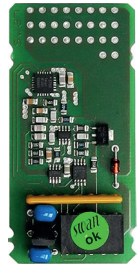
Profibus, Modbus Interface PCB (RS 485)

A On - OFF switch

3.9.3 HART Interface

Terminals 38 (+) and 37 (-).

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

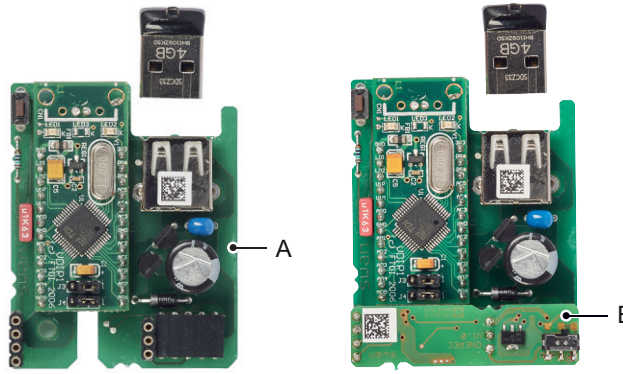


HART Interface PCB

3.9.4 USB Interface

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

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



USB Interface

A USB interface PCB

B Third signal output 0/4 - 20 mA PCB

4. Instrument Setup

4.1. Install the Diisopropylamine Bottle

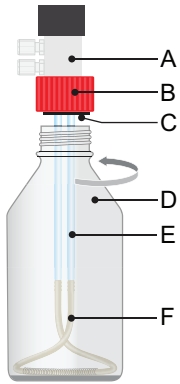
Only install the diisopropylamine bottle if you intend to start operation immediately. Do not it install if no sample in available!

Fill the Diisopropylamine into the glass bottle (G45 thread), delivered with the instrument. If you want to connect a Merck bottle directly, you need a thread adapter which can be ordered at SWAN, order number C-83.591.010.

WARNING

Diisopropylamine is corrosive.

- Read the Safety Data Sheets (SDS) first.
- Wear suitable protective clothing, gloves and eye/face protection.
- Avoid inhalation of DIPA vapor. To prevent formation of reagent vapors:
  - close the reagent bottle firmly
  - check the EPDM seal regularly
- In case of contact with eyes, rinse immediately with plenty of water eyelid wide open for at least 10 min, summon medical advice. In case of accident or if you feel unwell, summon medical advice immediately (show the label where possible).



A *Bottle holder*
B *Screw cover G 45*
C *EPDM seal mounted on the bottle holder*
D *Reagent bottle*
E *Steel tube*
F *Diffusions tube*

1 Fill roughly 750 ml high purity water into a 1 l beaker.
2 Dip the diffusion tube [F] into the beaker filled with high purity water and rinse it some seconds.
3 Push the diffusion tube over the steel tubes [E].
4 Open the reagent bottle [D], add 20 ml of high purity water.
5 Screw the reagent bottle into the screw cover [B], fixed to the bottle holder [A]
6 Make sure that the diffusions tube [F] is placed in the reagent bottle as shown in the picture above.
7 Tighten the screw cover well.

4.2. Establish Sample Flow

1 Make sure, that the grab sample valve is closed.
2 Open the flow regulating valve.
3 Wait until the flow cell is completely filled.
4 Switch on power.

4.3. Programming

Program all parameters for external devices (interface, recorders, etc.). Program all parameters for instrument operation (limits, alarms).
For explanations, see Program List and Explanations, p. 61.

4.4. Run in period

Let the instrument run-in for approximately 30 min continuous operation (flow on, power on). The Diisopropylamine needs roughly 30 min to penetrate the walls of new diffusion tubes.

4.5. Correction of Hydrazine Sensor

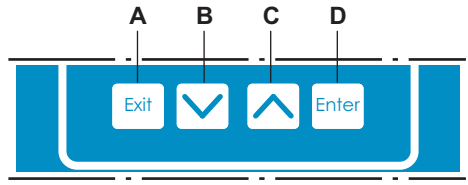
If necessary, correct the instrument after at least 30 min running-in. To correct the instrument the concentration of hydrazine in the sample has to be known. Hydrazine reacts with dimethylaminobenzaldehyde in an acid solution and forms a yellow color. The color intensity can be measured by a photometer. Refer to an appropriate standard method (e.g. DIN 38413).

The manual sample must be taken from the grab sample outlet of the flow cell. Let the sample flow out for roughly 1 minute before grabbing the sample for the manual analysis.

See Calibration of Hydrazine Sensor, p. 46.

5. Operation

5.1. Keys



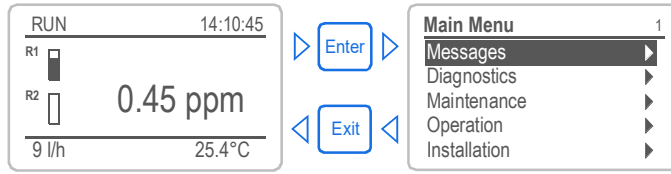
A to exit a menu or command (rejecting any changes)
to move back to the previous menu level

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

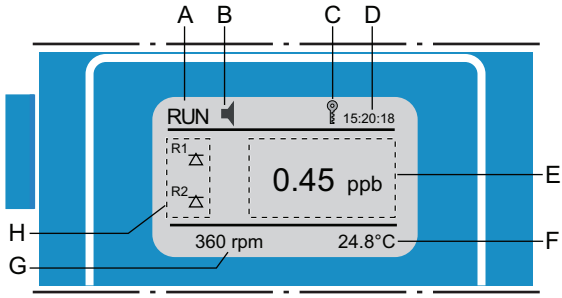
C to move UP in a menu list and to increase digits

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		
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

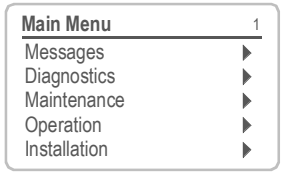
motor valve closed

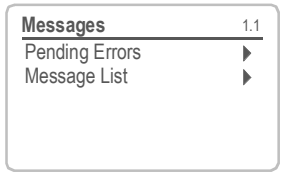
motor valve: open, dark bar indicates approx. position

timer

timer: timing active (hand rotating)

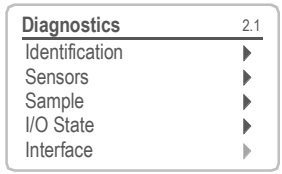
5.3. Software Structure





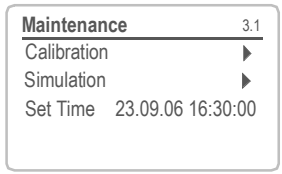
Menu **Messages 1**

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.



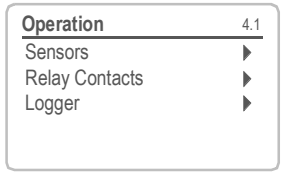
Menu **Diagnostics 2**

Provides user relevant instrument and sample data.



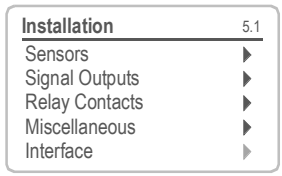
Menu **Maintenance 3**

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.



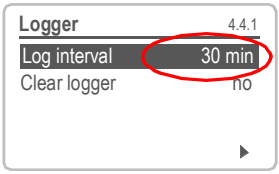
Menu **Installation 5**

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

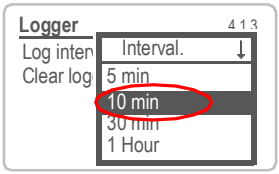
Changing parameters

The following example shows how to change the logger interval:



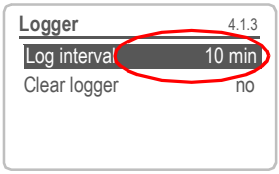
1 Select the parameter you want to change.

2 Press [Enter]



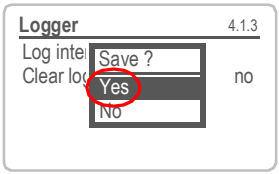
3 Press [▲] or [▼] key to highlight the required parameter.

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



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

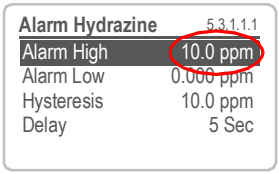
5 Press [Exit].



⇒ *Yes is highlighted.*

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

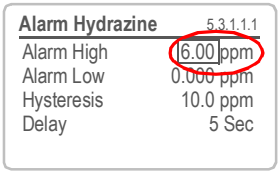
Changing values



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 supply for dirt. Check sample flow. Perform a process calibration, see Process Hydrazine, p. 47.
Monthly	Exchange Diisopropylamine bottle if there is less than 150 ml (half of the diffusion tube has to be covered with Diisopropylamine), see Changing the Diisopropylamine Bottle, p. 44.
Half-yearly	Replace sealing of reagent bottle (EPDM)
Yearly	Exchange diffusion tube, see Changing the Diffusion Tube, p. 45.

6.2. Stop of Operation for Maintenance

WARNING

Diisopropylamine is corrosive.

- Read the Safety Data Sheets (SDS) first.
- Wear suitable protective clothing, gloves and eye/face protection.
- Avoid inhalation of DIPA vapor.
- In case of contact with eyes, rinse immediately with plenty of water eyelid wide open for at least 10 min, summon medical advice. In case of accident or if you feel unwell, summon medical advice immediately (show the label where possible).

1 Wear safety gloves and safety glasses!

2 Remove the diisopropylamine bottle and close it well.

3 Screw an empty bottle on the holder. Let the sample run for 30 min.

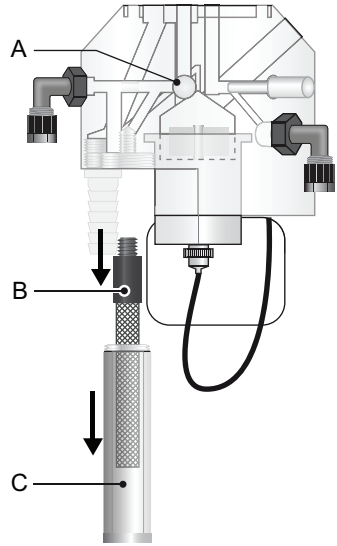
4 Stop sample flow by closing the flow regulating valve.

5 Wait until the rotor stops and hydrazine reading is 0 ppb.

6 Shut off power of the instrument.

7 Empty the constant head by opening the grab sample tap.

6.3. Cleaning of the Protective Filter



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

If the protection filter shows deposits, proceed as follows:

1 Close the flow regulating valve [A].

2 Close the sample main tap before the filter.

3 Unscrew and remove the filter vessel [C] from the flow cell block.

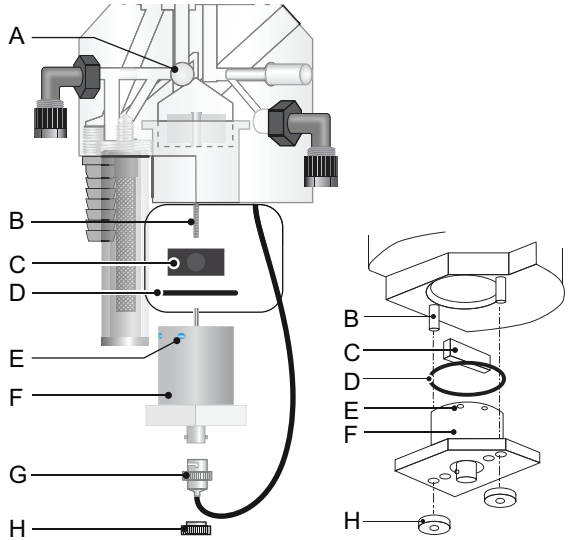
4 Unscrew and remove the filter from [B] the flow cell block.

5 Backwash the filter under pressure of tap water. Clean the outside of the filter.

6 Install the filter and filter vessel again.

7 Open sample supply and flow regulating valve again.

6.4. Cleaning of the Hydrazine Sensor



A *Flow regulating valve*
B *Threaded bolt*
C *Rotor*
D *O-Ring*
E *Orifices*
F *Hydrazine sensor*
G *BNC connector*
H *Knurled nut*

1 Close the flow regulating vale [A].

2 Wait until rotor [C] stops and hydrazine reading is 0 ppm.

3 Shut off power of the instrument.

4 Disconnect the BNC connector [G] from the hydrazine sensor [F].

⚠ *Prevent the connector from getting wet.*

5 Unscrew and remove one of the two knurled nuts [H].

CAUTION

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

6 Hold the hydrazine sensor [F] with one hand while unscrewing and removing the 2nd knurled nut.

7 Remove the hydrazine sensor from the flow cell.

⚠ *Take care not to spill the sample remaining in the sensor.*

Cleaning

1 Remove the rotor [C] from the hydrazine sensor.

2 Clean the tow orifices [E] with a pipe cleaner or a toothpick

3 Clean the rotor with a soft tissue.

4 Cautiously wipe the sensor with a soft tissue, mainly the platinum parts and the whole area which is in contact with water.

5 After cleaning rinse all parts well with clean water.

Install

1 Put rotor on the sensor.

2 Install the sensor into the flow cell.

3 Fasten the knurled nuts hand-tight.

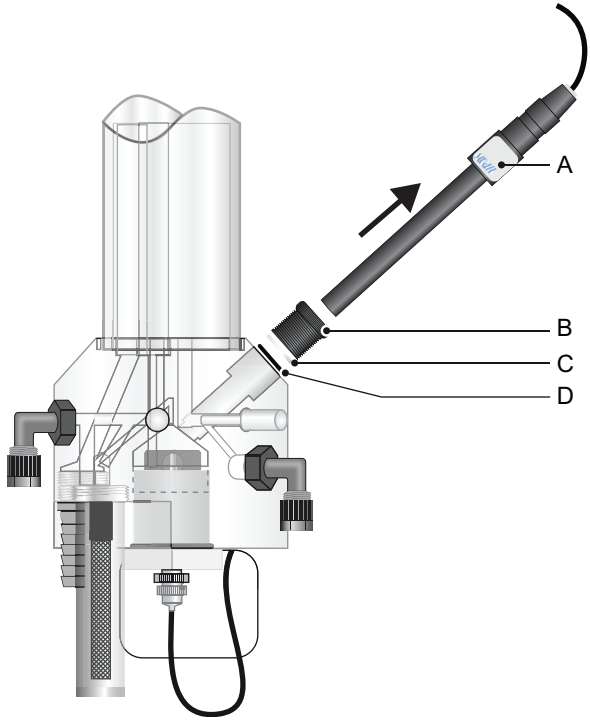
4 Connect the BNC connector to the hydrazine sensor.

5 Open the sample flow.

6 As soon as the rotor is turning, switch on power.

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

6.5. Cleaning of Reference Electrode



A *Reference electrode*
B *Union screw*
E *Washer*
F *O-Ring*

1 Close the flow regulating vale.

2 Loosen the union screw [B].

3 Pull the reference electrode out.

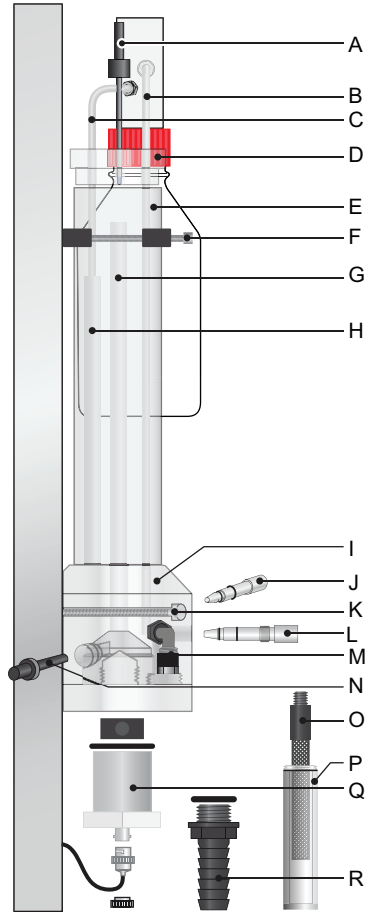
4 Wipe sensor tip cautiously with a soft tissue. If necessary use alcohol to remove oily deposits.

⚠ *Do not use any acid!*

5 Push the reference electrode through the union screw into the flow cell as far as it will go.

6 Tighten the union screw.

6.6. Cleaning of Flow Cell



A *Temperature senor*
B *Tube from sample inlet*
C *Tube to hydrazine sensor*
D *Constant head cover*
E *Constant head tube*
F *Constant head tube fixation*
G *Overflow tube to waste*
H *Overflow tube to sensor*
I *Flow cell block*
J *Grab sample tap*
K *Fixing screw*
L *Flow regulating valve*
M *Sample Inlet*
N *Hall sensor*
O *Filter*
P *Filter vessel*
Q *Hydrazine sensor*
R *Sample outlet*

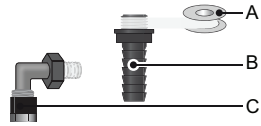
CAUTION

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

Disassemble the flow cell

1. Switch off the instrument.
2. Stop the sample flow at the main tap before the sample inlet.
3. Open the grab sample tap [J] to empty the flow cell.
4. Remove all sensors, see Cleaning of the Hydrazine Sensor, p. 38, Cleaning of Reference Electrode, p. 40 and temperature sensor.
5. Put the rubber cap on the tip of the reference electrode and plug cap on sensor plug.
6. Remove the following parts from the flow cell block [I], but without however removing the flow cell block from the panel:
   - Tube from sample inlet to DIPA bottle [B]
   - Tube from DIPA bottle to hydrazine sensor [C]
   - Constant head cover [D]
   - Constant head tube [E]
   - Overflow tube to waste (long) [G]
   - Overflow tube to sensor (short) [H]
   - Grab sample tap [J]
   - Sample inlet [M] and grab sample outlet (not visible)
   - Filter vessel [P]
   - Filter [O]
   - Sample outlet [R]
   - Hall-Effect sensor [N]
   - Flow regulating valve [L]
7. Clean all acrylic parts with a soft brush (e.g. a bottle cleaner) and soapy water. Remove calcareous deposits with a common household deliming agent with standard concentrations.
8. Clean the bores of the flow cell block with pipe cleaners.

Assemble the flow cell



A *Teflon band*
B *Hose nozzle at sample outlet*
C *Serto fitting at sample inlet and grab sample outlet*

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

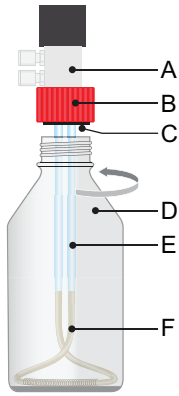
6.7. Changing the Diisopropylamine Bottle

Shut down the instrument as described in Stop of Operation for Maintenance, p. 36.

Consider the Warning concerning Diisopropylamine handling.

1. Fill roughly 750 ml high purity water into a 1 l beaker.
2. Unscrew and remove the almost empty reagent bottle [D].
3. Close the reagent bottle immediately.
4. Check the EPDM seal [C] for cracks an replace it if necessary.
5. Remove the diffusion tube [F] from the steel tubes [E].
6. Dip the diffusion tube into the beaker filled with high purity water. Rinse some seconds.
7. Push the diffusion tube over the steel tubes.
8. Open the new reagent bottle and add 20 ml of high purity water.

   NOTICE: *If you fill up Diisopropylamine into the almost empty bottle, no high purity water needs to be added.*
9. Slide the reagent bottle over the diffusions tube and ensure that it lies pretzel-shaped in the reagent bottle.
10. Fasten bottle to the bottle holder.
11. The liquid in the almost empty Diisopropylamine bottle must be disposed as chemical waste.



A *Bottle holder*
B *Screw cover G 45*
C *EPDM seal mounted on the bottle holder*
D *Reagent bottle*
E *Steel tube*
F *Diffusions tube*

6.8. Changing the Diffusion Tube

Shut down the instrument as described in Stop of Operation for Maintenance, p. 36.
Consider the Warning concerning Diisopropylamine handling.

1. Fill roughly 750 ml high purity water into a 1 l beaker.
2. Unscrew and remove Diisopropylamine bottle from the holder.
3. Close the bottle immediately.
4. Remove the old diffusion tube from the steel tubes.
5. Dip the new diffusion tube into the beaker filled with high purity water and rinse it some seconds.
6. Push the new diffusion tube over the steel tubes.
7. Open the reagent bottle and slide it over the diffusions tube.
   NOTICE: *Ensure that the diffusions tube lies pretzel-shaped in the reagent bottle as shown in the picture.*
8. Screw the bottle into the holder.

The correct measuring value will appear after 30 min of continuous operation (flow and power on). Diisopropylamine needs roughly 30 min to penetrate the walls of the new diffusion tube.

6.9. Calibration of Hydrazine Sensor

6.9.1 Calibration Procedure

Manual Measurement

Hydrazine reacts with dimethylaminobenzaldehyde in an acid solution and forms a yellow colour. The colour intensity is proportional to the concentration and can be determined by a photometer. Refer to an appropriate standard method.

Correction

The adjustment of the slope is called correction. The zero remains unchanged.

6.9.2 Zero Hydrazine

A zero point calibration is not necessary.
If your quality procedure specifies a zero point calibration, please proceed as described below:

NOTICE: *Let the instrument run continuously for at least 5 days in normal operation before doing a zero point calibration!*

1. Navigate to menu <Maintenance>/<Calibration>/<Zero Hydrazine>.
2. Press [Enter].
3. Follow the instructions on the screen.

During a zero calibration, the sample flow is turned off and the residual hydrazine in the small water volume around the sensor is consumed within 15–20 min. 0 ppb remains and after 30 min, a zero calibration is performed.

Current value / offset (Progress of zero cal. is shown). Wait until finished.

Open tap of the water inlet and regulate the sample flow.

6.9.3 Process Hydrazine

The sample must always overflow into the longer overflow tube of the constant head. Only perform process calibration if the difference is significant.

Grab sample

Take a grab sample directly from the flow cell. Open the grab sample valve and drain water for a minute before taking the sample.
Observe the displayed value of the AMI Hydrazine while taking the grab sample. The measuring value has to be stable.
Determine the hydrazine concentration of the sample by manual analysis.
Compare the result with the measuring value of the AMI Hydrazine.

If the measuring value of the AMI Hydrazine has changed while performing the manual analysis, enter the difference between the measuring values of the AMI Hydrazine.

Example

Displayed measuring value of AMI Hydrazine during grab sample: 10 ppb.

Displayed measuring value of AMI Hydrazine after concentration determination: 15 ppb.

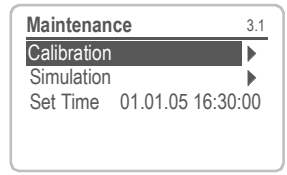
Determined hydrazine concentration: 8 ppb.

There is a change of the measurement value of 50% during the concentration determination. This means, you have to correct the determined hydrazine concentration also with a factor of 50%.

This will result in a value of 8 ppb + (50% of 8 ppb) = 12 ppb.

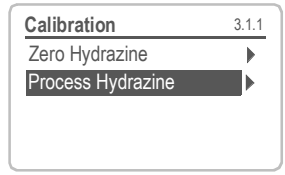
Finally, you have to enter 12 ppb as a process value at the AMI transmitter.

Example of Process Calibration



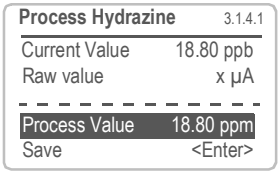
1 Navigate to menu <Maintenance>/<Calibration>.

2 Press [Enter].



1 Select Process Hydrazine.

2 Press [Enter].



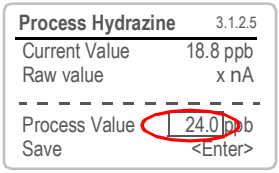
The following values are displayed:

- Current value
- Raw value
- Process value

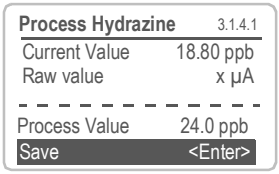
Current value and Process value are equal.

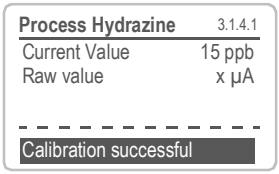
3 Press [Enter].

4 Enter the calculated value.
⇒ *Use the [▲] or [▼] keys to increase or decrease the Process value.*



5 Press [Enter] to save.





During calibration, control is interrupted. The signal outputs are frozen if hold after calibration has been programmed (menu 4.3.4.2). Otherwise the outputs track the measuring value. Hold after calibration is indicated by Hold in the display.

Possible error message see Troubleshooting, p. 50.

6.10. Longer Stop of Operation

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

Shut-down the instrument as described in chapter Stop of Operation for Maintenance, p. 36.

Consider the Warning concerning Diisopropylamine handling.

Then:

1. Remove the Diisopropylamine bottle from the bottle holder and close it well.
2. Remove the diffusion tube from the steel tubes and dip it into a beaker filled with high purity water. Rinse it some seconds.
3. Unscrew and remove the filter vessel from the flow cell block, empty and dry it, then screw it onto the flow cell block again.
4. Loosen the connector from the reference electrode and put the connector cap on the electrode plug.
   ⚠ *Do not spill water on connector.*
5. Remove the reference electrode from the flow cell block, fill water in the protective cap and put the protective cap on the electrode tip.
6. Store it dry and frost protected with tip pointing downwards.
7. Remove the BNC connector from the hydrazine sensor.
   ⚠ *Do not spill water on connector.*
8. Hold the hydrazine sensor with one hand while unscrewing and removing the 2nd knurled nut.
9. Remove the hydrazine sensor from the flow cell.
10. Dry it with a soft, clean tissue, and store dry.

7. Troubleshooting

This chapter provides some hints to make troubleshooting easier. For any detailed information how to handle or clean parts please see Maintenance, p. 35. For any detailed information how to program the instrument please see Program List and Explanations, p. 61.

Process calibration

Possible error message

- Current value too low or no sample flow.
- Offset Error
- Slope Error

Current value too low or no sample flow:

Possible cause	Corrective action
The ppb value of the sample is too low, thereby, the current difference to zero is too small.	◆ Process value used for calibration should be higher. ◆ Check the diagnostic value of the zero point.
Low sample flow resulting in no signal difference to zero.	Check sample inlet pressure, if necessary readjust sample flow to min. 170 rpm.
Hydrazine sensor contaminated Sensor does not provide enough current for the value measured with the manual analysis.	Clean sensor, see Cleaning of the Hydrazine Sensor, p. 38. In case of repeated sensor contamination, check for water treatment chemicals such as phosphates.

Offset Error:

Possible cause	Corrective action
Run-in time of sensor to short.	Let the sensor run-in at least 30 min
Zero point calibration was too short.	Repeat the zero point calibration

Slope Error:

Possible cause	Corrective action
Diisopropylamine bottle empty	Exchange Diisopropylamine bottle, see Changing the Diisopropylamine Bottle, p. 44 or Install the Diisopropylamine Bottle, p. 28.
Insufficient immersion depth of the diffusion tube.	Place the diffusion Tube correct, see Changing the Diffusion Tube, p. 45.
Orifices at sensor inlet clogged	Clean the senor, see Cleaning of the Hydrazine Sensor, p. 38.
Run-in time of diffusions tube too short	After replacing the diffusions tube let the instrument run in at least 30 min
Too much water in the Diisopropylamine bottle.	Check diffusion tube for leakage and replace it if necessary, see Changing the Diffusion Tube, p. 45. Install a new DIPA-bottle, see Install the Diisopropylamine Bottle, p. 28.
Sample flow too high.	Readjust the sample flow to min. 170 rpm
Sample flow too low	Sample flow must not be smaller than 170 rpm. Readjust sample flow to min. 170 rpm.

Reference electrode

The reference electrode may be old or damaged. Under the following conditions the reference voltage should be:

In water < 10 ppb oxygen and about 70 ppb hydrazine: ~ 1300 mV

In water with oxygen: ~ 400 mV

CE (counter electrode) value: 200–400 mV
Lower values indicate coated hydrazine sensors.

Diagnostic values

Offset: The offset is approx. 50 nA
An offset calibration is only necessary for Hydrazine values lower than 0.05 ppb. Running Time at least 24 hours.

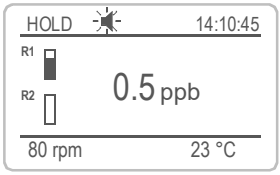
Slope: The slope is approx. 55 nA/ppb.

NOTICE: *Observe the running in time.*
A decreasing slope value over several process calibrations indicates coating of sensor.
Slope (and Zero) too high usually indicates that the running in time was too short.

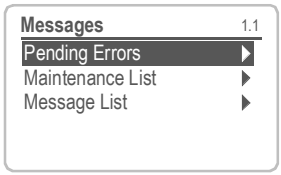
7.1. Error List

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:

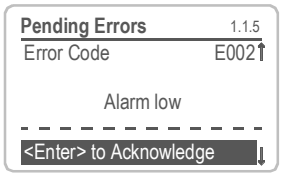
- Errors which disappear if correct measuring conditions are recovered (i.e. Sample Flow low).
  Such Errors are marked **E0xx** (bold and orange)
- Errors which indicate a hardware failure of the instrument.
  Such Errors are marked **E0xx** (bold and red)



Error or fatal Error
Error not yet acknowledged.
Check **Pending Errors 1.1.5 *** and take corrective action.
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	Hyd. Alarm high	– check process – check programmed value 5.3.1.1.1, p. 68
E002	Hyd. Alarm low	– check process – check programmed value 5.3.1.1.25, p. 68
E007	Sample Temp. high	– check process – check programmed value 5.3.1.3.1, p. 69
E008	Sample Temp. low	– check process – check programmed value 5.3.1.1.25, p. 68
E009	Sample Flow high	– check Inlet pressure – readjust sample flow – check programmed value 5.3.1.2.2, p. 68
E010	Sample Flow low	– check Inlet pressure – readjust sample flow – clean instrument – check programmed value 5.3.1.2.35, p. 69
E011	Temp. shorted	– Check wiring of temperature sensor, see Connection Diagram, p. 20. – Check sensor
E012	Temp. disconnected	– Check wiring of temperature sensor, see Connection Diagram, p. 20. – Check sensor
E013	Case Temp. high	– check case/environment temperature – check programmed value 5.3.1.4, p. 69
E014	Case Temp. low	– check case/environment temperature – check programmed value 5.3.1.5, p. 69

Error	Description	Corrective action
E015	Reference	– Check conductivity value of sample (must be > 5 µS/cm) – Check gain of hydrazine sensor. If too small, clean hydrazine sensor. – Exchange reference electrode.
E017	Control Timeout	– check control device or programming in Installation, Relay contact, Relay 1/2 see 5.3.2 and 5.3.3, p. 69
E024	Input active	– See If Fault Yes is programmed in Menu see 5.3.4, p. 73
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
E032	Wrong Frontend	– call service
E033	Power-on	– none, normal status
E034	Power-down	– none, normal status

7.2. Replacing Fuses

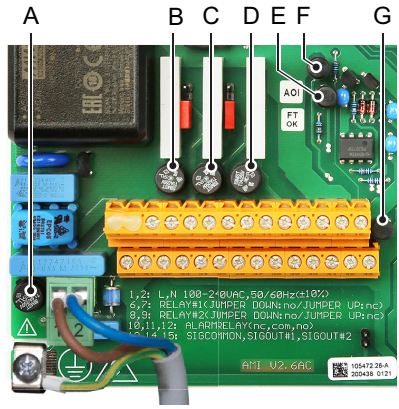
WARNING

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

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

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

8. Program Overview

For explanations about each parameter of the menus see Program List and Explanations, S. 61.

- 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	Designation	AMI Hydrazine		* Menu numbers
2.1*	Version	V6.20-05/18		
	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	**Hydrazine Sensor**	*Current Value*		
2.2*	2.2.1*	*(Raw value)*		
		Ref. voltage		
		Cal. History	*Number*	2.2.1.5.1*
		2.2.1.5*	*Date, Time*	
			Offset	
			Slope	
	Miscellaneous	*Case Temp.*	*2.2.2.1**	
	2.2.2*			
Sample	*Sample ID*	2.3.1*		
2.3*	*Temperature °C*			
	Nt5K Ohm			
	Sample Flow			
	(Raw value)			
I/O State	*Alarm Relay*	2.4.1*		
2.4*	*Relay 1 and 2*	2.4.2*		
	Input			
	Signal Output 1 and 2			
Interface	*Protocol*	2.5.1*		(only with RS485
2.5*	*Baud rate*			interface)

8.3. Maintenance (Main Menu 3)

Calibration	**Zero Hydrazine**		* Menu numbers
3.1*	3.1.1*		
	Process Hydrazine		
	3.1.2*		
Simulation	*Alarm Relay*	3.2.1*	
3.2*	*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)*		
3.3*			

8.4. Operation (Main Menu 4)

Sensors	*Filter Time Const.*	4.1.1*		
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*	4.2.1.1.26*
			Hysteresis	4.2.1.1.36*
			Delay	4.2.1.1.46*
	Relay 1 and 2	*Setpoint*	4.2.x.100*	
	4.2.2* and 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	*Temp.comp*	5.1.1*		* Menu numbers
5.1*				
Signal Outputs	**Signal Output 1 and 2**	*Parameter*	5.2.1.1 - 5.2.2.1*	
5.2*	5.2.1* and 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.40.10/10*
		5.2.x.40	*Range High*	5.2.x.40.20/20*
Relay Contacts	**Alarm Relay**	**Alarm Hydrazine**	*Alarm High*	5.3.1.1.1*
5.3*	5.3.1*	5.3.1.1*	*Alarm Low*	5.3.1.1.26
			Hysteresis	5.3.1.1.36
			Delay	5.3.1.1.46
		Sample Flow	*Flow Alarm*	5.3.1.2.1
		5.3.1.2*	*Alarm High*	5.3.1.2.2*
			Alarm Low	5.3.1.2.36*
		Sample Temp.	*Alarm High*	5.3.1.3.1*
		5.3.1.3*	*Alarm Low*	5.3.1.3.26*
		Case Temp. high	5.3.1.4*	
		Case Temp. low	5.3.1.5*	
	Relay 1 and 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	5.3.2.300–5.3.3.301*	
		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 Message List

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

2 Diagnostics

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

2.1 Identification

Desig.: Designation of the instrument.

Version: Firmware of instrument (e.g. V6.20-05/18)

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 **Hydrazine Sensor:**

- *Current value*: Actual measuring value in ppb
  (Raw value) measuring value in nA
- *Ref. Voltage*: Applied voltage at the counter electrode (CE) in mV

2.2.1.5 **Cal. History:** Shows the diagnostic values of the last calibrations of the hydrazine sensor. Only for diagnostic purpose.

- *Number*: Calibration counter
- *Date, Time*: Date and time of calibration
- *Offset*: Zero point displacement from the reference position in nA
- *Slope*: Steepness of the straight line in nA

Max. 65 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.
- *Sample Flow:* Shows the sample Flow in rpm
  (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 (option):	Actual current in mA

2.5 Interface

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

3 Maintenance

3.1 Calibration

3.1.1 Zero Hydrazine

Zero calibration (0 ppb). See Zero Hydrazine, p. 46 for more details.

3.1.2 Process Hydrazine

For a process calibration of the hydrazine sensor follow the instructions on the screen. Save the value with the [Enter] key. See Process Hydrazine, p. 47.

3.1 Simulation

To simulate a value or a relay state, select the

- alarm relay,
- relay 1or 2
- signal output 1or 2

with the [▲] or [▼] key.
Press the [Enter] key.

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

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 1:*	Actual current in mA
3.4.5	*Signal Output 2*	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 and the transmitter reboots.

3.2 Set Time

Adjust date and time.

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. 23

4.3 Logger

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

The logger can save approx. 1500 data records. The Records consists of: Date, time, alarms, measuring value, measuring value uncompensated, 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 Temp Comp

Temperature compensation in %.
Range: 0.0–5.0%

5.2 Signal Outputs

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

- Hydrazine
- Temperature
- Sample Flow

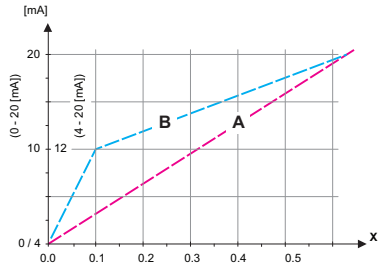
5.2.1.2 *Current Loop:* Select the current range of the signal output. Make sure the connected device works with the same current range. Available ranges: 0–20 mA or 4–20 mA

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:

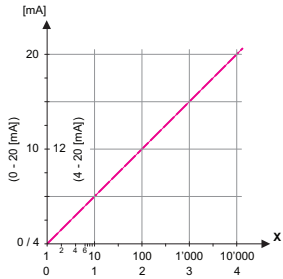
- Linear, bilinear or logarithmic for process values.
  See As process values, p. 65
- Control upwards or control downwards for controllers.
  See As control output, p. 66

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 = **Hydrazine**

5.2.1.40.10 Range low: 0.00–1000 ppb

5.2.1.40.20 Range high: 0.00–1000 ppb

If Parameter = **Temperature**

5.2.1.40.11 Range low: -30.0 to +120 °C

5.2.1.40.21 Range high: -30.0 to + 120 °C

If Parameter = **Sample flow**

5.2.1.40.12 Range low: 0–300 rpm

5.2.1.40.22 Range high: 0–300 rpm

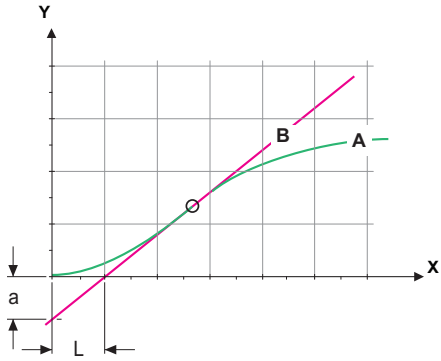
As control output

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

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

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

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



A	Response to maximum control output	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 = Hydrazine

5.2.1.43.10 *Setpoint*
Range: 0.00–1000 ppb

5.2.1.43.20 *P-Band*
Range:0.00–1000 ppb

5.2.1.43 **Control Parameters:** if Parameter = Temperature

5.2.1.43.11 *Setpoint*
Range: -30 to +120 °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 *Setpoint*
Range: 0–300 rpm

5.2.1.43.22 *P-Band*
Range: 0–300 rpm

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:

- Alarm Hydrazine
- Sample Flow
- Sample Temp.
- Case Temp. high
- Case Temp. low

5.3.1.1 Alarm Hydrazine

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: 0.00–1000 ppb

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: 0.00–1000 ppb

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. 0.00–1000 ppb

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 values rises above the programmed value E009 will be issued.
Range: 150–300 rpm

5.3.1.2.35 *Alarm Low:* If the measuring values falls below the programmed value E010 will be issued.
Range: 150–300 rpm

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: 30–70 °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: 0–20 °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 contacts can be set as normally open or normally closed with a jumper. See Relay Contacts 1 and 2, p. 23. 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
Hydrazine	0.00–1000 ppb
Temperature	-30 to +120 °C
Sample flow	0–300 rpm

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

Parameter	Range
Hydrazine	0.00–1000 ppb
Temperature	0 to +100 °C
Sample flow	0–300 rpm

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

5.3.2.1 Function = Control upwards/downwards:

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

5.3.2.22 *Parameter*: select a process value:

- Hydrazine
- Temperature
- Sample flow

5.3.2.32 Settings

Choose the respective actuator:

- Time proportional
- Frequency
- Motor valve

Actuator = Time proportional

Examples of metering devices that are driven time proportional are solenoid valves, peristaltic pumps.
Dosing is controlled by the operating time.

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

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

5.3.2.32.4 Control Parameters:
Range for each Parameter same as 5.2.1.43, p. 67

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. 67

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. 67

5.3.2.1 Function = Timer

The relay will be active 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 1–1440 min.

5.3.2.44 *Run Time*: Enter the time the relay stays active.
Range: 5–32400 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. 72.
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.

NOTICE: *If the option 2nd Sample Stream is connected to the AMI Hydrazine and <Channel Selection> is set to <External>, the Input will be set to "Active = no" and no further settings are possible.*

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. 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.

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.

5.4.6 *Line Break Detection:* Define if message E028 should be issued in case of a line break on signal output 1 or 2.

Choose between <Yes> or <No>.

5.5 Interface

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

5.5.1 *Protocol:* **Profibus**

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

5.5.1 *Protocol:* **Modbus RTU**

5.5.21 Device address: Range: 0–126
5.5.31 Baud Rate: Range: 1200–115200 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**

Device address: Range: 0–63

10. Default Values

Operation:

Sensors:	Filter Time Const.:	30 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	Temp. comp.:	3%
Signal Output 1	Parameter:	Hydrazine
	Current loop:	4–20 mA
	Function:	linear
	Scaling: Range low:	0.00 ppb
	Scaling: Range high:	100 ppb
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 Hydrazine:	
	Alarm high:	1000 ppb
	Alarm low:	0.00 ppb
	Hysteresis:	10 ppb
	Delay:	5 s
	Sample Flow; Flow Alarm	yes
	Sample Flow; Alarm high	300 rpm
	Sample Flow; Alarm low	150 rpm
	Sample Temp; Alarm high:	55 °C
	Sample Temp; Alarm low:	5 °C
	Case temp. high:	65 °C
	Case temp. low:	0 °C
Relay 1 and 2	Function:	limit upper
	Parameter:	Hydrazine
	Setpoint:	1000 ppb
	Hysteresis:	10 ppb
	Delay:	30 s

If Function = Control upw. or dnw:

Parameter: ..... **Hydrazine**
Settings: Actuator: ..... Frequency
Settings: Pulse Frequency: 120/min
Settings: Control Parameters: Setpoint: ..... 1000 ppb
Settings: Control Parameters: P-band: ..... 10 ppb
Parameter: ..... **Temperature**
Settings: Actuator: ..... Frequency
Settings: Pulse Frequency: 120/min
Settings: Control Parameters: Setpoint: ..... 30 °C
Settings: Control Parameters: P-band: ..... 1 °C
Parameter: ..... **Sample flow**
Settings: Actuator: ..... Frequency
Settings: Pulse Frequency: 120/min
Settings: Control Parameters: Setpoint: ..... 300 rpm
Settings: Control Parameters: P-band: ..... 10 rpm

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:	- - - - - - - -
	Line break detection	no

11. Index

12. Notes

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- Feedwater, Steam and Condensate
- Potable Water
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