ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION | OI/SCC-C-EN REV. J

SCC-C

Sample gas cooler

Standard version and explosion protected version for Zone 2 or Class I, Division 2

Measurement made easy

—
SCC-C

Introduction

The SCC-C gas cooler is used in analysis technology to lower the dew point of humid gases to prevent condensation in the analyzer.

The stable, low gas outlet dew point minimizes water vapor cross-sensitivity and volumetric errors.

Additional Information

Additional documentation on SCC-C is available for download free of charge at www.abb.com/analytical. Alternatively simply scan this code:

Table of contents

1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.
Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.
For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.
The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.
Modifications and repairs to the product may only be performed if expressly permitted by these instructions.
Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times.
The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

⚠ DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '***NOTICE***' indicates possible material damage.

Note

'**Note**' indicates useful or important information about the product.

Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

Intended use

The SCC-C sample gas cooler is designed for cooling the sample gas, separating the condensate and discharging the condensate. Optionally, the SCC-C can also be used for reagent dosing.
Any other use is not approved.

The intended use also includes taking note of this operating instruction.

Versions
The specifications on the type plate are decisive for the version of the sample gas cooler.

Standard version
The standard version of the sample gas cooler is designed for installation in non-hazardous areas.
The sample gas cooler complies with EN 61010 Part 1 "Safety requirements for electrical equipment for measurement, control, and laboratory use".

Version for flammable sample gases
The version of the sample gas cooler with stainless steel heat exchangers is suited for use with flammable sample gases.

Explosion protected design with ATEX certification
Refer to **ATEX version** on page 7.

Explosion protected design with CSA certification
Refer to **CSA version** on page 8.

Improper use

The following are considered to be instances of especially improper use of the device:

- The sample gas cooler may not be used for treating gases that attack the materials of wetted parts (e.g. gases containing chlorine).
- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

Safety instructions

Requirements for safe operation
In order to operate in a safe and efficient manner the device should be properly handled and stored, correctly installed and set-up, properly operated and correctly maintained.

Personnel qualifications
Only persons familiar with the installation, set-up, operation and maintenance of comparable devices and certified as being capable of such work should work on the device.

Special information and precautions
These include:

- The content of this operating instruction,
- The safety information affixed to the device,
- The applicable safety precautions for installing and operating electrical devices,
- Safety precautions for working with gases, acids, condensates, etc.

National regulations
The regulations, standards and guidelines cited in this operator's manual are applicable in the Federal Republic of Germany. The applicable national regulations should be followed when the device is used in other countries.

Safety of the equipment and safe operation
The device was built and tested in accordance with EN 61010 Part 1 'Safety regulations for electrical measuring, control and laboratory equipment' and it left the factory in perfect condition.

To maintain this condition and to assure safe operation, read and follow the safety instructions in this operating instruction. Failure to do so can put persons at risk and can lead to device damage as well as damage to other systems and devices.

… 1 Safety

… Safety instructions

Work prohibited when there is an explosion hazard
Carrying out work on live parts, and with auxiliary equipment which represents a danger of ignition is prohibited if there is a risk of explosion.

Protective lead connection
The protective lead (ground) should be attached to the protective lead connector before any other connection is made.

Risks of a disconnected protective lead
The device can be hazardous if the protective lead is interrupted inside or outside the device or if the protective lead is disconnected.

Risks involved in opening the covers
Current-bearing components can be exposed when the covers or parts are removed, even if this can be done without tools. Current can be present at some connection points.

Risks involved in working with an open device
All work on a device that is open and connected to power should only be performed by trained personnel who are familiar with the risks involved.

Danger from charged capacitors
Capacitors in the device may still be charged even if the device has been disconnected from all voltage sources.

When safe operation can no longer be assured
If it is apparent that safe operation is no longer possible, the device should be taken out of operation and secured against unauthorized use.

The possibility of safe operation is excluded:
- If the device is visibly damaged,
- If the device no longer operates,
- After prolonged storage under adverse conditions,
- After severe transport stresses.

Manufacturer's address

ABB AG
Measurement & Analytics
Stierstädter Str. 5
60488 Frankfurt am Main
Germany
Tel: +49 69 7930-4666
Email: cga@de.abb.com

Service address

If the information in this Operating Instruction does not cover a particular situation, ABB Service will be pleased to supply additional information as required.
Please contact your local service representative.

Customer service center
Tel: +49 180 5 222 580
Email: automation.service@de.abb.com

2 Use in potentially explosive atmospheres

ATEX version

Note
All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/analytical

Explosion protection

The sample gas cooler in explosion protected design is suitable for use in potentially explosive atmospheres in ATEX Zone 2.

Standards and directives

The sample gas cooler was designed and manufactured in accordance with the following standards:

- EN/IEC 60079-0
- EN/IEC 60079-7
- EN/IEC 60079-15

The sample gas cooler must be designed, installed and operated in accordance with the following standards and directives:

- EN/IEC 60079-14
- EN/IEC 60079-17
- EN/IEC 60079-19

Note
The full designation of the applied standards, including the date of issue, is included in the declaration of conformity supplied with the device.

Ex marking

Sample gas cooler SCC-C	
EC type examination certificate	BVS 16 ATEX E 056 X
Marking	Ex II 3G Ex nA nC IIC T4 Gc

Temperature Data

Sample gas temperature at the sample gas inlet

Maximum 130 °C

Safety instructions

Work on live parts

Do not start work on live parts until the environment has been approved as ‘safe’.

The fuses may not be changed until the sample gas cooler has been disconnected from the power supply or the environment has been approved as ‘safe’.

Work on the controller system

The cover of the controller flap may not be opened until the surrounding area has been declared an explosion-free zone - free from potentially explosive atmospheres.

Installation

Installation site requirements

The sample gas cooler in explosion protected design may only be used in areas that ensure suitable protection against the ingress of foreign bodies or liquids.
The sample gas cooler must be installed in a housing or cabinet with IP rating IP 54 or higher in accordance with IEC 60079-0.

… 2 Use in potentially explosive atmospheres

CSA version

Explosion protection

The sample gas cooler in the design with CSA certification is certified for use in hazardous areas of Class 1, Division 2, Groups A, B, C and D, Temperature Code T4, ambient temperature max. +50 °C

Standards and directives

The approval includes testing in accordance with the relevant Canadian CSA and US guidelines:

- Class 2258 02 Process Control Equipment – For Hazardous Locations and
- Class 2258 82 Process Control Equipment – For Hazardous Locations – Certified to U.S. Standards

Certificate

Certificate no. 1105720

Temperature Data

Sample gas temperature at the sample gas inlet

Maximum 135 °C

Safety instructions

Work on live parts

Do not start work on live parts until the environment has been approved as ‘safe’.

The fuses may not be changed until the sample gas cooler has been disconnected from the power supply or the environment has been approved as ‘safe’.

Work on the controller system

The cover of the controller flap may not be opened until the surrounding area has been declared an explosion-free zone - free from potentially explosive atmospheres.

Installation

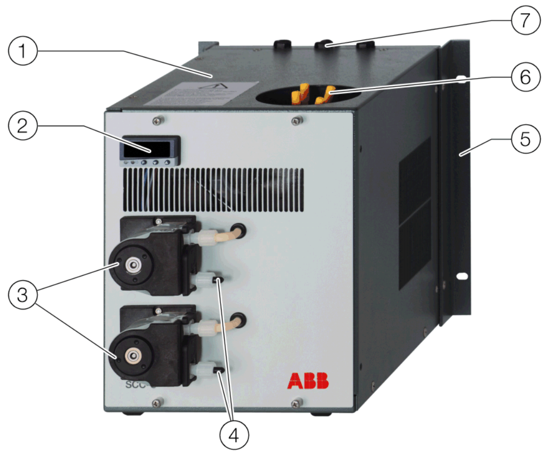
Installation site requirements

The sample gas cooler in explosion protected design may only be used in areas that ensure suitable protection against the ingress of foreign bodies or liquids.

The sample gas cooler must be installed in a housing or cabinet with IP rating IP 54 or higher in accordance with IEC 60079-0.

3 Design and function

Design



① Housing
② Temperature controller with LED display
③ Hose pumps for condensate or dosing (optional)
④ Condensate output
⑤ Mounting bracket
⑥ Sample gas connections of the heat exchangers
⑦ Cable entries for the electrical connection cables (permanently connected)

Figure 1: Device design, sample gas cooler SCC-C

Intended purpose of the sample gas cooler

The SCC-C sample gas cooler is a component of the sample gas conditioning system in an analyzer system.
In the sample gas cooler, the humid sample gas is cooled to such an extent that the temperature does not down-scale the dew point at any subsequent point in the analyzer system and therefore no condensate can penetrate the gas analyzer.

Functions of the sample gas cooler

The SCC-C sample gas cooler has the following functions:

- cooling of the sample gas,
- separation of the condensate and
- condensate discharge.

For certain measuring functions, the dew point of the sample gas must be kept constant in order to eliminate the influence of water vapor on the measurement result. In these cases, the constant water vapor content is considered during calibration by the test gas supply upstream of the sample gas cooler.

Use in conjunction with the sample gas feeder unit SCC-F

The SCC-C sample gas cooler can be used in conjunction with the SCC-F sample gas feeder unit.
The SCC-F sample gas feeder unit has the following functions:

- condensate monitoring,
- sample gas feed and
- flow adjustment and monitoring.

For information on the SCC-F sample gas feeder unit, refer to the operating instructions OI/SCC-F.

Note

The SCC-F sample gas conveying unit is not available in an explosion protected version in category 3G.

… 3 Design and function

Options

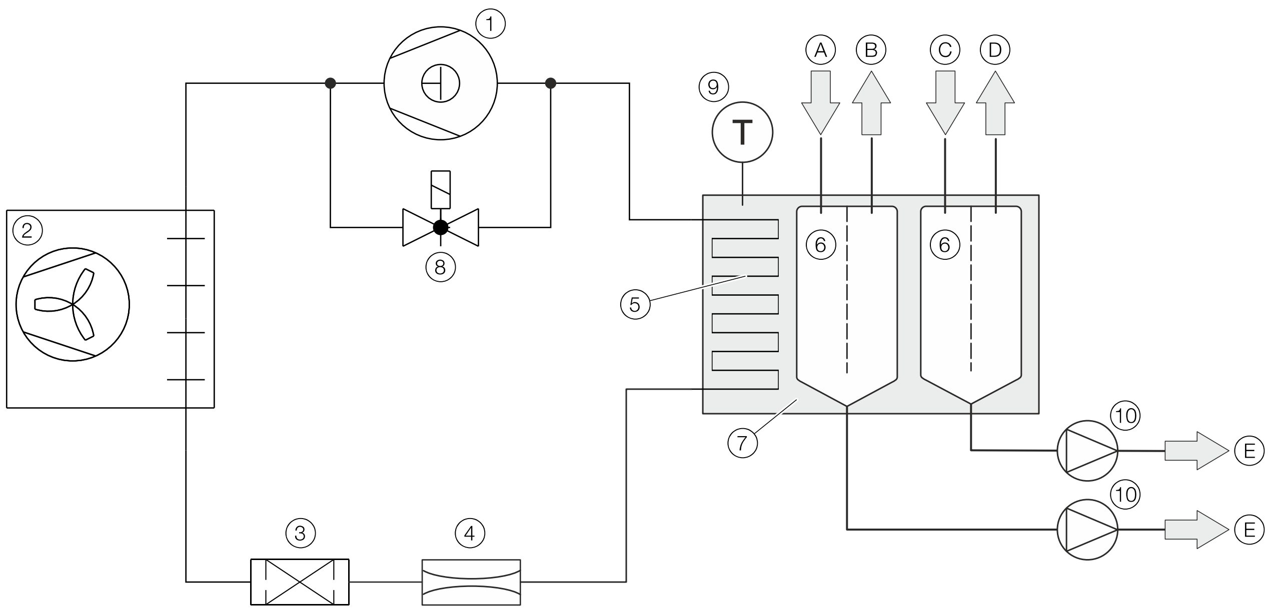
Dosing unit

Using a T-piece at the sample gas inlet and with a hose pump installed in the SCC-C sample gas cooler or in the SCC-F sample gas feeder unit. Reagent bottle and level monitor available as accessories

Hose pumps

1 or 2 hose pumps for condensate discharge (feed rate approx. 300 ml/h, 5 U/min) and dosing (feed rate approx. 15 ml/h), pressure resistance p_{abs} = 50 to 150 kPa (0.5 to 1.5 bar), hose service life approx. 5 months.

Functional description



1 Refrigerant compressor
2 Refrigerant condenser
3 Refrigerant dryer
4 Capillary tube
5 Refrigerant evaporator
6 Sample gas heat exchanger (WT1 / WT2)
7 Cooling block
8 Refrigerant bypass valve
9 Temperature sensor
10 Hose pump (condensate, 2nd pump optional)

Connections:
A Sample gas inlet WT1
B Sample gas outlet WT1
C Sample gas inlet WT2
D Sample gas outlet WT2
E Condensate outlet

Figure 2: System diagram refrigeration circuit

The SCC-C sample gas cooler contains 1 or 2 heat exchangers in which the sample gas is cooled to approx. +3 °C. The condensate produced escapes from the condensate nozzle of the heat exchanger.
The optionally installed hose pump automatically removes the condensate.

Refrigeration circuit
The refrigerant compressor ① compresses the gaseous refrigerant at an intake pressure from approx. 100 kPa (1 bar) to 800 to 1700 kPa (8 to 17 bar), depending on the operating conditions.
The vaporous refrigerant is liquefied by cooling in the downstream air-cooled refrigerant condenser ②. The liquid refrigerant flows through the refrigerant dryer ③ to the capillary tube ④.

In the capillary tube ④, the liquid refrigerant is expanded from a high pressure (condensation pressure) of 800 to 1800 kPa (8 to 18 bar) to a low pressure (evaporation pressure) of 100 kPa (1 bar) in the evaporator ⑤.

In the heat exchanger ⑥, which is installed in a hole in the cooling block ⑦, energy is extracted from the sample gas; the sample gas is cooled and the energy is supplied to the vaporous refrigerant at an evaporation pressure of 100 kPa (1 bar, approx. –10 °C). The gaseous refrigerant is sucked back in by the refrigerant compressor ①.

To keep the sample gas outlet temperature (dew point) constant, the temperature-controlled valve ⑧, which is located in the bypass of the refrigerant compressor ①, regulates the refrigerant mass flow depending on the required capacity. If no cooling is required, the valve is open.

Condensate discharge
The condensate produced escapes from the condensate nozzle of the heat exchanger ⑥.
The optional hose pump ⑩ automatically removes the condensate.

Measurement and display of the sample gas outlet temperature
The sample gas outlet temperature is measured using the Pt-100 temperature sensor in the cooling block ⑦ of the sample gas cooler and displayed in digital form in °C on the temperature controller ⑨. The sample gas outlet temperature is factory-set to +3 °C.

Monitoring the sample gas outlet temperature
The temperature controller issues a status signal if the temperature down-scales or up-scales the factory-set temperature limits (< 0 °C or > 6 °C). This signal is available at two potential-free changeover contacts.

Set point adjustment
The set point for the sample gas outlet temperature can be set on the temperature controller.

Information regarding the refrigerant

⚠ CAUTION

Improper work on the cooling unit!
Danger due to improper work on the cooling unit.
Maintenance work on the cooling unit, including servicing and decommissioning, may only be carried out by professional refrigeration companies.
- Risk of burns. Do not touch refrigerant hot gas lines.
- Risk of injury. Do not touch the sharp-edged cooling fins of the condenser.

Note
Refrigerants are harmful to the environment as soon as they are released into the atmosphere.
- Work on the refrigeration system may only be performed by experts in accordance with the Chemicals Climate Protection Ordinance.
- Do not damage the refrigerant lines.
- For disposal, send the refrigerant to a professional treatment expert.

The device contains a small amount of refrigerant.
The refrigerants used are so-called partially halogenated fluorocarbons (H-FC) with no ozone depletion potential (ODP=0).

Please observe the following points:
- Do not damage the pipes of the cooling circuit during transportation or installation.
- In the event of damage to the cooling circuit, keep open flames or ignition sources away from the device.
  - Escaping refrigerant can lead to injuries.
  - Ensure adequate ventilation!
- Do not commission damaged cooling units.
- For refrigerant filling quantity and global warming potential, see "Technical data" in the annex or refer to the device type plate.
- The refrigerant must be assigned to safety group A1 in accordance with EN 378, “Refrigeration systems and heat pumps”.

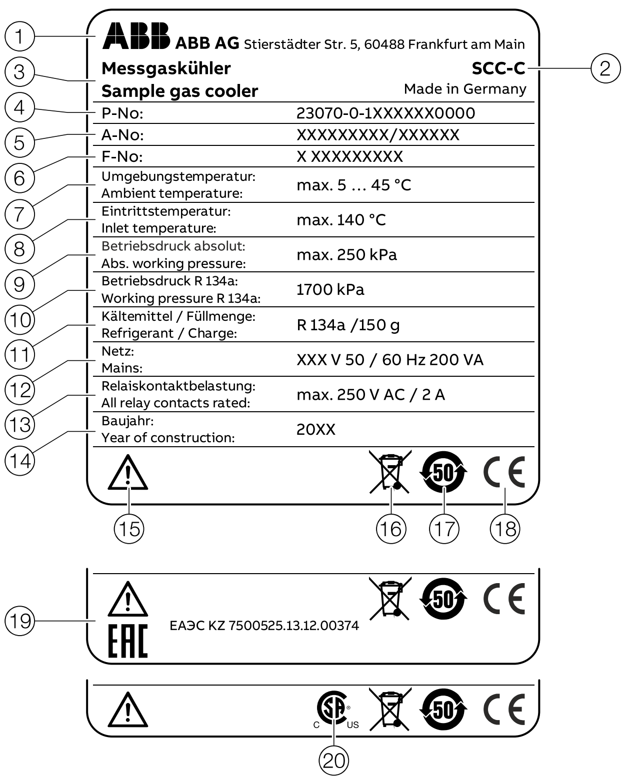
4 Product identification

Name plate

Note

Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

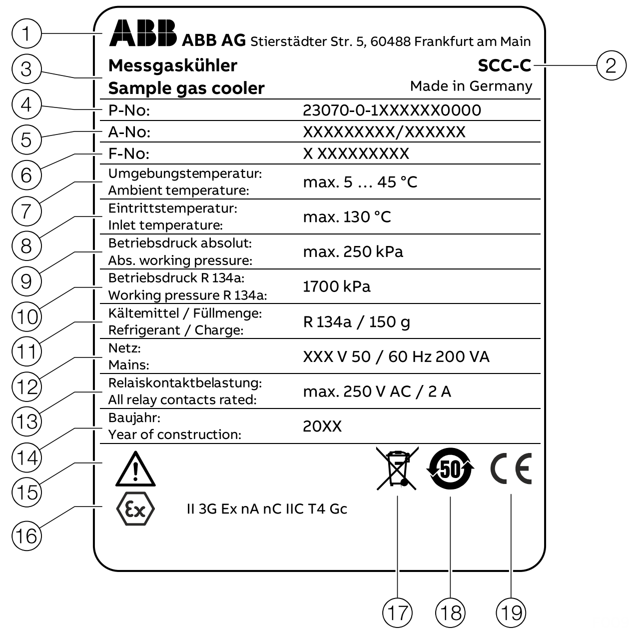
Note
The name plates displayed are examples. The device identification plates affixed to the device can differ from this representation.



1. Manufacturer, manufacturer address
2. Type designation
3. Device type
4. Order code
5. Order number
6. Serial number
7. Ambient temperature range
8. Sample gas inlet temperature
9. Maximum sample gas pressure
10. Refrigerant circuit operating pressure
11. Refrigerant filling quantity
12. Power supply (voltage / frequency / power consumption)
13. Contact load capacity of potential-free changeover contact (status signal)
14. Year of manufacture
15. ‘Follow operating instruction’ symbol
16. Disposal instructions
17. EFUP marking (China RoHS)
18. CE marking
19. EAC marking
20. $_{C}CSA_{US}$ marking (General Purpose)

* See data sheet of the analyzer

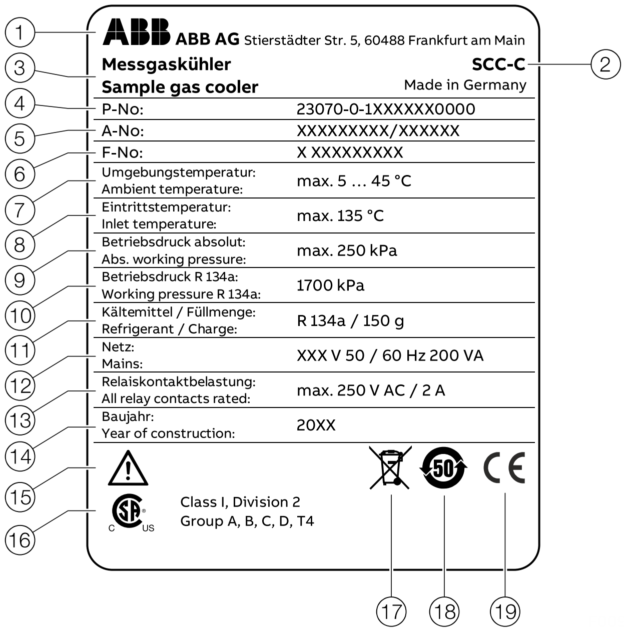
Fig. 3: Type plate non-explosion protected version (example)

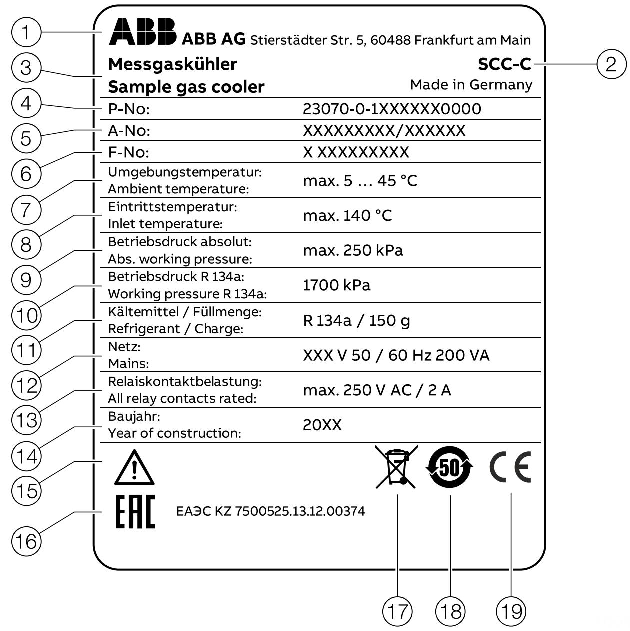


1. Manufacturer, manufacturer address
2. Type designation
3. Device type
4. Order code
5. Order number
6. Serial number
7. Ambient temperature range
8. Sample gas inlet temperature
9. Maximum sample gas pressure
10. Refrigerant circuit operating pressure
11. Refrigerant filling quantity
12. Power supply (voltage / frequency / power consumption)
13. Contact load capacity of potential-free changeover contact (status signal)
14. Year of manufacture
15. ‘Follow operating instruction’ symbol
16. Ex marking in accordance with Atex Zone 2
17. Disposal information
18. EFUP marking (China RoHS)
19. CE marking

* See data sheet of the analyzer

Fig. 4: Name plate explosion protected version according to ATEX (example)





(1) Manufacturer, manufacturer address
(2) Type designation
(3) Device type
(4) Order code
(5) Order number
(6) Serial number
(7) Ambient temperature range
(8) Sample gas inlet temperature
(9) Maximum sample gas pressure
(10) Refrigerant circuit operating pressure
(11) Refrigerant filling quantity
(12) Power supply (voltage / frequency / power consumption)
(13) Contact load capacity of potential-free changeover contact (status signal)
(14) Year of manufacture
(15) ‘Follow operating instruction’ symbol
(16) Ex-marking according to cCSAus Class I, Division 2
(17) Disposal information
(18) EFUP marking (China RoHS)
(19) CE marking

* See data sheet of the analyzer

Fig. 5: Name plate explosion protected version according to cCSAus (example)

(1) Manufacturer, manufacturer address
(2) Type designation
(3) Device type
(4) Order code
(5) Order number
(6) Serial number
(7) Ambient temperature range
(8) Sample gas inlet temperature
(9) Maximum sample gas pressure
(10) Refrigerant circuit operating pressure
(11) Refrigerant filling quantity
(12) Power supply (voltage / frequency / power consumption)
(13) Contact load capacity of potential-free changeover contact (status signal)
(14) Year of manufacture
(15) ‘Follow operating instruction’ symbol
(16) Ex marking in accordance with EAC-Ex
(17) Disposal information
(18) EFUP marking (China RoHS)
(19) CE marking

* See data sheet of the analyzer

Fig. 6: Name plate explosion protected version in accordance with EAC-Ex (example)

… 4 Product identification

Plates and symbols

The following markings and symbols are attached to the sample gas cooler.

Marking / Symbol	Meaning
	Comply with the documentation, i.e. follow these operating instructions.
	Danger of electric shock!

Transport protection warning sign

Position: On the housing cover next to the sample gas connections.

Vor Inbetriebnahme die Transportsicherung des Kompressors durch den Boden des Kühlers lösen!
Kühler erst 4 Stunden nach der Montage in Betrieb nehmen!
– siehe Betriebsanleitung!

Loosen the compressor shipping locks through the bottom of the cooler prior to start up!
It is necessary to wait after installation 4 hours before powering up the cooler!
– see operator’s manual!

Before commissioning, release the transport protection of the compressor through the base of the cooler!
Do not commission the cooler until 4 hours after installation!
– see operating instructions!

Figure 7: Transport protection warning sign

Device version for Class I Div. 2 - CSA

Devices that are approved for use in Class I Div. 2 – CSA hazardous areas have the following additional signs.

Position: On the right-hand side of the housing (from the front view) above the name plate.

WARNING
-EXPLOSION HAZARD-
DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS!
AVERTISSEMENT
-RISQUE D'EXPLOSION-
AVANT DE DÉCONNECTER L'ÉQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX!

Warning –Risk of explosion-

Do not disconnect the connections until the power supply has been switched off or the area is classified as non-hazardous!

Figure 8: Warning sign – Do not disconnect while energized

WARNING
-EXPLOSION HAZARD-
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2!
I/O CONNECTED TO CLASS 2 CIRCUITS
SECURE ALL CONNECTORS WITH FASTENERS PROVIDED!
AVERTISSEMENT
-RISQUE D'EXPLOSION-
LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE CLASSE 1, DIVISION 2!
LES CONNECTEURS D'ENTRÉE/SORTIE DOIVENT ÈTRE BRANCHES SEULEMENT AVEC DES CIRCUITS DE CLASSE 2
FIXER TOUS LES CONNECTEURS AVEC LES LIENS FOURNISI!

Warning –Risk of explosion-

Replacement of components may compromise the approval for Class I, Division 2!
Secure all plugs for inputs and outputs that are connected to Class 2 circuits using the provided fastening materials!

Figure 9: Warning sign – Replacing components

Scope of delivery

- Sample gas cooler SCC-C
- Operating instructions
- Accessories for the design with glass heat exchanger:
  - GL union nuts with inserted 6×4×1 mm hose/ pipe fittings (2 per heat exchanger)

Note
The mounting brackets are factory-fitted.

5 Transport and storage

Safety instructions

NOTICE

Damage to the sample gas cooler
When transporting and storing the sample gas cooler, the sample gas connections must always be directed upwards. Otherwise the oil contained in the refrigeration circuit may shift from the compressor.

- The sample gas connections must always be directed upwards during transport and storage.
- Before commissioning, the sample gas cooler needs to be set in the operating position for approx. 24 h so that the oil can flow back into the compressor.

Inspection

Check the devices immediately after unpacking for possible damage that may have occurred from improper transport.
Details of any damage that has occurred in transit must be recorded on the transport documents.
All claims for damages must be submitted to the shipper without delay and before installation.

Transporting the device

Observe the following instructions:

- Do not expose the device to humidity during transport. Pack the device accordingly.
- Pack the device so that it is protected against vibrations during transport, e.g., by using air-cushioned packing.
- Make sure that the enclosed accessories do not get misplaced, see **Scope of delivery** on page 15.
- Keep the shipping carton and cushioning material for future transportation.

… 5 Transport and storage

Storing the device

Bear the following points in mind when storing devices:

- Store the device in its original packaging in a dry and dust-free location.
- Observe the permitted ambient conditions for transport and storage.
- Avoid storing the device in direct sunlight.
- In principle, the devices may be stored for an unlimited period. However, the warranty conditions stipulated in the order confirmation of the supplier apply.

Ambient conditions

Transport- / Storage temperature

−25 to 60 °C

Packaging

1. If the original packing material is no longer available, wrap the device in bubble foil or corrugated cardboard.
   When shipping overseas, also heat-seal the device air-tight in 0.2 mm thick polyethylene, including a desiccant (e.g. silica gel). The amount of desiccant used should be adequate for the package volume and the probable shipping time (at least 3 months).
2. Pack the device in an adequately large box lined with shock absorbent material (e.g. foam material). The thickness of the cushioning material should be adequate for the weight of the device and the mode of shipping. The box should also be lined with a double layer of bitumen paper for overseas shipping.
3. Mark the box ‘Fragile! Handle with care!’.

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.
Fill out the return form (see **Return form** on page 41) and include this with the device.
In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:
All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Address for the return:

ABB AG
Service Analysentechnik – Parts & Repair
Stierstädter Straße 5
60488 Frankfurt
Germany
Phone: +49 69 7930-4591
Email: repair-analytical@de.abb.com

6 Preparation for Installation

Material required for installation

Installation Material
4 M6 screws

Gas connections
- Glass heat exchanger:
  2 GL union nuts with inserted 6 × 4 × 1 mm threaded hose/pipe fittings are supplied with each heat exchanger.
- PVDF heat exchanger:
  Suited pipe/hose fittings for the PVDF 6×1 mm pipe must be provided on site.
- Stainless steel heat exchanger:
  Suited pipe/hose fittings for G¼ in internal thread must be provided on site.

Condensate connections
- PVDF heat exchanger / stainless steel heat exchanger: Suited pipe/hose fittings must be provided on site. Use screw fittings according to DIN 2999/1 only with tapered R-thread together with suited sealing tape / sealing fluid.

Requirements for the installation site

Short gas paths
Install the sample gas cooler as close as possible to the gas analyzer.

Adequate air circulation
Provide adequate natural air circulation around the sample gas cooler. Avoid heat build-up.

The sample gas cooler should be installed away from sources of heat, with open ventilation and at a minimum distance of 10 cm from other components, so that no interfering heat build-up can occur.

IP rating of housing
The sample gas cooler housing has an IP rating of IP 20.

The sample gas cooler, without further protective measures, is intended for indoor installation only.

The sample gas cooler – especially the explosion protected version (see **Use in potentially explosive atmospheres** from page 7 onwards) may only be operated in clean and dry areas.

The ingress of solid foreign bodies or liquids into the housing through the cooling openings must be prevented.

Installation location altitude
Maximum 2000 m above sea level

Protection from adverse ambient conditions
Protect the sample gas cooler from the following influences:
- Cold,
- Exposure to heat from e.g. the sun, furnaces, boilers,
- Temperature variations,
- Strong air currents,
- Accumulation of dust and ingress of dust,
- Corrosive atmosphere,
- Vibration.

… 6 Preparation for Installation

… Requirements for the installation site

Climatic Conditions

Ambient temperature during operation
5 to 45 °C

Transport- / Storage temperature
−25 to 60 °C

Relative humidity
≤ 80 %, non-condensing

Power supply

Input voltage

- Standard design:
  230 or 120 V AC ±10 %, 50 to 60 Hz
- CSA version:
  240 or 120 V AC ±10 %, 50 to 60 Hz

Power
Maximum 200 VA

Starting current
2.5 A at 230 V AC

Safety

In accordance with EN 61010-1

Protection class
Protection class I

Overvoltage category
II

Pollution degree
2

Safety
Testing to EN 61010-1
Protective class
I
Overvoltage category / degree of contamination
II / 2
Protective separation
Electrical isolation of the 115/230 V AC power supply from the other current circuits by means of reinforced or double insulation. Functional extra-low voltages (PELV) on the low voltage side

Sample gas inlet conditions

Sample gas pressure

Heat exchanger material	Sample gas pressure p_{abs}	
	without hose pump	**with hose pump**
Glass	50 to 200 kPa (0.5 to 2.0 bar)	50 to 150 kPa (0.5 to 1.5 bar)
PVDF	50 to 250 kPa (0.5 to 2.5 bar)	50 to 150 kPa (0.5 to 1.5 bar)
Stainless steel	0.05 to 1 MPa (0.5 to 10 bar)	50 to 150 kPa (0.5 to 1.5 bar)

Sample gas flow
1 × 250 l/h (WT250) or 1 × 125 l/h (WT125) or 2 × 125 l/h (WT125), based on a sample gas pressure of p_{abs} = 100 kPa (1 bar) and 25 °C

Note
Only the WT125 is used in the AO2000 system

Sample gas inlet temperature

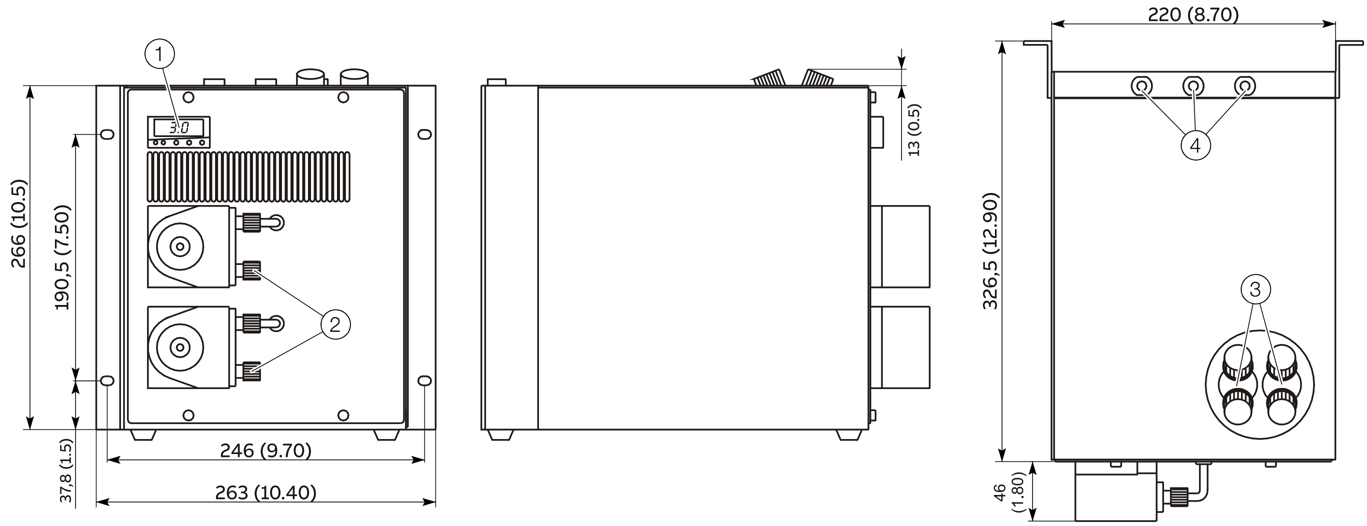
- Standard design: maximum 140 °C
- CSA Class I, Division 2 design: maximum 135 °C
- ATEX Zone 2 design: maximum 130 °C

Sample gas inlet dew point
max. 70 °C,
max. 60 °C for WT250 with sample gas flow > 200 l/h

Note

- The sample gas line must be installed and connected in such a way that no condensation can occur upstream of the heat exchanger.
- Unheated cable sections must be insulated with a suitable insulation material in accordance with **Figure 12** on page 23.

Dimensions



1 Temperature display

2 Condensate outlet (for option with hose pumps)

3 Sample gas connections of the heat exchangers

4 Cable entries for the electrical connection cables (permanently connected)

Figure 10: Dimensions in mm (in)

Note

The connections for the sample gas inlet and outlet 3 are marked with arrows on the heat exchangers for the respective version.

Note

The following points should be observed during assembly:

- Consider additional space requirements:
  - to the right of the device for the cooling air inlet and in front of the device for the cooling air outlet (approx. 10 cm each),
  - in front of and below the device for connecting the condensate lines and
  - above the device for connection of the sample gas lines and the electrical lines.
- The mounting brackets are factory-fitted with approx. 2.5 cm overhang to the rear wall.
- Incline max. 5°.

7 Installation

Safety instructions

⚠ DANGER

Risk of explosion!

There is an explosion hazard if the housing is opened in a potentially explosive atmosphere:

- Before opening the housing, make sure that no flammable or potentially explosive atmospheres are present.

⚠ WARNING

Risk of injury due to live parts.

Improper work on the electrical connections can result in electric shock.

- Connect the device only with the power supply switched off.
- Observe the applicable standards and regulations for the electrical connection.

⚠ WARNING

Risk of poisoning

Risk of poisoning due to escaping poisonous or suffocating sample gas.

- if poisonous or oxygen-supplanting sample gases are conveyed using the device, the gas paths need to be purged with inert gas or air before the gas-bearing components are opened.
- Close open process connections so that they are gas-tight to prevent the escape of sample gas.
- When working on the device, use suited personal protection equipment (PPE) in accordance with the risk assessment.
- Comply with operator regulations regarding occupational safety!

⚠ CAUTION

Risk of injury caused by aggressive media

The media and condensates in the device can be aggressive and cause corrosion.

- When working on the device, use suited personal protection equipment (PPE), such as safety goggles, protective gloves or protective clothing.

⚠ CAUTION

Risk of burns caused by hot components in the device

The surface temperature of components in the device can up-scale 60 °C (140 °F)!

- Before opening the housing, switch off the power supply.
- Observe a cooling time of > 20 min before working on the device.

⚠ CAUTION

Risk of crushing caused by rotating components!

Risk of crushing caused by the automatically operating hose pump.

- Switch off the power supply before starting work on the hose pump.

NOTICE

Damage to the sample gas cooler

When transporting and storing the sample gas cooler, the sample gas connections must always be directed upwards. Otherwise the oil contained in the refrigeration circuit may shift from the compressor.

- The sample gas connections must always be directed upwards during transport and storage.
- Before commissioning, the sample gas cooler needs to be set in the operating position for approx. 24 h so that the oil can flow back into the compressor.

Mounting

Mounting the sample gas cooler

Wall mounting

Mount the sample gas cooler on the wall using 4 M6 screws (not included in the scope of delivery). The mounting brackets required for this are factory-attached to the rear end of the side panels.

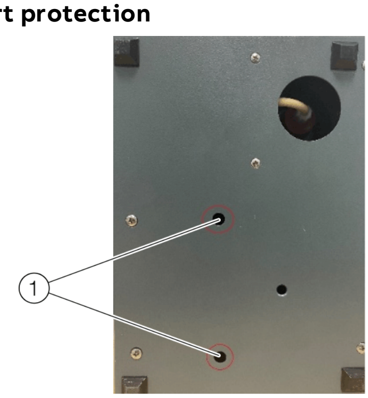
Note

To ensure that the cooling air from the sample gas cooler can also escape unhindered to the rear, the factory-provided overhang of the mounting bracket of approx. 2.5 cm from the rear wall must not be reduced.

Mounting in a 19″ cabinet/rack

1. Unscrew the mounting brackets at the rear end of the side panels and screw them on the front end of the side panels flush with the front panel in the holes provided for this purpose.
2. Mount the sample gas cooler in the 19″ cabinet/rack using 4 M6 screws (not included in the scope of delivery).

Transport protection



① Screws (transport protection)

Figure 11: SCC-C transport protection

Using a PH2 Phillips screwdriver, turn the two screws counterclockwise through the holes in the base plate until resistance is felt.

Side-by-side installation of sample gas cooler and sample gas feeder unit

Side-by-side installation of the sample gas cooler and sample gas feeder unit is described in the operating instructions OI/SCC-F for the SCC-F sample gas feeder unit.

Note

The SCC-F sample gas feeder unit is not available in an explosion protected version in category 3G.

Connecting the gas lines

Design of the sample gas and condensate connections

Heat exchanger

Heat exchanger material	Type	Sample gas inlets and outlets	Condensate outlet
Window	WT125	Threaded hose fitting / threaded pipe fitting GL18-6 mm*	Pipe fitting GL25-12 mm
	WT250		
PVDF	WT125	Pipe 6 × 1 mm	G⅜ in internal thread
	WT250	G¼ in internal thread	G⅜ in internal thread
Stainless steel	WT125	Pipe 6 × 1 mm	G⅜ in internal thread
	WT250	G¼ in internal thread	G⅜ in internal thread

* 2 GL union nuts with inserted 6 × 4 × 1 mm threaded hose/pipe fittings are supplied with each heat exchanger.

Hose pump (option)

Condensate outlet: PVDF, DN 4/6

Connecting the sample gas line

Connect sample gas lines made of material adapted to the measuring task to the sample gas inlets and outlets on the top of the heat exchanger:

- Do not swap the connections for sample gas inlet and outlet. The connections are indicated by arrows on the heat exchangers.
- Glass heat exchanger:
  Before fitting the GL union nuts, check that the PTFE/silicone clamping rings are undamaged. Fit the clamping rings with the white PTFE surface facing the glass.
- PVDF and stainless steel heat exchangers:
  Screw suitable pipe/hose connectors onto the pipe fittings. Use screw fittings according to DIN 2999/1 only with tapered R-thread together with suited sealing tape/sealing fluid.
- Ensure that the clamping rings and sealing rings are arranged correctly!
- When tightening the screw connections, relieve the pressure on the connection pieces, e.g. by holding them with a suitable wrench!
  Otherwise, there is a risk that the connection pieces will become twisted and thus will start to leak.
- Observe the sample gas inlet conditions, see **Sample gas inlet conditions** on page 18.
- For checking the gas path seal integrity, see **Checking gas path leak tightness** on page 36.

… 7 Installation

… Connecting the gas lines

Connecting the condensate lines

⚠ CAUTION

Acidic condensate

The accumulated condensate is frequently acidic!

- Provide appropriate protective measures (e.g. neutralization) when discharging the condensate.
- Observe the national regulations for the disposal of condensate!

Connect the condensate line to the condensate outlet of the heat exchanger or the hose pump:

- Glass heat exchanger:
  Before fitting the GL union nuts, check to make sure that the PTFE/silicone clamping rings are not damaged. Fit the clamping rings with the white PTFE surface facing the glass.
- PVDF and stainless steel heat exchangers:
  Screw in a suited pipe/hose fitting. Use screw fittings according to DIN 2999/1 only with tapered R-thread together with suited sealing tape/sealing fluid.
- Hose pump:
  Connect the condensate line to the DN 4/6 mm pipe/hose fitting.
- To avoid obstructing the condensate drainage, the specified drainage cross-sections must not be reduced.

Connecting the reagent dosing (option)

Hose pump for reagent dosing

The hose pump for reagent dosing is installed as an option:

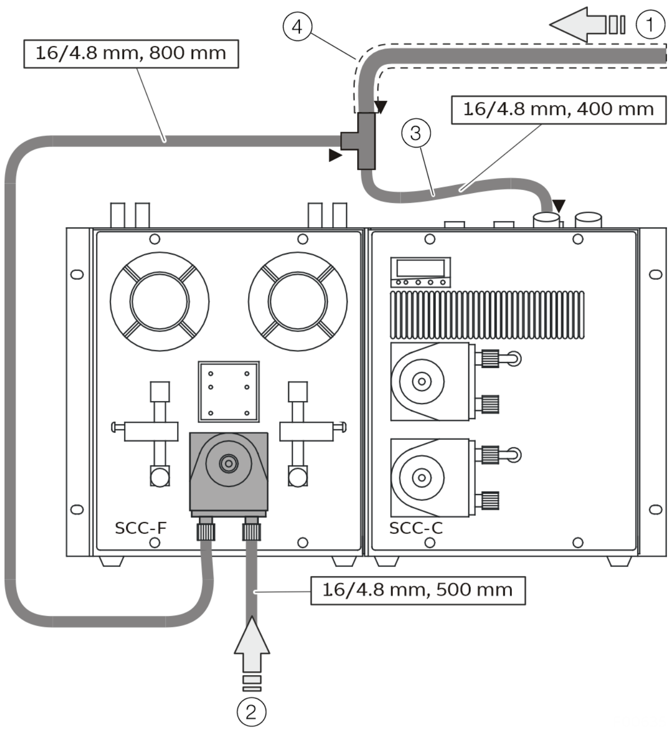
- Either in the sample gas cooler SCC-C
  (order no. 23070-0-x1xx3xxx0000)
- Or in the sample gas feeder unit SCC-F
  (order no. 23212-0-xx1xxx000000)

If the hose pump is installed in the sample gas feeder unit, it is switched off if a “condensate” fault occurs; this is not possible if it is installed in the sample gas cooler.
The delivery rate of the peristaltic pump is 15 ml/h.

Requisite Material

If the sample gas cooler has been ordered in the “with dosing device” version (order no. 23070-0-x1xxxxxx0000), the scope of delivery also includes the following:

Quantity	Description
1	T-piece
1	Hose, 500 mm long (reagent storage bottle – hose pump)
1	Hose, 800 mm long (hose pump – T-piece)
1	Hose, 400 mm long (T-piece – sample gas inlet cooler)



1 Sample gas
2 Reagent storage bottle
3 Reaction distance
4 Insulation

Figure 12: Connect reagent dosing

Example Figure 12:
The hose pump for reagent dosing is installed in the sample gas feeder unit.

Connect reagent dosing

Connect the reagent dosing as shown in Figure 12.

Electrical connections

Safety instructions

⚠ WARNING

Risk of injury due to live parts.
Improper work on the electrical connections can result in electric shock.

- Connect the device only with the power supply switched off.
- Observe the applicable standards and regulations for the electrical connection.

Protective lead connection

The protective lead (ground) should be attached to the protective lead connector before any other connection is made.

Danger from charged capacitors

Capacitors in the device may still be charged even if the device has been disconnected from all voltage sources.

Potential equalization

- Equipotential bonding takes place via the PE2 terminal of the power supply.
- In the CSA version, equipotential bonding takes place via a separate ring cable lug on the connection board in the housing.
- The local potential equalization must be connected before any other connections are made.
- The connectors have a clamping range of max. 4 mm^2.

… 7 Installation

… Electrical connections

Electrical connection

⚠ CAUTION

Increased device internal voltage in devices for 120 V AC line voltage
Devices that connect to a line voltage of 120 V AC are equipped with an internal transformer to generate the required device internal voltage of 240 V AC.

- The live parts in the device thus have a voltage of 240 V AC.

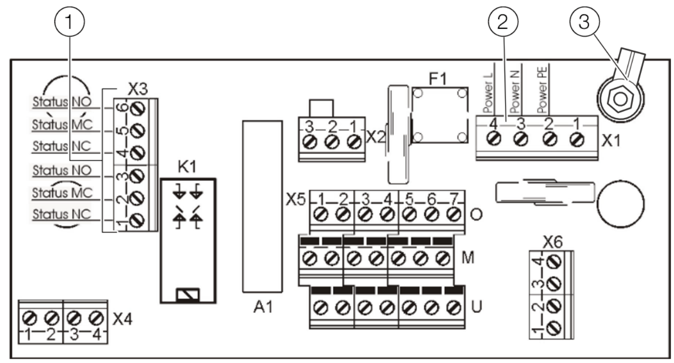
NOTICE

Damage to the device due to incorrect line voltage
Incorrect line voltage may destroy the device.

- Pay attention to the correct line voltage in accordance with the name plate when connecting the device!

Observe the following points when connecting to an electrical supply:

- The requirements of VDE 0100 as well as their relevant standards and regulations must be observed when installing high-voltage systems with nominal voltages of up to 1000 V!
- A circuit breaker with a maximum rated current of 10 A must be installed in the power supply connection lead.
- An easily accessible mains isolating device (main switch) with appropriate labeling must be installed in the power supply line.
- Lay the signal lines separately from the power supply lines.
- Only copper cables may be used for the connection.



① Terminal **–X3** status message
② Terminals **–X1** power supply
③ Ring cable lug for connecting the protective conductor (PE) for the CSA design of the device

Figure 13: Terminals SCC-C

Terminal strip –X1 for power supply

Terminal	Function/comments
4 (POWER L)	Phase
3 (POWER N)	Neutral conductor
2 (POWER PE)	Protective earth (PE)
1	Not assigned

Terminal strip –X3 for status messages

Terminal	Function/comments
1 / 4 (STATUS NO)	Changeover contact (normally open)
2 / 5 (STATUS MC)	Changeover contact (center contact)
3 / 6 (STATUS NC)	Changeover contact (normally closed)

Connecting the power supply

The terminals are located behind the front plate of the SCC-C housing, see Figure 13.

1. Remove the front plate of the SCC-C housing.
2. Pull a suitable cable* through a cable gland in the cover of the cooler and connect to terminal **–X1** in accordance with the electrical connection.
   - For the CSA version, connect the PE protective conductor to the ring cable lug (Figure 13,pos. 3).
3. Reattach the front plate of the SCC-C housing.

* The cable must meet the following minimum requirements: Outer cable diameter 8.3 - 9.1 mm, cross-section: 3×1.04 mm^2 (17/3 AWG), nominal voltage: 300 V, temperature resistance 75 °C (167 °F), flammability class in accordance with VW-1, FT2 or EN60332-1-2/-2-2

Connect status signal

The sample gas cooler has contacts for signaling when the temperature up-scales or down-scales the limit values.

Switching point: < 0 °C and > 6 °C
2 potential-free changeover contacts,
Switching capacity 250 V AC, 2 A; 500 VA / 50 W

The terminals are located behind the front plate of the SCC-C housing, see Figure 13.

1. Remove the front plate of the SCC-C housing.
2. Pull a suitable cable* through a cable gland in the cover of the cooler and connect to terminal **–X3** in accordance with the electrical connection.
3. Reattach the front plate of the SCC-C housing.

* The cable must meet the following minimum requirements: Outer cable diameter 8.3 - 9.1 mm, cross-section: 0.75 mm^2 (20 AWG), 2 to 6-core; depending on the required contacts

Connection of the SCC-C sample gas cooler to the SCC-F sample gas feeder unit

If the SCC-C sample gas cooler and the SCC-F sample gas feeder unit are used together (e.g. in an analysis system), both the power supply and the status signal or the optional PT100 temperature sensor for temperature monitoring (temperature alarm) of the sample gas cooler can be connected to the sample gas feeder unit.

In the event of a temperature alarm in the sample gas cooler, the diaphragm pumps in the sample gas feeder unit are switched off.

The electrical connection of the SCC-C sample gas cooler to the SCC-F sample gas feeder unit is described in the operating instructions OI/SCC-F for the SCC-F sample gas feeder unit.

8 Commissioning

Safety instructions

⚠ WARNING

Risk of injury due to live parts!

When the housing is open, contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

⚠ WARNING

Risk of poisoning

Risk of poisoning due to escaping poisonous or suffocating sample gas.

- if poisonous or oxygen-supplanting sample gases are conveyed using the device, the gas paths need to be purged with inert gas or air before the gas-bearing components are opened.
- Close open process connections so that they are gas-tight to prevent the escape of sample gas.
- When working on the device, use suited personal protection equipment (PPE) in accordance with the risk assessment.
- Comply with operator regulations regarding occupational safety!

⚠ CAUTION

Risk of injury caused by aggressive media

The media and condensates in the device can be aggressive and cause corrosion.

- When working on the device, use suited personal protection equipment (PPE), such as safety goggles, protective gloves or protective clothing.

⚠ CAUTION

Risk of burns caused by hot components in the device

The surface temperature of components in the device can up-scale 60 °C (140 °F)!

- Before opening the housing, switch off the power supply.
- Observe a cooling time of > 20 min before working on the device.

… 8 Commissioning

… Safety instructions

⚠ CAUTION

Risk of crushing caused by rotating components!
Risk of crushing caused by the automatically operating hose pump.

- Switch off the power supply before starting work on the hose pump.

NOTICE

Damage to the device due to incorrect line voltage
Incorrect line voltage may destroy the device.

- Before connecting the power supply, make sure that the operating voltage set on the sample gas cooler (see name plate) matches the mains voltage!

Power Supply Power-Up

Switch on the power supply using the externally installed supply circuit isolator or the socket.

- The hose pumps start to run.

Lead time

The lead time is approx. 15 minutes, after which the factory-set sample gas outlet temperature of +3 °C is reached.

Status Signal

The temperature monitoring status signal (temperature alarm) is present during the lead time.

Operational readiness

After the lead time expires, the analyzer system is ready for operation.

Connecting the sample gas

The sample gas may only be switched on when the sample gas outlet temperature is within the factory-set limit values, i.e. when it has fallen below +6 °C.

9 Operation

Safety instructions

⚠ WARNING

Risk of injury due to live parts!

When the housing is open, contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

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Risk of poisoning

Risk of poisoning due to escaping poisonous or suffocating sample gas.

- if poisonous or oxygen-supplanting sample gases are conveyed using the device, the gas paths need to be purged with inert gas or air before the gas-bearing components are opened.
- Close open process connections so that they are gas-tight to prevent the escape of sample gas.
- When working on the device, use suited personal protection equipment (PPE) in accordance with the risk assessment.
- Comply with operator regulations regarding occupational safety!

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The media and condensates in the device can be aggressive and cause corrosion.

- When working on the device, use suited personal protection equipment (PPE), such as safety goggles, protective gloves or protective clothing.

⚠ CAUTION

Risk of burns caused by hot components in the device

The surface temperature of components in the device can upscale 60 °C (140 °F)!

- Before opening the housing, switch off the power supply.
- Observe a cooling time of > 20 min before working on the device.

⚠ CAUTION

Risk of crushing caused by rotating components!

Risk of crushing caused by the automatically operating hose pump.

- Switch off the power supply before starting work on the hose pump.

When safe operation can no longer be assured

If it is apparent that safe operation is no longer possible, the device should be taken out of operation and secured against unauthorized use.

The possibility of safe operation is excluded:

- If the device is visibly damaged,
- If the device no longer operates,
- After prolonged storage under adverse conditions,
- After severe transport stresses.

… 9 Operation

Operation

Adjustment of the temperature set point is described below.

MC 1000 temperature controller

① Display status channel 1 (K1) / channel 2 (K2)	③ OK / ESC operating buttons (confirm / discard entries)
② 3-digit LED display	④ Arrow keys for navigation and parameter setting

Figure 14: MC 1000 temperature controller

Display

In standard operating mode, the temperature controller display shows the currently measured cooling temperature.

The current controller status is displayed via LEDs K1 and K2:

- K1: Heat exchanger temperature alarm
- K2: Controller output status

PIN protection

On delivery, the temperature controller is protected by a PIN. The PIN must be entered to change the set point or settings.

1. Press and hold the **OK** button for > 2.5 s.
   - The LED display flashes and shows "000"
2. Use the ▲ or ▼ buttons to set the PIN “017”.
3. Press the **OK** button to accept the entry.

Display temperature set point

1. Press and hold the **OK** button.
   - As long as the **OK** button is pressed, the set point temperature is displayed. Once the **OK** button is released, the actual temperature is displayed again.

Set the temperature set point

1. Enter PIN.
2. Press and hold the **OK** button for > 3 s.
   - The defined temperature set point flashes on the display. Factory setting = 3 °C.
3. Now set the desired set point using the ▲ and ▼ buttons.

> ***NOTICE***
>
> **Impairment of the device function**
>
> Impairment of the device function caused by freezing of the heat exchanger or a temperature setting that is too high.
>
> - Do not set the set point below +1 °C to prevent freezing of the heat exchanger.
> - Do not set the set point higher than the ambient temperature. If the set point is set to a level higher than the ambient temperature, the cooling will not work!

4. Press the **OK** button to accept the set point.
   - The LED display returns to the actual value display.

Set temperature limit values / parameterize controller

1. Enter PIN.
2. Press and hold the **OK** button for > 8 s.
   - The display changes to the "C00" parameter level (flashing) through the temperature set point display.
3. Now select the desired parameters using the ▲ and ▼ buttons, see table Available parameters.
4. Press the **OK** button to confirm the entry or press the ESC button to cancel the process and exit the parameter level.
5. Make the desired parameter settings using the ▲ and ▼ buttons.
6. Press the **OK** button to confirm the entry or press the ESC button to cancel the process and exit the parameter level.

Available parameters

Parameter	Description
C00	**Setpoint** Set the temperature set point. Setting range: −99 to 999 °C
C01	**Software version** Displays the software version.
C02	**Device Profile** Display the set device profile of the controller.
C04	**Display brightness** Set the brightness of the LED display. Setting range: 0 to 9
C08	**PIN lock** **Activate and change the PIN.**
C13	**Decimal places on the temperature display** Set the decimal places displayed.
C20	**Temperature high alarm** Set the temperature limit for the high alarm. If the actual temperature up-scales the defined temperature set point by the specified limit, the controller contact K2 switches.
C21	**Temperature low alarm** Set the temperature limit for the low alarm. If the actual temperature down-scales the defined temperature set point by the specified limit, the controller contact K2 switches.

10 Diagnosis / Troubleshooting

Troubleshooting

Error	Cause	Repair
Condensate in the sample gas output	Ambient temperature < 5 °C	• Heat downstream assemblies.
	Sample gas cooler overloaded	• Comply with sample gas inlet conditions (see **Sample gas inlet conditions** on page 18) and operating data (see **Operating data** on page 39).
	Hose pump failed	• Replace the hose pump.
	Pump hose defective	• Replace the hose (see **Replace the hoses of the hose pumps** on page 32).
	Cooling capacity too low although the sample gas cooler is not overloaded	• Ensure good cooling air circulation. • The fan must be in operation. • Observe the minimum distances to neighboring assemblies or walls (see **Dimensions** on page 19). • Clean the condenser fins, see **SCC-C – Clean condenser fins** on page 34.
	The compressor motor protection switch has tripped	• Eliminate thermal load due to the sample gas flow or excessively high ambient temperature. • Clean the condenser fins, see **SCC-C – Clean condenser fins** on page 34. • Comply with sample gas inlet conditions (see **Sample gas inlet conditions** on page 18) and operating data (see **Operating data** on page 39). • Allow to cool before starting the compressor again.
Sample gas flow blocked	Sample gas paths contaminated	• Contamination may be caused by dust or sublimate that has not been removed previously. Ensure that dust is removed before the sample gas enters the sample gas cooler; remove sublimate beforehand. • Clean sample gas lines and cooling systems. When using chemical detergents, take into account their corrosive effect and durability and flush with inert gas in order to prevent the detergent influencing the sampling results.
Incorrect temperature display	Temperature regulator faulty	• Replace the temperature regulator.
	Refrigerant flows out	• Send the sample gas cooler to Service for repairs.
Sample gas cooler failed	Power supply interrupted	• Restore the power supply.
	The motor protection switch or motor winding is defective, i.e. the compressor motor is not running	• Measure the electrical resistance of the motor winding (the reference value is approx. 40 Ω). • If there is significant deviation (sampling circuit open or short-circuited), replace the motor protection switch. • If the motor winding is defective, send the sample gas cooler to Service for repair.

11 Maintenance

Safety instructions

⚠ WARNING

Risk of injury due to live parts!

When the housing is open, contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

⚠ DANGER

Risk of explosion during maintenance of the device

While the device or its components are being maintained/serviced, there is no explosion protection.

- ensure that no potentially explosive atmosphere can occur.

⚠ WARNING

Risk of injury

Risk of injury due to maintenance work being carried out incorrectly.

The work described in this chapter requires special knowledge and may require work to be done on the sample gas cooler while it is open and under voltage!

- Maintenance work on the sample gas cooler should be performed by qualified and specially trained personnel only!
- Work on an open energized sample gas cooler should be performed only if absolutely necessary.

⚠ WARNING

Risk of poisoning

Risk of poisoning due to escaping poisonous or suffocating sample gas.

- if poisonous or oxygen-supplanting sample gases are conveyed using the device, the gas paths need to be purged with inert gas or air before the gas-bearing components are opened.
- Close open process connections so that they are gas-tight to prevent the escape of sample gas.
- When working on the device, use suited personal protection equipment (PPE) in accordance with the risk assessment.
- Comply with operator regulations regarding occupational safety!

⚠ CAUTION

Risk of injury caused by aggressive media

The media and condensates in the device can be aggressive and cause corrosion.

- When working on the device, use suited personal protection equipment (PPE), such as safety goggles, protective gloves or protective clothing.

⚠ CAUTION

Risk of burns caused by hot components in the device

The surface temperature of components in the device can upscale 60 °C (140 °F)!

- Before opening the housing, switch off the power supply.
- Observe a cooling time of > 20 min before working on the device.

⚠ CAUTION

Risk of crushing caused by rotating components!

Risk of crushing caused by the automatically operating hose pump.

- Switch off the power supply before starting work on the hose pump.

… 11 Maintenance

Replace the hoses of the hose pumps

Component	Ordering number
Hose for hose pump	90P1007

When is replacement of the hoses required?
Depending on the operating time, the hoses of the pump hoses must be replaced every 5 months at the latest.

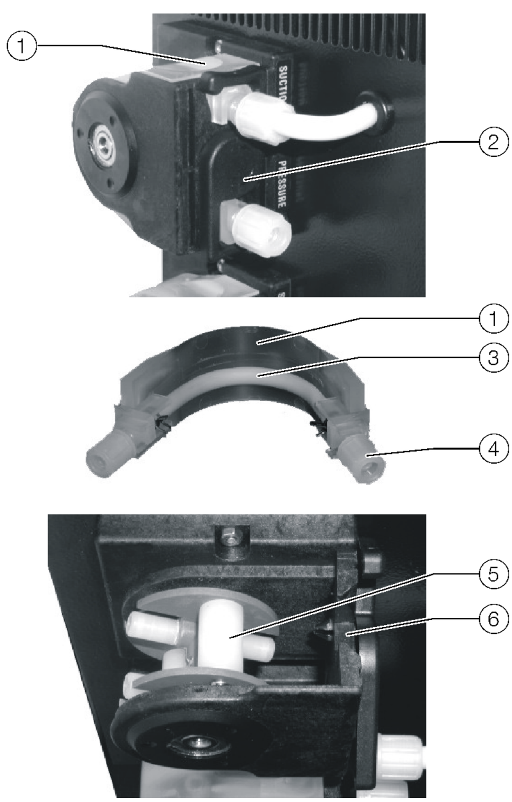
⚠ CAUTION

Risk of injury due to acidic condensate
The condensate is frequently acidic. There may be condensate or acid residues in the hoses. This may escape when the hose connections are opened.

- Collect and dispose of the escaping liquid.
- Implement relevant protective measures and observe the applicable regulations for its disposal!

NOTICE

Damage to components!
The hoses on the peristaltic pumps should never be lubricated.



①	Moving belt	④	Hose connections
②	S-clip	⑤	Pressure rollers
③	Peristaltic pump hose	⑥	Dovetail guide

Figure 15: Replacing peristaltic pump hose

1. Disconnect the sample gas supply and switch off the power supply to the sample gas cooler.

Remove the old hose:

2. Undo the hoses from the hose connections ④.
3. Press together the conveyor ① at the recessed grip and turn the S-bar ② clockwise up to the stop.
4. Remove the conveyor ① from the pump head and pull the old hose ③ on the hose connections ④ from the conveyor guides.
5. Press together the pressure roller ⑤ and check whether the spring tension is sufficient; if not, replace the pressure springs and, if necessary, the pressure roller (see **Replace the pressure rollers and springs of the hose pumps** on page 33).

Install a new hose:

6. Insert a new hose ③ with hose connections into the guides of conveyor ①.
7. Insert conveyor ① with the new hose into the dovetail guide ⑥ of the pump head; press together the conveyor at the recessed grip and at the same time turn the S-bar ② counter-clockwise until it engages.
8. Screw the hoses onto the hose connections ④.
   - Make sure that the hoses are not kinked

Recommissioning the sample gas cooler:

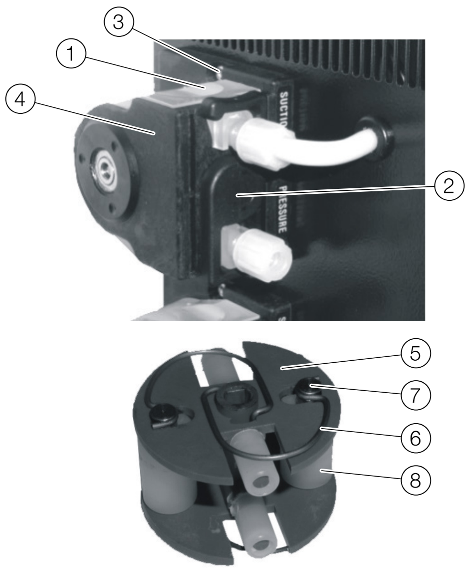
9. Turn on the power supply of the gas analyzer.
10. Only restore the sample gas after the end of the lead time.

Replace the pressure rollers and springs of the hose pumps

Component	Ordering number
Pressure roller	90P1045
Pressure spring	90P1010

When is replacement of the pressure rollers and pressure springs required?
Pressure rollers for the hose pumps must be replaced if their surface is damaged.

The pressure springs for the hose pumps must be replaced if they are broken.



1	Conveyor	5	Roller mount
2	S-bar	6	Pressure spring (4 pieces)
3	Nuts of the pump head fastening (2 pieces)	7	Roller axle
4	Pump head	8	Pressure roller (2 pieces)

Figure 16: Hose pump, roller mount

1. Disconnect the sample gas supply and switch off the power supply to the sample gas cooler.

Remove the hose pump hose:

2. Press together the conveyor 1 at the recessed grip and turn the S-bar 2 clockwise up to the stop; remove the conveyor with hose pump hose from the pump head.

Remove the pump head:

3. Undo the two nuts 3 for the pump head fastening (SW 5.5).
4. Pull the pump head 4 from the roller mount axis and remove the roller mount 5 from the pump head.

Replace pressure rollers and pressure springs:

5. Pull the pressure springs 6 out of the hole in the roller mount 5 and out of the retaining groove in the roller axis 7. Remove the roller axis from the roller mount and pull the pressure roller 8 off the roller axis.
6. Place a new pressure roller 8 on the roller axis 7 and secure in roller mount 5 using new pressure springs 6.

Install the pump head:

7. Insert roller mount 5 in the pump head 4 and place both parts together on the roller mount axis. When doing this, check the fit of the roller mount axis on the roller mount!
8. Secure the pump head 4 using the two nuts 3.
   - When doing this, it is appropriate to open the front so that the pump base plate can be counterheld from inside using the attachment screws.

Reinstall the hose pump hose:

9. Insert conveyor 1 with the hose pump hose in the pump head; press together the conveyor at the recessed grip and turn S-bar 2 counter-clockwise at the same time until it engages.

Recommissioning the sample gas cooler:

10. Turn on the power supply of the gas analyzer.
11. Only restore the sample gas after the end of the lead time.

… 11 Maintenance

SCC-C – Clean condenser fins

When should the condenser fins be cleaned?
Cooling performance is reduced by the accumulation of dust on the condenser fins.

For this reason the condenser fins should be inspected regularly and cleaned if any dust deposits are visible.

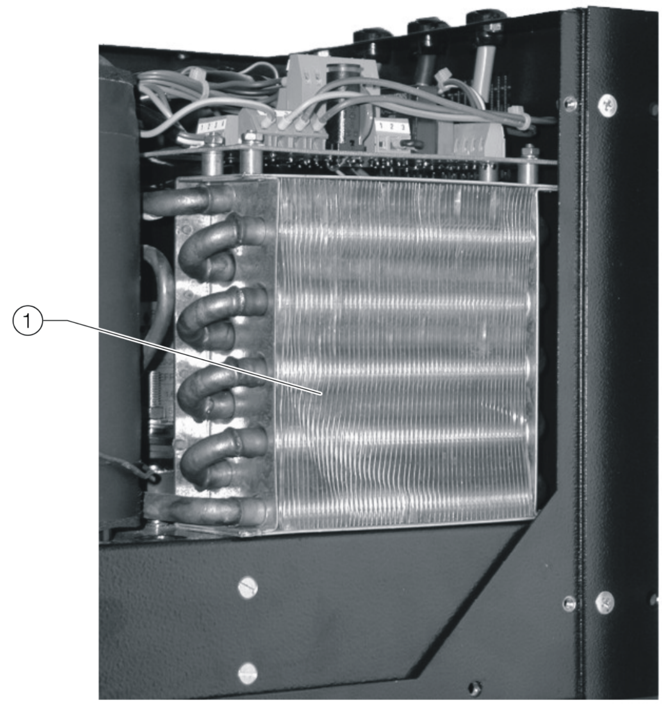
⚠ CAUTION

Improper work on the cooling unit!
Danger due to improper work on the cooling unit.
Maintenance work on the cooling unit, including servicing and decommissioning, may only be carried out by professional refrigeration companies.

- Risk of burns. Do not touch refrigerant hot gas lines.
- Risk of injury. Do not touch the sharp-edged cooling fins of the condenser.

Note
Refrigerants are harmful to the environment as soon as they are released into the atmosphere.

- Work on the refrigeration system may only be performed by experts in accordance with the Chemicals Climate Protection Ordinance.
- Do not damage the refrigerant lines.
- For disposal, send the refrigerant to a professional treatment expert.



1 Condenser fins

Figure 17: Cleaning the condenser fins

1. Disconnect the sample gas supply and switch off the power supply to the sample gas cooler.
2. Loosen the 4 fixing screws of the front panel and open the front panel forwards (the front panel remains fixed in the notch of the base plate).
3. Loosen the 8 fixing screws of the housing cover, remove the cable lug of the earthing cables from the plug-in tongue on the inside of the housing cover and lift off the housing cover.
4. Carefully blow out the condenser fins 1 with compressed air.
5. Plug the cable lug of the earthing cables onto the plug-in tongue on the inside of the housing cover, fit the housing cover (taking care not to crush any cables or hoses) and fasten with the 8 screws.
6. Close the front panel (taking care not to crush any cables or hoses) and secure with the 4 screws.
7. Turn on the power supply of the gas analyzer.
8. Only restore the sample gas after the end of the lead time.

Remove and clean the heat exchanger

Component	Ordering number
Heat-conducting paste for heat exchangers	90K0114

When should the heat exchanger be cleaned?
Removal and installation of the heat exchanger is necessary if the heat exchanger is dirty and needs to be cleaned.

① Sample gas connections of the heat exchangers
② Condensate connections of the heat exchangers
③ Cooling block
④ Temperature sensor

Figure 18: View of the sample gas cooler from the front, front panel folded down

> ⚠ **CAUTION**
> **Risk of injury due to acidic condensate**
> There may be condensate residues in the heat exchanger. The condensate is frequently acidic! Condensate may escape when the heat exchanger is removed and cleaned.
> - Collect and dispose of the escaping liquid.
> - Implement relevant protective measures and observe the applicable regulations for its disposal!

Remove and install the heat exchanger

1. Disconnect the sample gas supply and switch off the power supply to the sample gas cooler.

Remove the heat exchanger:

2. Loosen the sample gas and condensate lines from the connections ① and ② of the heat exchanger.
3. Pull the heat exchanger out of the cooling block ③ while turning it slightly upwards.
4. The heat exchanger is coated with heat-conducting paste to improve thermal conductivity. Clean the outside of the heat exchanger with a suited cloth and remove the heat-conducting paste.

Flush the heat exchanger:
Provide distilled water and a collection container to remove dirt and condensate residues from the heat exchanger.

5. Flush the heat exchanger with distilled water without pressure and collect the contaminated water in the collection container.
   - Observe the local regulations for the disposal of contaminated water.

Cleaning the heat exchanger in case of stubbon stains:
The heat exchanger is made of Duran® glass, stainless steel or PVDF.

6. Depending on the material of the heat exchanger, use a dirt-dissolving cleaning agent to clean the inside of the heat exchanger.
   - The cleaning agent must not corrode the material of the heat exchanger.
   - Observe the local regulations for the disposal of the cleaning agent.
7. Alternatively, use an ultrasonic bath to clean the inside of the heat exchanger.
   - Observe the operating instructions for the ultrasonic bath.
8. After cleaning, rinse the heat exchanger with distilled water without pressure and collect the contaminated water in a collection container.
   - Observe the local regulations for the disposal of contaminated water.

… 11 Maintenance

… Remove and clean the heat exchanger

Prepare the installation of the heat exchanger:

9. Dry the outside of the heat exchanger with a suited cloth.
10. Clean and dry the opening in the cooling block with a cloth.
11. Seal the condensate drain of the heat exchanger with adhesive tape to prevent the heat-conducting paste from penetrating the heat exchanger during installation.
12. Coat the entire surface of the opening in the cooling block and the heat exchanger with a thin, even layer of heat-conducting paste to ensure good temperature transfer.

Install heat exchanger:

13. Insert the heat exchanger into the opening in the cooling block, turning it slightly, and push it down to the stop.
14. Remove the adhesive tape on the condensate drain of the heat exchanger and any heat-conducting paste that has been pressed out.
15. Connect the sample gas and condensate lines to the connections ① and ② of the heat exchanger.
    - Note when installing a glass heat exchanger:
      Before fitting the GL union nuts, check that the PTFE/silicone clamping rings are not damaged. Fit the clamping rings with the PTFE surface facing the glass. Tighten the GL union nuts hand-tight.
16. Make sure that the temperature sensor ④ is inserted into the cooling block to the stop.

Recommissioning the sample gas cooler:

17. Check the tightness of the open sample gas path.
18. Switch the power supply to the sample gas cooler back on.
19. Only restore the sample gas after the end of the lead time.

Checking gas path leak tightness

The leak tightness of the sample gas path should be checked on a regular basis.

We recommend that you check the leak tightness of the sample gas or reference gas path prior to commissioning at the installation site, as it may have been affected during transport of the device (for example, because of high vibrations).

For the leak test, the pressure drop method
can be applied:

- For this purpose, a test pressure of pe ~ 500 hPa for a test duration of 5 min should be applied.
- Within this time, the pressure must not drop more than 10 hPa.

Fuses

Replace the fuse

The fuse is located on the connection board behind the front panel of the SCC-C sample gas cooler.

⚠ WARNING

Fire hazard

Fire hazard due to incorrect fuse type or tampering with the fuse.

- Fuses must not be tampered with or bypassed.
- The fuse holder must not be short-circuited.
- Only fuses of the specified type and rated current may be used as replacements.

Power supply	120 V AC	230 / 240 V AC
Rated current of fuse	3.15 A time-lag	2.0 A time-lag
Nominal voltage of fuse	250 V AC	250 V AC
Design	Device fuse 5 x 20 mm	
Order number	93K0550	90G3010

Perform the following steps to replace the fuse:

1. Switch off the power supply.
2. Open the front panel.
3. Pull out the defective fuse and insert a new fuse.
4. Close the front panel.
5. Switch on the power supply.
6. Check that the device is working correctly.

12 Decommissioning

Decommissioning the sample gas cooler

1. Switch off the power supply.
2. Disconnect the supply of sample gas to the sample gas cooler.
3. Loosen the sample gas and condensate lines from the connections onthe sample gas cooler.

⚠ CAUTION

Risk of injury due to acidic condensate

There may be condensate residues in the sample gas cooler. The condensate is frequently acidic!

- Collect and dispose of the escaping liquid.
- Implement relevant protective measures and observe the applicable regulations for its disposal!

4. Thoroughly flush the gas paths in the sample gas cooler with inert gas.
5. Tightly seal the gas ports.
6. Loosen the electrical leads from the sample gas cooler.

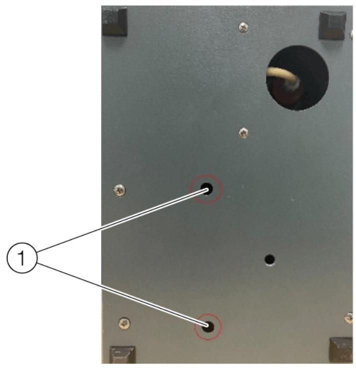
Note

- If the sample gas cooler is returned to the service department, e.g. for repair, it is essential to specify which gases were fed into the sample gas cooler!
  - This information is needed so that service personnel can take any requisite safety precautions for harmful gases.
- Make sure that no moisture that could freeze at low storage and transport temperatures remains in the sample gas cooler.

… 12 Decommissioning

Packaging sample gas coolers

Activate the compressor transport protection



① Screws (transport protection)

Figure 19: SCC-C transport protection

Using a PH2 Phillips screwdriver, turn the two screws clockwise through the holes in the base plate until the compressor housing rests on the base plate (noticeable resistance).

Packaging sample gas coolers

1. If the original packaging is not available, wrap the sample gas cooler in bubble wrap or corrugated cardboard.
2. When shipping overseas, additionally shrink-wrap the sample gas cooler air-tight in 0.2 mm thick polyethylene film adding a desiccant (such as silica gel).
   - Use an amount of desiccant that is appropriate for the packing volume and the expected transport time (min. 3 months).
3. Pack the sample gas cooler in an adequately sized box lined with shock-absorbing material (e.g. foam).
   - The thickness of the shock-absorbing material should be adequate for the weight of the sample gas cooler and the mode of dispatch.
4. When shipping overseas, line the box additionally with a double layer of bitumen paper.
5. Mark the box with "Fragile goods" and "Transport upright" labels.

Transport- / Storage temperature
−25 to 60 °C

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.
Fill out the return form (see **Return form** on page 41) and include this with the device.
In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:
All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Address for the return:
ABB AG
Service Analysentechnik – Parts & Repair
Stierstädter Straße 5
60488 Frankfurt
Germany
Phone: +49 69 7930-4591
Email: repair-analytical@de.abb.com

13 Recycling and disposal

Note
- The refrigeration circuit must be completely disposed of by an appropriately certified company.
- The refrigeration circuit may only be dismantled by refrigeration specialists.

Note

Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:
- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

14 Specification

Note
The device data sheet is available in the ABB download area at www.abb.com/analytical.

Operating data

Sample gas outlet temperature
Factory set to 3 °C

Dew point stability
- ±0.3 °C per 10 °C change in temperature,
- ±0.3 °C per 10 l/h change in flow rate

Cooling capacity
40 W at 10 to 45 °C ambient temperature

Lead time
Approx. 15 minutes

Pressure loss in the heat exchanger
- WT 250: approx. 1 hPa (1 mbar)
- WT 125: approx. 4 to 8 hPa (4 to 8 mbar)

Dead volume of the heat exchanger

Heat exchanger material	Dead volume of the heat exchanger	
	WT125	**WT250**
Glass	40 ml	140 ml
PVDF	25 ml	100 ml
Stainless steel	30 ml	100 ml

Seal integrity
5×10^{-6} hPa l/s

Cooling unit

Refrigerant / filling quantity
R 134a / 150 g

GWP (Global Warming Potential)
1430

CO_2-equivalent
0.215 t

15 Additional documents

Note
All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/analytical

16 Appendix

Return form

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.
Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:

Address:

Contact person:	Telephone:
Fax:	Email:

Device details:

Type:	Serial no.:

Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items):

☐ biological	☐ corrosive / irritating	☐ combustible (highly / extremely combustible)
☐ toxic	☐ explosive	☐ other toxic substances
☐ radioactive		

Which substances have come into contact with the device?

1.

2.

3.

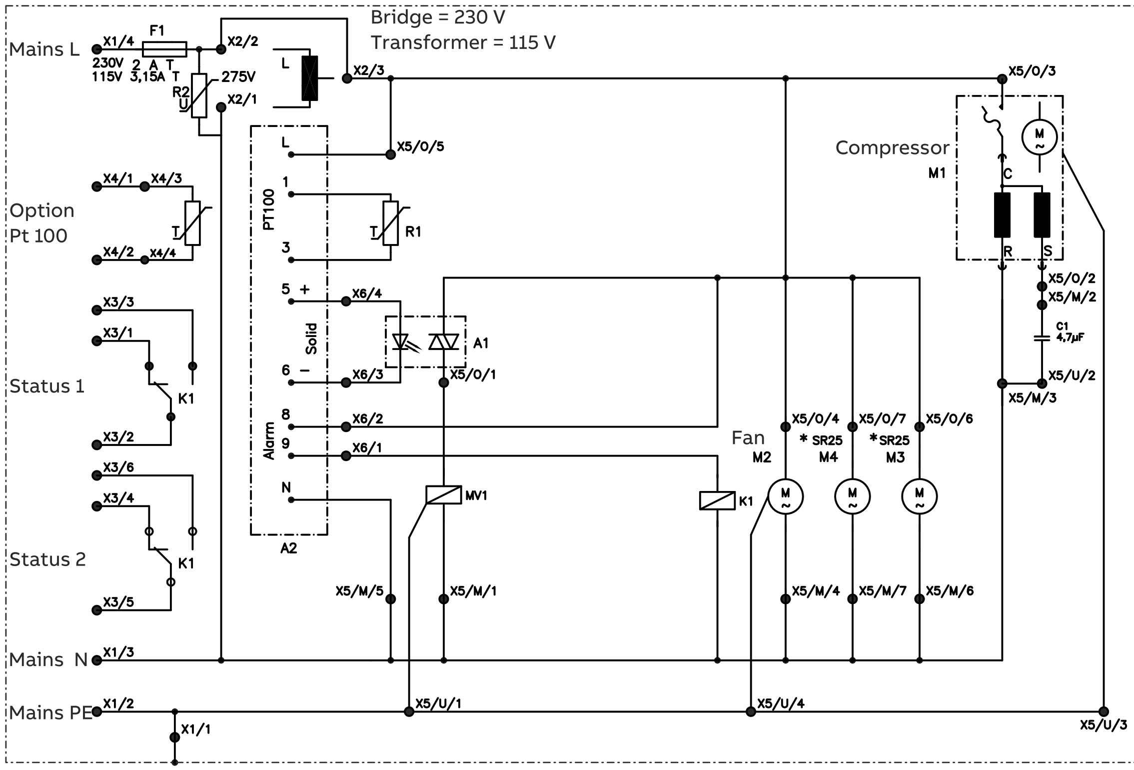
We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date

Signature and company stamp

... 16 Appendix

Terminal assignment



* SR25 = Hose pump

Figure 20: SCC-C Circuit diagram

Notes

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ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/analytical

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