Embracing Challenge

Electric Gas Cooler Series EC®

ECM-EX2

II 3 G Ex nA nC IIC T4 Gc

Instruction Manual
Doc: M_ECM-EX_EN_
Version1.03.03

Dear customer,

Thank you for buying our product. In this instruction manual you will find all necessary information about this M&C product. The information in the instruction manual is fast and easy to find, so you can start using your M&C product right after you have read the manual.

If you have any question regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor. You will find all the addresses in the appendix of this manual.

For additional information about our products and our company, please go to M&C's website www.mc-techgroup.com. There you will find the data sheets and manuals of all our products in German and English.

With the release of this version all older manual versions will no longer be valid. The German instruction manual is the original instruction manual. In case of arbitration only the German wording shall be valid and binding.

Version: 1.03.03

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1 General information

The product described in this manual has been built and tested in our production facility.

All M&C products are packed to be shipped safely. To ensure the safe operation and to maintain the safe condition, all instructions and regulations stated in this manual need to be followed. This manual includes all information regarding proper transportation, storage, installation, operation and maintenance of this product by qualified personnel.

Follow all instructions and warnings closely.
Read this manual carefully before commissioning and operating the device. If you have any questions regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor.

2 Declaration of conformity

CE - Certification

The product described in this operating manual complies with the following EU directives:

ATEX-Directive

The product described in this manual is produced in accordance with the EU directive for devices and protection systems for appropriate use in hazardous areas 2014/34/EU.

RoHS Directive

The requirements of the RoHS2 ('Restriction of Hazardous Substances 2') directive 2011/65/EU and its annexes are met.

EMV-Instruction

The requirements of the EU directive 2014/30/EU 'Electromagnetic compatibility' are met.

Low Voltage Directive

The requirement of the EU directive 2014/35/EU 'Low Voltage Directive' are met.

Declaration of conformity

The EU Declaration of conformity can be found in the annex of this manual. It can also be downloaded from the **M&C** homepage or directly requested from **M&C**.

3 Safety instructions

Please follow these safety directions and instructions regarding installation, commissioning and operation of the equipment:

- Read this manual before commissioning and operating the product. Please make sure to follow all safety instructions.
- Attention must be paid to the Type Examination Certificate in the appendix: BVS 16 ATEX E 055 X.
- Installation and commissioning of electrical devices must be carried out only by qualified skilled personnel in compliance with the current regulations.
- The installation and commissioning of the device must conform to the requirements of VDE 0100 (IEC 364) 'Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V' and must be in compliance with all relevant regulations and standards.
- For use in hazardous area, observe the relevant national and international directives and regulations.
- Before connecting the device, make sure to compare the supply voltage with the specified voltage on the product label.
- Protection against damage caused by contact with parts carrying high voltages:
  Disconnect the power supply before opening the device for access. Make sure that all extern power supplies are disconnected.
- Operate the device only in the permitted temperature and pressure ranges. For details please refer to the technical data sheet or manual.
- The device needs to be mounted inside a housing or cabinet with protection class IP54 or higher, complying with the IEC 60079-0 standard.
- Installation, maintenance, inspections and any repairs of the devices must be carried out only by qualified and skilled personnel in compliance with the current regulations.

3.1 Intended use

The **ECM-EX2** must be operated properly under the conditions described in chapter 9. Only use the **ECM-EX2** within the permitted temperature and pressure ranges.
Refrain from any use other than for this purpose.
Improper use can lead to serious injuries, see the safety instructions at the appropriate point.

4 Warranty

In case of a device failure, please contact immediately M&C or your M&C authorized distributor.

We have a warranty period of 12 months from the delivery date. The warranty covers only appropriately used products and does not cover the consumable parts. Please find the complete warranty conditions in our terms and conditions.

The warranty includes a free-of-charge repair in our production facility or the free replacement of the device. If you return a device to M&C, please be sure that it is properly packaged and shipped with protective packaging. The repaired or replaced device will be shipped free of delivery charges to the point of use. Do not send the heat exchangers with the device.

5 Warning signs and definitions

Danger

The 'Danger' warning sign indicates that death, serious injury and/or significant material damage will be the consequence, if the appropriate precautions should not be taken.

Warning

The 'Warning' warning sign indicates that death, serious injury or damage to property may occur if the relevant precautionary measures are not observed.

Caution

The 'Caution' warning sign indicates that slight personal injury can occur if the appropriate safety precautions are not observed.

Caution

'Caution' indicates that damage to property can occur if the appropriate safety precautions are not observed.

Note

'Note' indicates important information relating to the product or highlights parts of the documentation for special attention.

Qualified personnel

'Qualified personnel' are experts who are familiar with the installation, commissioning, maintenance and operation of these types of products. The following knowledge is at least required for the work:

- Instructed person in EX-protection
- Trained person in the electrotechnical field
- Detailed knowledge of the manual and the applicable safety regulations

'Ex' indicates important information about the product or about the corresponding parts in the instruction manual, relating to usage in potentially explosive atmospheres.

High voltages!
Protect yourself and others against damage which might be caused by high voltages.

Toxic!
Acute toxicity (oral, dermal, inhalation)! Toxic when in contact with skin, swallowed or inhaled.

Corrosive!
These substances destroy living tissue and equipment upon contact.
Do not breathe vapors; avoid contact with skin and eyes.

Hot surface!
Contact may cause burn! Do not touch!

Caution, risk of being crushed due to rotating parts.
Do not open the device. Use personal protective equipment (PPE).

Wear protective gloves!
Working with chemicals, sharp objects or extremely high temperatures requires wearing protective gloves.

Wear safety glasses!
Protect your eyes while working with chemicals or sharp objects. Wear safety glasses to avoid getting something in your eyes.

Wear protective clothes!
Working with chemicals, sharp objects or extremely high temperatures requires wearing protective clothes.

Wear safety footwear!

Use safety helmet and full protective goggles!

6 Information and safety instructions for using the cooler in hazardous areas

The compressor cooler ECM-EX2 is suitable for using in hazardous area of zone 2 (see Type Examination Certificate).

The explosion proof protection for both models is:

230 V / 115 V: II 3G Ex nA nC IIC T4 Gc
(Type Examination Certificate Number: BVS 16 ATEX E 055 X)

Certification was carried out by DEKRA EXAM BBG Prüf- und Zertifizier GmbH.
For detailed information see Type Examination Certificate in the appendix.
Installation and operating of the cooler have to be done corresponding to the conditions specified in the Type Examination Certificate. Only in this case the reliability of the operation in the hazardous area can be guaranteed.

Any modification of the standard configuration of the device with parts, which are not approved by M&C and not explicitly specified for usage in explosive atmospheres, will void the Type Examination Certificate. This also refers to any repair work and service using parts which are not M&C approved and not specified for usage in explosive atmospheres.

Please don't hesitate to contact M&C or your M&C distributer if you have any questions about parts, service and repair work of the device.

Disconnect power supply before opening the device for access.
Make sure that all external power supplies are disconnected.
This also applies to any external control circuits which may be connected.

Pay close attention to the requirements of the Type Examination Certificate in the appendix of this instruction manual: BVS 16 ATEX E 055 X.

Only carry out work on the controller, when the process and area is declared as an explosive free zone. An explosive free zone is free of explosive atmosphere.

7 Information and safety instructions for using the cooler

Warning

Inhalation hazard possible, if using toxic or asphyxiant gases!

Purge cooler with inert gas or air before opening! If the cooler is used for toxic gas or asphyxiant (oxygen-displacing) gas, it needs to be purged with inert gas or air before opening. Follow closely all relevant occupational safety regulations during operation.

Warning

Disconnect power supply before opening the device for access.
Make sure that all external power supplies are disconnected.

Do not carry out any work at the sensor while potentially explosive atmosphere is present.
The process and the environment of the device needs to be explosion-free (explosion-free zone) during any maintenance or repair work. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

Aggressive condensate is possible.

Wear protective gloves and protective glasses!

Wear proper protective clothing!

8 Introduction

The **M&C ECM-EX2** gas cooler unit is designed to operate whenever there is moisture interference in the sample gas.
Lowering the sample gas temperature to a very low and stable dew point prevents condensate built-up in the analyzer and avoids unstable measurements, because of water vapour cross-sensitivity or volumetric errors.

The **ECM-EX2** is certified for appropriate use in the specified Ex zones noted in the Type Examination Certificate.

Only operate the ECM-EX2 according to the specifications stated in this instruction manual and in the extended manufacturer documents.

8.1 Serial number

The type plate with the serial number is located at the right hand side panel of the cooler housing (wall-mount version).
Please refer to this serial number if you have any questions about your **ECM-EX2** or if you need to order spare parts or consumables.

8.2 Power supply

The cooler can be operated with AC voltage in the range of 110 V to 240 V, 50 to 60 Hz.

8.3 Patent references

The **M&C** sample gas cooling device is patented under the following patent number:
• Germany 199 57 052
• USA 6.477.851

9 Technical Data

9.1 For basic cooler ECM-EX2 without heat exchanger

Gas cooler series EC®	Version ECM-EX2-1	Version ECM-EX2-2
Part No. for 230 V 50 Hz	02K7650X	02K7655X
Part No. for 115 V 60 Hz	02K7650XA	02K7655XA
Amount of possible heat exchangers (HE)	1 x HE	2 x HE
Ambient temperature	+10 to +50 °C [+50 to +122 °F]	
Max relative humidity	80 % at temperatures up to 50 °C 122 °F], non-condensing	
Storage temperature	-20 to +60 °C [-4 to +140 °F]	
Sample outlet dewpoint	Range of adjustment: +2 to +7 °C [+35.6 to +44.6 °F], factory setting: +5 °C [+41 °F]	
Dew point stability	At const. conditions: < ±0.1 °C [±0.18 °F]	
Sample inlet temp. in EX zone with T3*	Max. +180 °C [356 °F] if cooler is mounted in EX zone with temperature class T3	
Sample inlet temp. in EX zone with T4*	Max. +120 °C [248 °F] if cooler is mounted in EX zone with temperature class T4	
Sample inlet dew point*	Max. +80 °C [176 °F]	
Total cooling capacity	144 kJ/h at 10 to 50 °C [+50 to +122 °F] ambient temperature	
Ready for operation	< 15 min	
Main power connection	230 V AC -15/+10 %, 50-60 Hz or 115 V AC -15/+10 %, 50-60 Hz	
Power consumption	Max. 200 VA (start-up current at 230 V/50-60 Hz = 2.5 A; at 115 V/50-60 Hz = 4.5 A)	
Electrical connection	Terminals: 2.5 mm^2, tightening torque for terminals X1 and X3: 0.5 to 0.6 N m	
Cable glands	2 x M20 x 1.5, clamping range: 6-12 mm	
Status alarm	1 x free configurable status alarm with 2 x potential free change-over contacts, contact rating: 250 V AC, 2 A; 500 VA; 50 W, factory-set alarm limits: < 2 °C [35.6 °F] and > 8 °C [46.4 °F] with an outlet dew point of +5 °C [+41 °F], an alarm window of 3 °C [5.4 °F] and an alarm hysteresis of 1 °C [1.8 °F] (For further information see chapter 21)	
ATEX	230 V/115 V: ⟨Ex⟩ II 3G Ex nA nC IIC T4 Gc (Type Examination Certificate Number : BVS 16 ATEX E 055 X)	
Electrical safety	EN 61010-1	
Installation sites	The cooler is intended for indoor use. The maximum altitude is 2,000 m above sea level.	
Overvoltage category	II	
Pollution degree	2	
Refrigerant	R134a, content: 130 g [≈ 0.3 lb], max. operating pressure: 17 bar	
System of protection	IP20 EN 60529	
Method of mounting/case colour	Wall-mounting/RAL 9003	
Dimensions (W x H x D)	270 x 270 x 316 mm [10.6" x 10.6" x 12.4"]	
Weight	230 V version: 12 kg [≈ 26.5 lbs]/115 V version: 13.5 kg [≈ 29.8 lbs]	

* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C [77 °F] ambient temperature and an outlet dew point of 5 °C [41 °F].

9.2 Options for basic cooler ECM-EX2

Standard sizes are highlighted in the table.

Heat exchanger type	**ECM-1G**	**ECM-1PV**	**ECM-1SS**	**ECM-2G**	**ECM-2PV**	**ECM-2SS**
Part No	93K0140	93K0170	93K0160	97K0100	97K0110	97K0115
Material of heat exchanger	Duran® glass	PVDF	Stainless steel 316Ti	Duran® glass	PVDF	Stainless steel 316Ti
Max. gas flow rate*	250 Nl/h	250 Nl/h	250 Nl/h	150 Nl/h	150 Nl/h	150 Nl/h
Max. sample gas pressure[2)]	2/3[1)] bar abs.	3 bar abs.	Max. 10 bar	2/3[1)] bar abs.	3 bar abs.	10 bar abs.
Sample gas connection	GL 18 for **Ø 6 mm** OD tube	G1/4" i	**G 1/4" i** oder 1/4" NPT	GL18 for **Ø 6 mm** OD tube	Tube **Ø 6 mm**	Tube **Ø 6 mm**
Condensate connection	GL 25 for **Ø12 mm** tube Ø 8 or 10 mm	G3/8" i	**G3/8" i** or 3/8" NPT	GL 25 for **Ø 12 mm** tube Ø 8 or 10 mm	G3/8" i	**G 3/8" i** or 3/8" NPT
ΔP at max. flow	1 mbar					
Stagnant space approx.	100 ml			40 ml	25 ml	30 ml

Peristaltic pump SR25.2	1 x incorporated in the cooler, compl. installed, part no.: 01P9125; Novopren tubing, pumping capacity 0.3 l/h, 5 rpm, cooler weight plus 0.6 kg [1.32 lb] per pump ⚠ The sample gas pressure is limited to 2 bar absolute. For more information about the SR25.2 and about other tubing materials see SR25.2 manual.

* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C [77 °F] ambient temperature and 5 °C [41 °F] outlet dew point.

1) With GL connecting adapter.

2) With SR25.2 max. 2 bar abs

Duran® glass is a brand name for borosilicate glass produced by the German company Duran Group GmbH.

Please note: Nl/h and Nl/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.

10 Application

Figure 1 shows a typical application example for an **ECM-EX2-1** gas cooler unit.

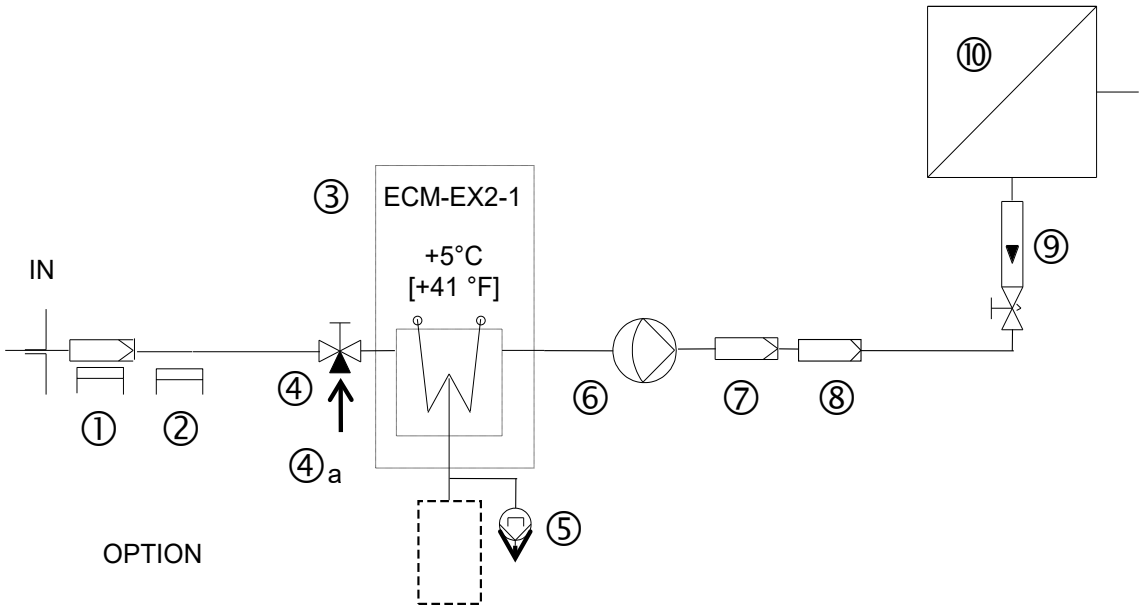


Figure 1 Application example of the ECM-EX2-1

1 : Filter sample probe SP ...
2 : Heated sample line
3 : **ECM-EX2** cooler
4 : 3-way ball valve
4a : Test gas
5 : Peristaltic pump (optional)
6 : Membrane pump
7 : Super fine filter FP ...
8 : Aerosol filter CLF-5
9 : Flow meter FM10
10 : Analyzer

The sample gas enters the gas sample probe ①, and via a heated sample line ② it reaches the **ECM-EX2** gas cooler ③. The gas cooler ③ cools the sample gas down to a dew point of +5 °C [41 °F]. The super-fine filter ⑦ removes solid particles from the sample gas. To enhance the operating safety of the entire system, we recommend installing a super-fine filter ⑦ with a liquid alarm sensor. If required, an aerosol filter ⑧ can be installed in-line, in front of the flow meter ⑨. The conditioned gas can now enter the analyzer ⑩.

Do not use the gas cooler to extract gases or gas compositions, which could be potentially explosive without the presence of air. Do not use gases or gas compositions which can alter the relevant safety-related material properties of the cooler materials. The gas or gas composition needs to be free of particles which could cause, in combination with the materials of the gas cooler, sparks by friction or impact.

Warning

Inhalation hazard possible, if using toxic or asphyxiant gases!

Purge gas cooler with inert gas or air before opening!

If the gas cooler is used for toxic gas or asphyxiant (oxygen-displacing) gas, it needs to be purged with inert gas or air before opening. Follow closely all relevant occupational safety regulations during operation.

11 Description

Figure 2 shows the **ECM-EX2-2** cooler unit. Dimensions are in mm and the three arrows show the direction of the air flow.

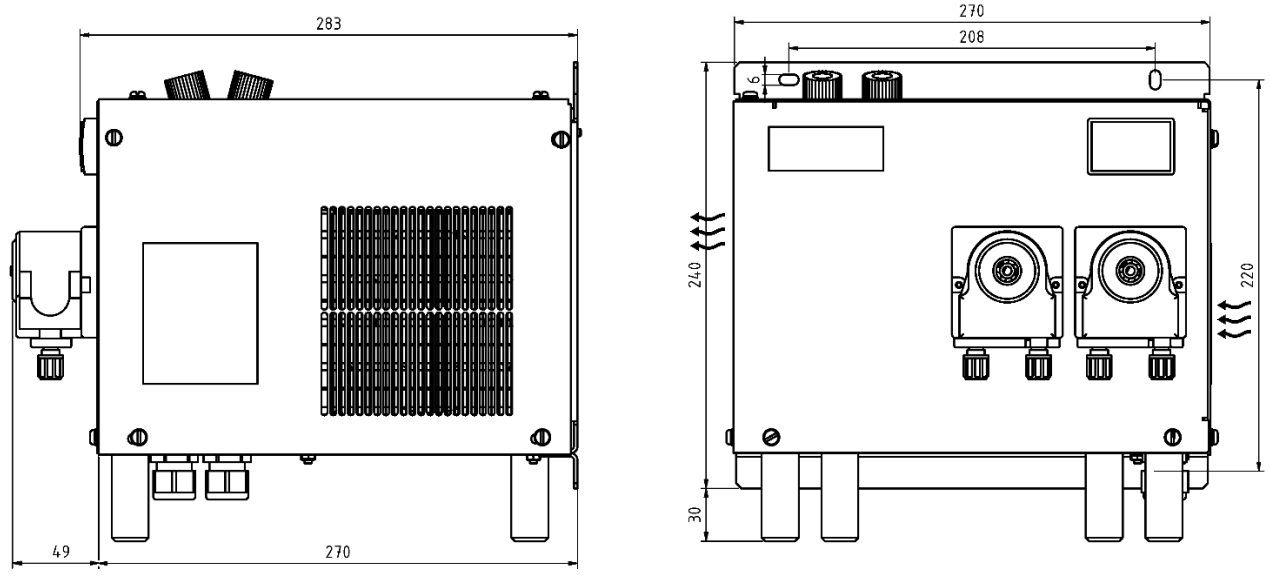


Figure 2 ECM-EX2-2

The cooler **ECM-EX2** is also suitable for wall mounting. The depth of the cooler housing is 270 mm [≈ 10.63"] without, and 316 mm [≈ 12.44"] with optionally mounted peristaltic pumps.

Warning

The cooler ECM-EX2 is conform to the system protection IP20 (EN 60529). The gas cooler needs to be mounted inside a housing or cabinet with the protection class IP54 or higher, complying with the IEC 60079-0 standard. Solids and water must be prevented from entering the cooler housing through the ventilation outlets. For installation, according to NEC article 501.4 (B) (2) (conduit installation), the cable glands need to be replaced by the enclosed Conduit Hub.

On the top of the cooler housing are cut-outs for 1 or 2 heat exchangers. The sample gas inlet and outlet are located at the upper part of the heat exchanger. For information about tubing connections of the heat exchangers, please see chapter 8, technical data.

The main power connector and the output contact of the status alarm can be connected at terminals X1 respectively X3, located behind the removable front panel of the **ECM-EX2** housing.

The following connections are accessible from outside the housing underneath the bottom plate:

- standard condensate outlets of the heat exchangers,
- cable glands 2 x M20 x 1.5; clamp range 6-12 mm.

In under pressure operation the condensate will be removed either via optional **SR25.2** peristaltic pumps (pump in-line after the cooler), which are mounted into the front panel of the cooler, or with an external condensate vessel **TG.../TK...**.
In over pressure operation the condensate will be removed via an automatic liquid drainer **type AD-..**.

12 Function

The **M&C** gas cooler type **ECM-EX2** is a compressor cooler equipped with a status alarm for safe and continuous operation.

Up to 2 Jet-stream heat exchangers made of Borosilicate glass, PVDF or stainless steel are located in a heat-insulated cooling block, where they are easy to access and to remove.
Figure 3 shows a diagram of the heat exchanger function. The compressor cooler system keeps the heat-insulated cooling block at a constant temperature of +5 °C [+41 °F].
The controlled, forced-air cooled compressor cooling system and the special design of the Jet-stream heat exchanger ensure excellent condensate pre-separation and sample gas drying.

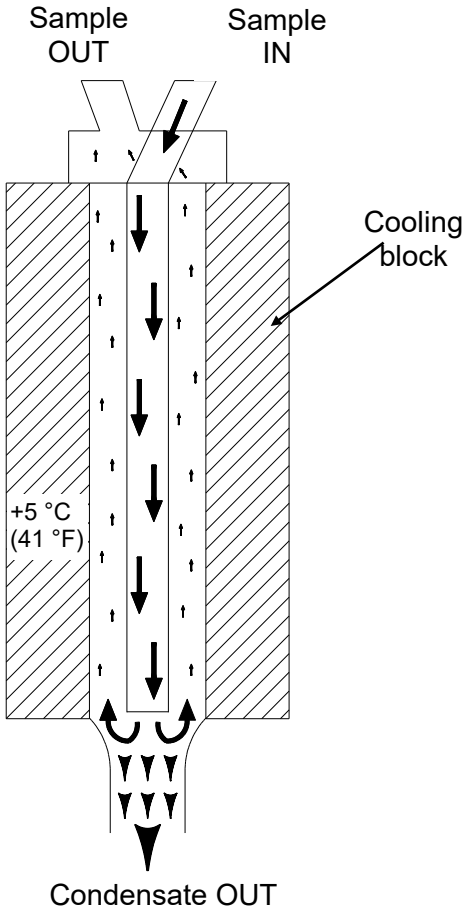


Figure 3 Diagram of the heat exchanger function

13 Receiving and storing of the device

The **ECM-EX2** gas cooler is a complete pre-installed unit.

- Please remove the **ECM-EX2** carefully from the packaging. Check the scope of the delivery specified on the delivery note. Please make sure that you have received all items stated on the delivery note.
- Please check the unit for any transport damage after receipt, and report any complaints to the transport company immediately.

Note

The cooler must be stored in a weather protected frost-free area!
The cooler should always be transported and stored in an upright position, with the equipment feet facing downwards to ensure that the oil in the closed compressor circuit cannot run out of the compressor case.

If the cooler was transported on its back by mistake, it needs to stand upright in the operating position for approx. 24 hours before switching on!

14 Installation instructions

The gas cooler needs to be mounted inside a housing or cabinet with the protection class IP54 or higher, complying with the IEC 60079-0 standard. The gas cooler needs to be installed at a location, which is frost-free in winter and adequately vented in summer. Avoid direct sun light.
The operating position for this cooler is vertical only. This is the only way to ensure proper separation and removal of condensate in the heat exchangers. During transport and installation, the cooler needs to be in an upright position, with the equipment feet facing downwards to ensure that the oil in the closed compressor circuit cannot run out of the compressor case.

Install the cooler away from heat sources in a well-ventilated area. To prevent heat build-up interfering with operation, install the device with a minimum distance of 100 mm [≈ 3.94"] to other components.

Un-heated sample gas lines need to be installed with a declining angle towards the cooler. In this case, any built-up condensate in the gas lines can flow towards the cooler, and pre-separation of the condensate is not required.

Heated sample gas lines need to end at least 20 cm [≈ 7.874"] before the gas line reaches the cooler to make sure that the heated sample line and the cooler is thermally decoupled. This means, the last 20 cm [≈ 7.874"] of the gas lines are not isolated.

- The ECM-EX2 cooler is suitable for wall mounting.

  The gas cooler needs to be mounted inside a housing or cabinet with the protection class IP54 or higher, complying with IEC 60079-0 standard.

15 Mounting

Warning

Do not mount or carry out any work at the gas cooler while potentially explosive atmosphere is present.
The process and the environment of the cooler needs to be explosion-free (explosion-free zone) during mounting. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

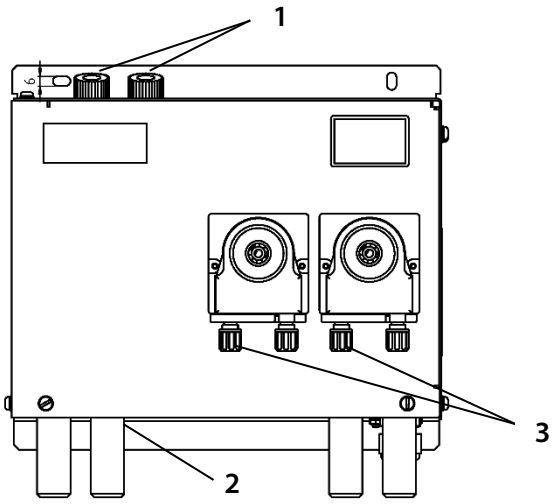
Connect the cooler to earth (electrical bonding terminal).
The bleeder resistor needs to have an overall value of $< 10^6\ \Omega$.

15.1 Tubing connections

Note

Check tubing and hose connections for any type of leakage!

The sample gas inlet and outlet are located at the upper part of the heat exchanger. For information about tubing connections of the heat exchangers, please see chapter 9, technical data.



1 Gas inlet and outlet

2 Condensate outlet (behind device foot)

3 Condensate outlet with optional mounted peristaltic pump

Figure 4 Position of the gas and condensate connections

Suitable tube and hose connectors are optional and available at **M&C** (see data sheet for connection fittings).

Note

Do not mix up the hose connections; the gas inlet and outlet connections of the heat exchangers are marked with arrows.

Make sure that all the connections are sealed adequately.
To ensure free removal of the condensate, do not decrease the stated diameters of the condensate removal lines**!**

Follow these instructions to ensure the adequate sealing of the connections:

Borosilicate glass heat exchangers with connections GL 18-6 respectively GL 25-12 (standard)

- Before assembly, check the GL coupling rings to see if the PTFE/silicon locking rings have been damaged.

- The sealing rings should be installed with the PTFE side facing the medium.

PVDF- resp. stainless steel heat exchangers with G 1/4" female resp. G 3/8" female

- The fitting tubing or hose couplings with threaded connections have to be screwed in with PTFE thread sealing tape.
- For a functional and smooth mounting, we recommend using union pieces with tapered pipe thread type R according to DIN 2999/1 in connection with suitable sealing tape or fluid.

Note

To tighten the connectors onto the PVDF or stainless steel heat exchanger, hold a wrench against the spanner flats of the bushing!

Option: stainless steel heat exchanger with NPT

- The heat exchangers with NPT threaded connectors are marked with a notch around the connecting pieces.
- The NPT thread must be screwed in with sealant or glued in with adhesive.

In the standard configuration, the tubes for condensate removal are connected directly to the heat exchangers. These protrude with the GL 25-12 tube connectors (standard, Borosilicate glass heat exchanger) respectively with G 3/8" (standard) thread joint PVDF or stainless steel heat exchanger out of the bottom plate of the cooler housing (Figure 2).

The condensate removal is customer specific and depends on the type of operation:

- peristaltic pump(s) type **SR25.2** optionally mounted into the cooler housing,
- external mounted condensate vessel(s), which needs to be emptied manually respectively,
- automatic float-type liquid drainer type **AD-...** (only for over-pressure operation).

Note

If using a stainless steel heat exchangers with G 3/8" thread, the float-type automatic liquid drainer AD-SS can be directly mounted to the heat exchanger by using the threaded adapter part number FF11000 (1/2" NPT to G 3/8" female). In this case wall mounting and tubing of the AD-SS unit isn't necessary!

16 Electrical connections

Caution

Wrong supply voltage can destroy your cooler!

When connecting the equipment, make sure that the supply voltage is identical with the information provided on the model type plate!

Warning

Only carry out work on live parts when the area has been proved to be “safe“. Only carry out work on the protective cover in front of the temperature controller, when the area has been proved to be “safe“.

Note

The installation and commissioning of the device must conform to the requirements of VDE 0100 (IEC 364) ‘Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V’ and must be in compliance with all relevant regulations and standards.

The cooler has a replaceable fuse. Because of this replaceable fuse, the installation site of the cooler needs to be equipped with a suitable external switch to switch off the main power supply.

Warning

Cooler versions with 115 V have a built-in transformer to generate an internal current of 230 V. This means, that the internal live parts of the device have a current of 230 V not 115 V.

Figure 5 shows the electrical connections behind the front panel of the **ECM-EX2** housing.
For alarm incidents (over- and under-temperature), there is a user-configurable status alarm with two potential-free changeover contacts available. The alarm will be set off, when the current temperature is lower than +1.5 °C [+34.7 °F] or higher than +8.5 °C [47.3 °F] (default setting).

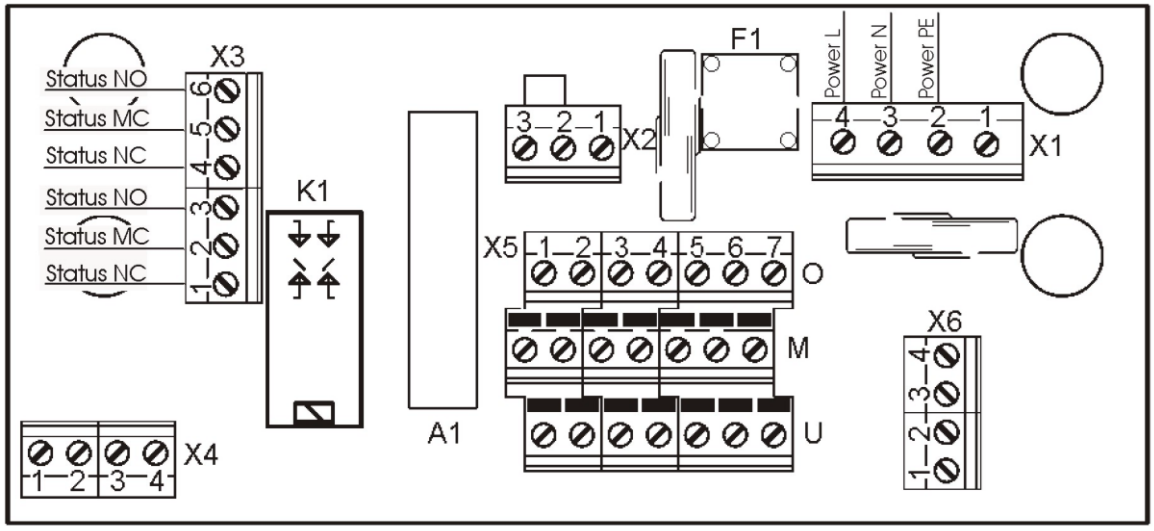


Figure 5 Electrical connections, alarm contacts

Follow these instructions to connect the status alarm and power cables:

1. release the screws (7 pcs.) from the cooler hood and remove the hood;

2. put the cables (6-12 mm) through one of the cable glands in the bottom plate, and connect them according to the electrical connections in Figure 5;

17 Preparations for commissioning

Before initial startup, all plant- and process-specific safety measures must be observed. It is mandatory for the operator to complete the enclosed risk assessment of the product.
The gas exposure risk must be assessed by the operator with regard to the hazards posed by process and calibration gas and the setup at the installation site (e.g. tubing, system cabinet/container/plant). If the risk assessment reveals increased exposure hazards, further measures are required.
A visible label must be attached to the installation site in accordance with the risk assessment provided by the operator.

18 Start-up

Qualified personnel

The work described in this chapter can be carried out by qualified personnel. The following knowledge is at least required for the work:

- Instructed person in EX-protection
- Trained person in the electrotechnical field
- Detailed knowledge of the manual and the applicable safety regulations

The operator must ensure that all work on the **ECM-EX2** is carried out only by authorized and qualified personnel. Observe the plant- and process-specific regulations and the regulations which are applicable to Ex zones.
Any work must only be carried out after the EX-free measurement has been completed. Immediately after finishing the work, all safety and protective devices must be reattached or put into operation and tested.

The controlled cooling system of the **ECM-EX2** permits automatic start-up of the cooler.
The following description applies to a start-up at an ambient temperature of > 8 °C [> 46.4 °F] only.

Only carry out any work at the gas cooler, when the process and the environment of the cooler is declared as an explosion-free zone. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

Only open the protective cover in front of the temperature controller, when the process and the environment of the cooler is declared as an explosion-free zone. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

Warning

Connect the cooler to earth (electrical bonding terminal).
The bleeder resistor needs to have an overall value of $< 10^6\ \Omega$.

Note

Before starting up the gas cooler, it must be placed in its operating position for at least two hours. The liquid inside the system may have been redistributed, and this could cause problems during operating.

The following steps should be carried out before initial start-up:

1. Connect the cooler unit to the mains power supply; Make sure that the equipment is connected to the correct mains voltage, 115 V or 230 V, as shown on the type plate.

2. Connect the status contact output to the measuring station;

Note

Connect the status contact output to an external sample gas pump or a solenoid valve in the gas line. In case of an alarm incident, this can protect the whole analysing system by immediate interruption of the gas supply.

19 Closing down

Note

The installation site of the cooler must be frost-free, even when the unit has been switched off!
In case of a short-term decommissioning of the cooler no special measures are required.
In case of a long-term decommissioning, we recommend to purge the cooler with inert gas or air to remove residual condensate entirely from the cooler.

Aggressive condensate is possible.

Wear protective gloves and protective glasses!

Wear proper protective clothing!

20 Maintenance

Qualified personnel

The work described in this chapter can be carried out by qualified personnel. The following knowledge is at least required for the work:

- Instructed person in EX-protection
- Trained person in the electrotechnical field
- Detailed knowledge of the manual and the applicable safety regulations

The operator must ensure that all work on the **ECM-EX2** is carried out only by authorized and qualified personnel. Observe the plant- and process-specific regulations and the regulations which are applicable to Ex zones.
Any work must only be carried out after the EX-free measurement has been completed. Immediately after finishing the work, all safety and protective devices must be reattached or put into operation and tested.

Before starting any maintenance work, make sure that any work done on the device is in compliance with all relevant regulations and standards.

Warning

Disconnect power supply before opening the device for access.
Make sure that all external power supplies are disconnected.

This also applies to any external alarm or control circuits which may be connected.

Only carry out any work at the gas cooler, when the process and the environment is declared as an explosion-free zone. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

Only carry out any work at the temperature controller, when the process and the environment is declared as an explosion-free zone. A zone is declared as explosion-free zone, if it is free of explosive atmosphere.

Warning

Inhalation hazard possible, if using toxic or asphyxiant gases!

Purge cooler with inert gas or air before opening! If the cooler is used for toxic gas or asphyxiant (oxygen-displacing) gas, it needs to be purged with inert gas or air before opening. Follow closely all relevant occupational safety regulations during operation.

Warning

Connect the cooler to earth (electrical bonding terminal). The bleeder resistor needs to have an overall value of $< 10^6\ \Omega$.

The intervals between servicing are dependent on the process and system conditions in your facility. The facility QA/QC plan should address the frequency for maintenance and should be updated based on your operations.

20.1 Adding and replacing the heat exchangers

Removal of the heat exchangers may be necessary to carry out any maintenance or repair work. The cooler does not need to be switched off while replacing the heat exchangers.

We recommend the following procedure to replace the heat exchangers:

1. Release the upper gas connections and lower condensate connections;

Warning

Aggressive condensate residues possible.
Chemical burns due to aggressive media possible!

Wear protective gloves!

Wear safety goggles and appropriate protective clothing!

2. Pull the heat exchanger upwards and slightly rotate it out of the cooling block;

Replace the heat exchangers as follows:

3. Dry and clean the opening in the aluminium cooling block with a cloth;
4. Apply a thin and equal layer of thermal conductivity paste (part no. 90K0115) onto the opening;
5. Close the condensate removal connections of the heat exchanger with adhesive tape to prevent any thermal conductivity paste getting into the heat exchanger;
6. Apply a thin and equal layer of thermal conductivity paste over the whole surface of the heat exchangers (part no. 90K0115) to ensure good conduction of heat.
7. Lightly push and slightly rotate the heat exchanger back into the opening of the cooling block and press it to the upper block;
8. Remove the adhesive tape and any surplus thermal conductivity paste;
9. Reconnect the tubing.

Note

Do not mix up the tubing connections!
Gas outlet and gas inlet at the heat exchangers are marked with arrows!

Mounting the Borosilicate glass heat exchangers please notice:

10. Check the PTFE/Silicon clamping rings for damage. Assemble the clamping rings with the PTFE side facing the medium, otherwise the required degree of sealing cannot be guaranteed!
11. Screw-on the GL union nuts hand-tight by turning them to the right;

To ensure a safe connection of the sample gas or condensate tubes to the Borosilicate glass heat exchanger(s) we recommend the use of GL-couplings. Please don't hesitate to contact M&C or your M&C distributer, if you have any questions about GL-couplings.

20.2 Cleaning a heat exchanger

Warning

Aggressive condensate residues and cleaning agents possible.
Chemical burns due to aggressive media possible!

Wear protective gloves!

Wear safety goggles and appropriate protective clothing!

You will need the following tools to clean the heat exchanger:

- A suitable cloth to remove the heat-conducting paste
- Suitable cloth for drying the heat exchanger
- Distilled water
- Collecting container
- If necessary, cleaning agent suitable for the heat exchanger material or an ultrasonic bath
- Disposal options for the contaminated liquids

The following step-by-step procedure is recommended for cleaning the heat exchanger:

1. The heat exchanger is coated on the outside with heat-conducting paste to improve thermal conductivity. Remove the heat-conducting paste with a suitable cloth.
2. Use distilled water to clean the heat exchanger. Rinse the heat exchanger with distilled water and collect the dirty water in a collecting container. Dispose of it in accordance with the applicable regulations. Dry the heat exchanger with a suitable cloth.

For persistent dirt, either a **suitable cleaning agent** or an **ultrasonic bath** can be used. Proceed as follows:

1. **Use cleaning agent:** The cleaning agent must be suitable for the respective material. Heat exchanger materials are Duran® glass, stainless steel and PVDF. Collect the contaminated cleaning agent in a collection container after cleaning and then dispose it according to the applicable regulations.
   Use an ultrasonic bath: When using an ultrasonic bath, follow the manufacturer's operating instructions.
2. After cleaning with a cleaning agent or inside an ultrasonic bath: Rinse the heat exchanger with distilled water and collect the contaminated water in a container. Dispose it according to the applicable regulations. Dry the heat exchanger with a suitable cloth.

20.3 Cleaning the fins of the condenser

Dust on the fins of the condenser reduces the cooling capacity. Therefore, it is necessary to clean the fins frequently. The following steps are recommended:

1. Shut off the gas flow;
2. Disconnect the power supply.
3. Disconnect the tubing for gas in- and outlet;
4. Unscrew the cooler hood and remove it carefully;
5. Clean the fins carefully with compressed air;
6. Re-install the cooler hood;
7. Connect the tubing for gas in- and outlet.

Note

Do not mix up the tubing connections; the inlet and outlet connections of the heat exchangers are marked with arrows.

20.4 Maintenance of the optional mounted peristaltic pump(s), type SR25.2

Before starting any maintenance work, please make sure that any work done on the device is in compliance with all relevant regulations and standards.

Danger

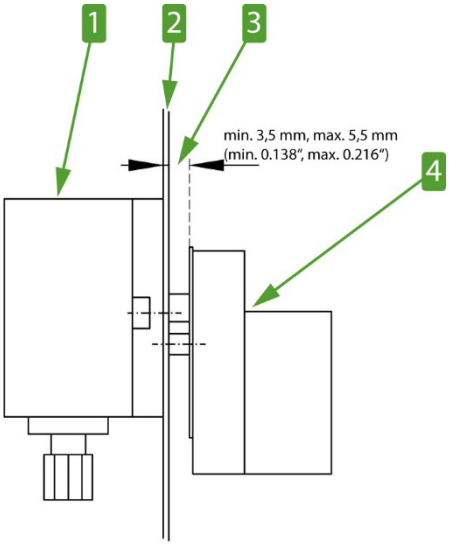
Dangerous voltage!
Disconnect power supply before carrying out any type of maintenance work.

Flexible tube, conveying belt, contact pulleys and contact springs are the only parts of the pump subject to wear. They can easily be replaced.

20.4.1 Mounting instructions for SR25.2 peristaltic pump (optional)

Make sure to mount the peristaltic pump SR25.2 to a front plate with a minimum thickness of 3.5 mm [≈ 0.138"]. If the front plate is thinner than 3.5 mm [≈ 0.138"], use shims to adjust spacing. The maximum thickness of the front plate is 5.5 mm [≈ 0.216"].

The minimum distance avoids damage to the pump motor, and the maximum distance prevents the motor shaft from losing the guide inside the pump head.



1 Pump head (outside the cooler housing) 2 Cooler front panel
3 Recommended mounting distance 4 Pump motor (inside the cooler housing)

Figure 6 SR25.2: Mounting distance between front panel and pump motor

Note

For detailed mounting instructions, see the SR25.2 instruction manual. The manual is available on our website www.mc-techgroup.com.

20.4.2 Replacing the pump tubing

Aggressive condensate is possible.

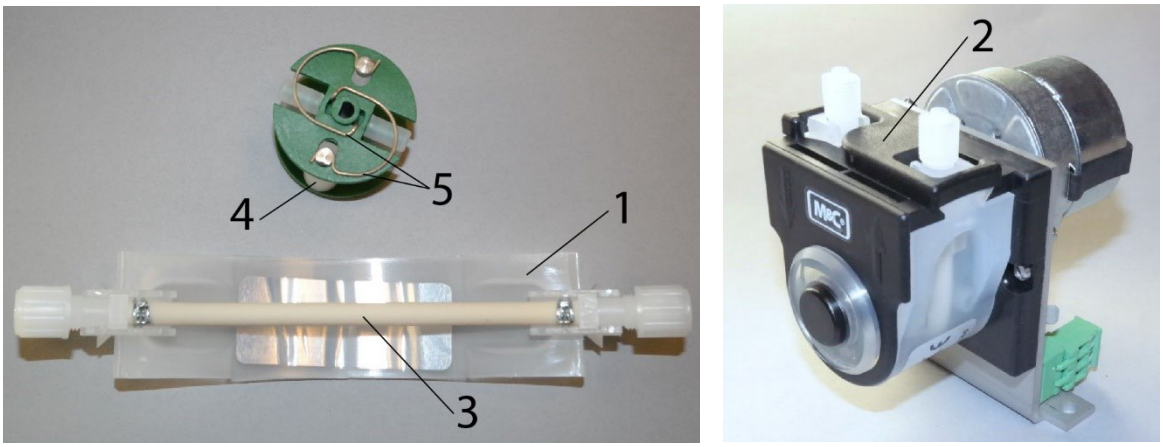
Wear protective gloves and protective glasses during decommissioning, repair or cleaning of the cooler!

Wear proper protective clothing during decommissioning, repair or cleaning of the cooler!

Note

When sending the peristaltic pump to M&C customer service for repair, please indicate the type of medium pumped.

Before shipping the pump, please remove hazardous or aggressive contaminations from all parts of the pump!



1 Conveying belt **2** S-bolt **3** Pump tubing with connectors
4 Contact pulley **5** Springs

Figure 7 Replacing the pump tubing

For changing the pump tubing please proceed as follows:

1. Unplug the pump from the mains voltage. The device needs to be voltage free.
2. Open tube connections at the pump;
3. Press conveying belt **1** at the recessed grips and turn S-bolt **2** clockwise up to limit stop;
4. Take away conveying belt **1** and remove the old pump tubing **3** from the guides by pulling on the tube connectors;
5. Press the two contact pulleys **4** and check whether the spring pressure is still sufficient, if not, the contact springs have to be changed;
6. Put the new pump tubing **3** with the tube connectors into the guides of the conveying belt **1** ;

Note

Use only the original M&C spare parts!
Only the use of the original tubing set guarantees a perfect operation!

Never lubricate tubing!
Before mounting the pump, check all parts for contaminations and clean if necessary.

7. Put the conveying belt **1** with the new tubing **3** into the dovetail guide of the pump body;
8. Press conveying belt at the recessed grips and simultaneously turn the S-bolt **2** anticlockwise until it snaps;
9. Switch on pump.

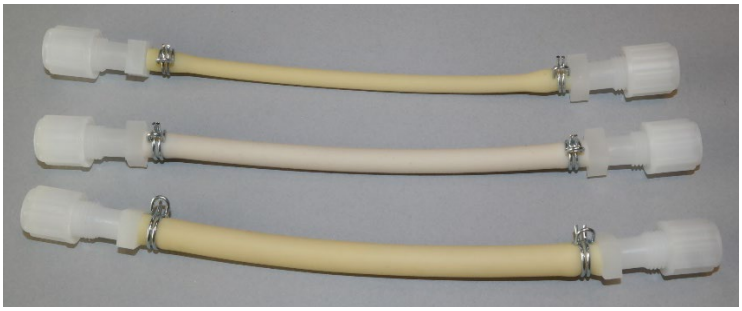


Figure 8 Different pump tube sizes

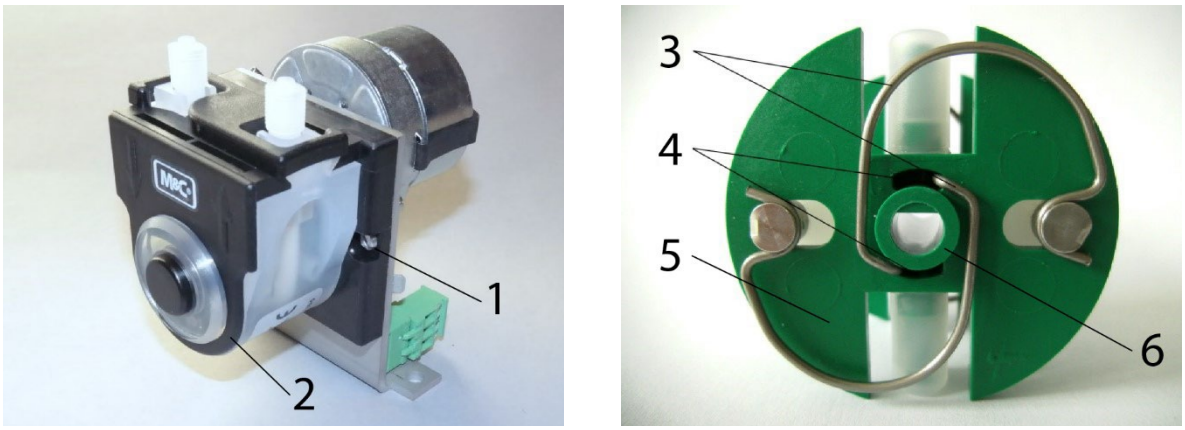
20.4.3 Replacing contact pulleys and springs

Note

While mounting, make sure that the center of rotation and the driver are aligned.
Use genuine spare parts only!

Follow these instructions to change the contact pulley and springs:

1. Disconnect the peristaltic pump from power supply.
2. Unscrew nuts of the pump head (wrench size 5.5) **1**.



1 Pump head nuts **2** Pump head **3** Springs
4 Groove **5** Driver (roll carrier) **6** Collar of the shaft bore

Figure 9 Disassembly of pump head and driver

3. Remove the pump head **2** from the motor shaft.
4. Now the driver can be removed from the pump head and is ready for maintenance.
5. The removal of the springs 4 pcs.) **3** away from the driver is easily possible without the aid of any tools. For this take spring out of the groove **4** near to the shaft bore.

6. Dismount roller axes and change contact pulleys. Take care that axes are not worn out by the springs and have damaged the dent at the axes front end. In case of abrasion the axes have to be changed (see Figure 10).

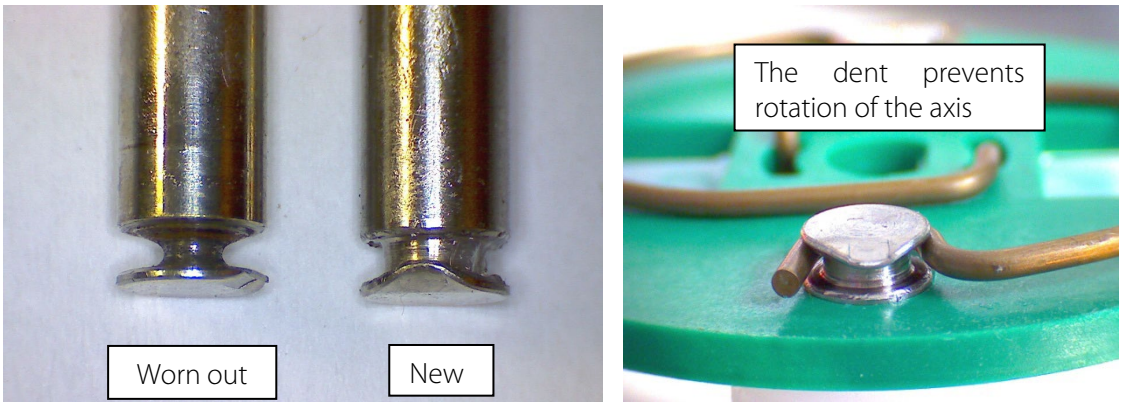


Figure 10 Check of axes and rolls

Note

The springs may come in different colorings. This is not a quality impairment. Make sure to use the right spring strength. This can be identified by the spring wire diameter.

The 'standard version for Novoprene pump tubing' (Part No. 90P1010) has a diameter of 1.1 mm and the 'reinforced version for FKM-, Acidflex®- or Masterflex®-tubing' (Part No. 90P1015) has a diameter of 1.2 mm.

Note

Two different types of springs are mounted inside the driver (right and left springs) for the first delivery.
When spare springs are ordered, for simplified storage, only one type will be delivered (right spring) which can be used for all four springs and will replace without any problems the initial springs. The replacement springs guarantee full functionality when all four springs are replaced.

7. Make sure that contact pulleys move easily on the axis. After remounting the axis with contact pulley into the driver, the spring has to be mounted as shown as in Figure 10. Please pay attention to the alignment of the dent.

20.4.4 Reassembly of the driver

Reassemble the driver in reverse order:

1. Insert the roll carrier back into the pump head
2. Push the pump head with the roll carrier onto the motor shaft **2**.
3. Tighten the nuts of the pump head fastening (SW 5.5) **1**.

Note

While mounting, make sure that the center of rotation and the roll carrier (driver) are aligned.
Make sure that the collar of the shaft bore (see Figure 9) faces towards the front of the pump head while mounting the roll carrier.
Use genuine spare parts only!

20.4.5 Cleaning the pump head

When changing flexible tubing or other parts, inspect all parts for contaminations before assembling the pump head. Clean contaminated parts if necessary.
We recommend cleaning the parts with a dry cloth. Solvent should not be used, because it can damage the plastics and synthetic rubber parts. Use oil-free compressed air to clean the parts if available.

Aggressive condensate is possible.

Wear protective gloves and protective glasses during decommissioning, repair or cleaning of the cooler!

Wear proper protective clothing during decommissioning, repair or cleaning of the cooler!

20.4.6 Repair information for integrated peristaltic pump type SR25.2 (optional)

Note

When sending the peristaltic pump to M&C customer service for repair, please indicate the type of medium pumped. Before shipping the pump, please remove hazardous or aggressive contaminations from all parts of the pump!

21 Operating of the built-in electronic temperature controller

A new electronic temperature controller was installed in the housing of the ECM-EX2 cooler starting in June 2024. All built-in temperature controllers are factory set to the following values: Gas outlet dew point 5 °C, alarm window 3 °C and hysteresis 1 °C.

Figure 11 shows the hysteresis behavior of the status alarm at factory settings. The status alarm of the temperature controller is activated (alarm ON) and deactivated (alarm OFF) depending on the temperature, following the hysteresis.

When the cooler is switched on, the temperature is cooled down starting from the ambient temperature, which means that the status alarm is activated: Alarm ON. Figure 11 shows that the alarm remains active until the temperature of 7.5 °C is reached. The status alarm follows the hysteresis and is set to Alarm OFF at 7.5 °C. If the temperature remains within the range of 1.5 to 8.5 °C, the status alarm will stay at Alarm OFF. If the temperature changes beyond these limits, the temperature controller follows the hysteresis and sets the status alarm back to Alarm ON at a temperature below 1.5 °C or above 8.5 °C.

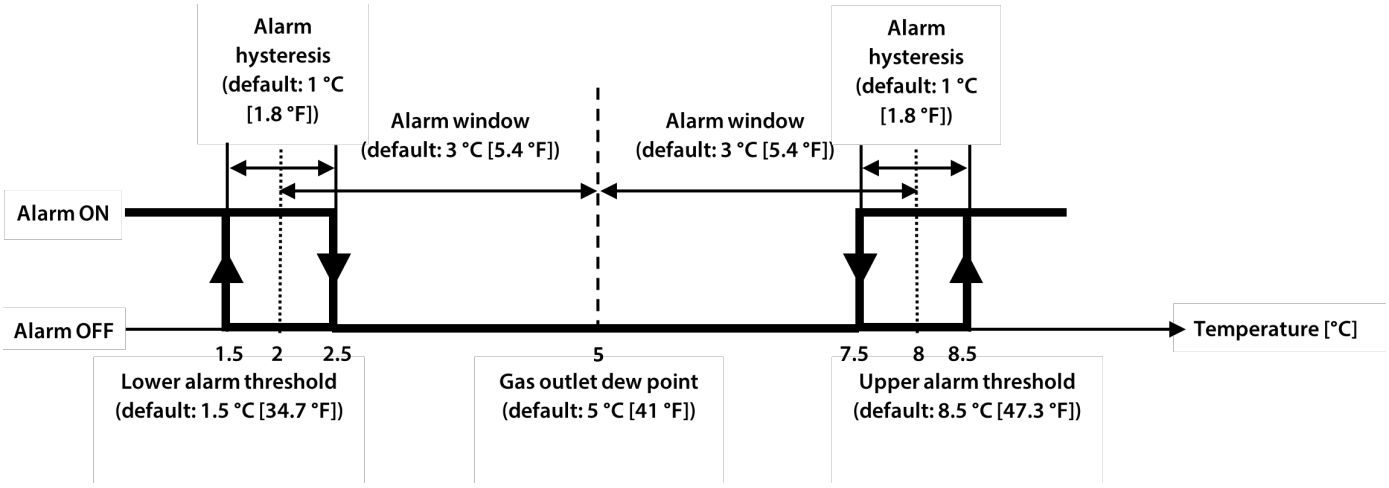


Figure 11 Hysteresis behavior of the status alarm at factory settings

21.1 Temperature controller version starting 06.2024

In normal operation, the display shows the measured temperature (temperature view). The ESC key and the arrow keys (UP and DOWN) are disabled in this view. Figure 12 shows the front view of the temperature controller.

Figure 12 Front view of the temperature controller version starting 06.2024

While you tap the OK key, the set setpoint value is displayed. The factory setting of the setpoint is "5.00". After releasing the key, the display immediately returns to the temperature view. The setpoint is only visible when the key is tapped.

21.1.1 Changing the setpoint

The temperature controller needs to be unlocked, before changing the setpoint. To unlock the device, first press the OK key for about 3 seconds. The display changes to a flashing "000".
Then enter the PIN code "017" with the arrow keys and confirm the entry with OK. The display jumps back to the temperature view.
Now the temperature controller is unlocked. Again, press the OK key for about 3 seconds. The display changes to the setpoint view and the display is flashing.
While the display is flashing, the setpoint can be adjusted with the arrow keys. With OK the new setpoint is accepted. With ESC the current changes are discarded. In both cases, the display jumps back to the normal temperature display after pressing.

Note

If you hold the OK key too long, you will enter the configuration menu. This menu shows a “C”, followed by two digits on the display. To return to the temperature view tap on the ESC key.

21.1.2 Changing the temperature alarm window

The exact description of how to change the temperature alarm window can be found in the temperature controller instruction manual.

22 Trouble shooting

The following table gives an overview of possible errors and instructions for checking and repairing the unit (Applies only to the start-up period of the cooler).

Error	Possible reason	Check/Repair
Condensate in the gas outlet	Ambient temperature < 5 °C [41 °F] Cooler is overloaded Peristaltic pump doesn't work Tube of the peristaltic pump defective Cooling capacity too low (cooler is not overloaded) Motor protection switch released	Heat up the components downstream; for operating limits see technical data chapter 9; Change peristaltic pump; Change the tubing (20.3.2); Clean the fins of the condenser (20.2); Check the vent; Check the safety distance to other heated components; Secure sufficient ventilation; Thermal load caused by sample gas or high ambient temperature; Clean the fins of the condenser; for operating limits see technical data chapter 9; Let the cooler cool down before restarting it;
Gas flow is blocked	Contamination of the sample gas line	Optimize the dust pre-separation upstream of the cooler; Clean the gas lines and the cooling system;
Wrong temperature	Temperature sensor defect Temperature controller defect Leakage in the coolant circulation	Check the PT100-sensor; Check the temperature controller; Send the cooler for repair;
Cooler break-down	Power supply interrupted	Check the power supply and reconnect; ⚠ **Pay attention to the relevant safety instructions!**
Compressor does not work	Compressor defect; Motor protection switch defect	Send the cooler for repair;

23 Proper disposal of the device

At the end of the life cycle of our products, it is important to take care of the appropriate disposal of obsolete electrical and non-electrical devices. To help protect our environment, please follow the rules and regulations of your country regarding recycling and waste management.

24 Spare parts list

The replacement interval for spare parts and consumables depends on the specific operating condition of the analyzer. The quantities recommended in the following table are based on experience. Your replacement intervals will be based on your operating conditions.

Electric gas cooler ECM-ExII					
(C) Consumable parts **(R) Recommended spare parts** **(S) Spare parts**					
		Recommended quantity being in operation [years]			
Part No.	**Indication**	**C/R/S**	**1**	**2**	**3**
93K0140	ECP-3000 G Jet-Stream heat exchanger material: Borosilicate glass Gas connections: GL 18-6 mm Condensate: GL 25-12 mm	R	1	1	1
93K0160	ECP-3000 SS Jet-Stream heat exchanger material: SS 316 Gas connections: G 1/4" female Condensate: G 3/8" female	R	1	1	1
93K0170	ECP-3000 PV Jet-Stream heat exchanger material: PVDF (Polyvinylidenfluorid) Gas connections: G 1/4" female Condensate: G 3/8" female	R1	1	1	1
97K0100	ECM-2G Jet-Stream heat exchanger material: Borosilicate glass Gas connections: GL 18-6 mm Condensate: GL 25-12 mm	R	1	1	1
97K0110	ECM-2PV Jet-Stream heat exchanger material: PVDF (Polyvinylidenfluorid) Gas connections: 6 mm tube Condensate: G 3/8" female	R	1	1	1
97K0115	ECM-2SS Jet-Stream heat exchanger material: SS 316 Gas connections: 6 mm tube Condensate: G 3/8" female	R	1	1	1
90K0115	EC-thermal conductivity paste 50 g (-40 to 140 °C [-40 to 284 °F])	E	1	1	2
90K0035	Fan ECP 230 V, 50 Hz	C	-	-	1
93K0040X	PT-100 temperature sensor for ECM	C	-	-	1
90K7014	Cooling unit, complete with compressor, vaporiser and condenser for ECM-EX2 Cooling medium: R134A, power: 230 V, 50 Hz	R	-	-	-
97K0010	ECM transformer 115 V / 230 V, ... 230 VA	R	-	-	-
04E1200	Temperature controller MCU1000EX for ECM-EX2 (starting 06.2024)	S	-	-	1

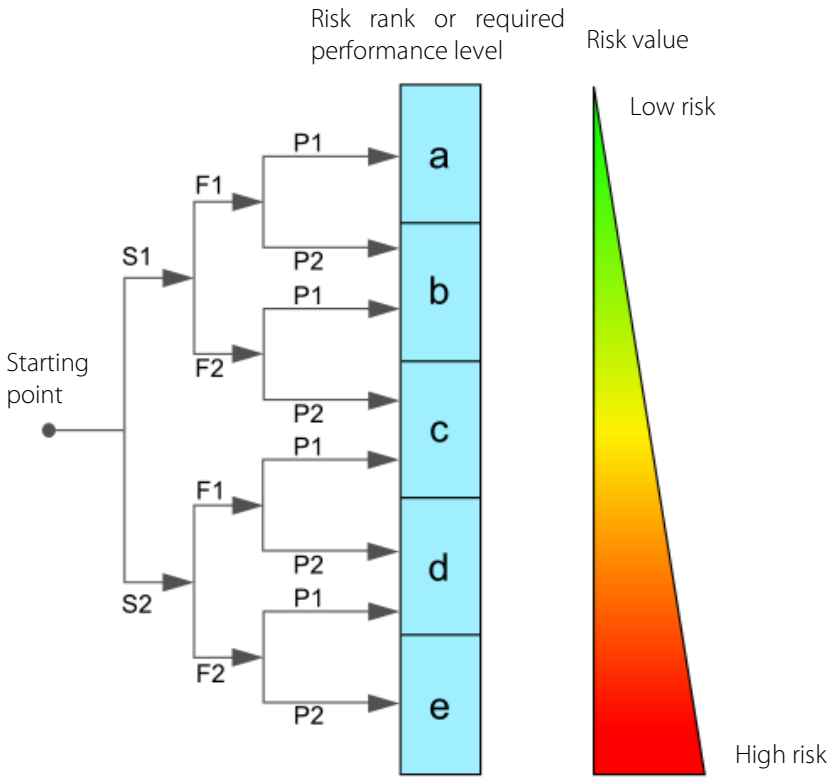
Peristaltic pump SR25.2					
(C) Consumable parts **(R) Recommended spare parts** **(S) Spare parts**					
		Recommended quantity being in operation [years]			
Part No.	**Indication**	**C/R/S**	**1**	**2**	**3**
90P1007	Hose set ③ SR25.1 with PVDF-tube connectors 4/6 mm, standard	C	1	2	4
90P1020	Driver SR25, complete	S	-	1	1
90P1010	1 set (4 pcs) contact springs SR25 for driver	R	1	2	2
90P1045	Contact pulleys SR25 PVDF ④ for driver	S	2	4	4
90P1050	Conveying belt SR25.1 ①	S	-	1	2
90P1025	S-bolt ② SR25.1	S	-	-	1
01P1300	Peristaltic pump SR25.2, complete 230 V/115 V, 50/60 Hz	R	-	-	1
90P1031	Heat peristaltic pump SR25, complete without tube set, motor and gears	S	-	-	1

25 Risk assessment

The risk assessment provided in this chapter is intended for all work activities on the product. The hazards can occur in the work steps of assembly, commissioning, maintenance, disassembly and in the event of a product fault. During normal operation, the product is protected by a system cabinet or appropriate covers.
Only qualified personnel is permitted to perform the work. The following minimum knowledge is required for the work:

- Employee instruction provided in process engineering
- Employee instruction provided in electrical engineering
- Detailed knowledge of the instruction manual and the applicable safety regulations

The product complies with the current regulations according to state-of-the-art science and technology.
Nevertheless, not all sources of danger can be eliminated while observing technical protective measures. Therefore, the following risk assessment and the description of exposure hazards refer to the work steps mentioned above.



Severity of injury:
S1 = 1 = minor (reversible injury)
S2 = 2 = serious (irreversible injury, death)

Frequency and duration:
F1 = 1 = infrequent or short exposure to hazard
F2 = 2 = frequent (more than once per hour/shift)

Possibility of preventing or limiting the damage
P1 = 1 = possible
P2 = 2 = hardly possible

Figure 13 Overview risk assessment

Aggressive condensate possible

Risk rank group A
Chemical burns due to aggressive media possible!
This applies to all liquids in vessels and in the product.
In general, for electrical and mechanical work on the product, wear personal protective equipment (PPE) in accordance with the risk assessment.

Caution risk of being crushed by rotating parts

Risk rank - group A
The product contains rotating parts. Do not open covers until the device has been switched off.

Caution glass

Risk rank - group A

The product contains glass components. In general, for electrical and mechanical work on the product, wear personal protective equipment (PPE) in accordance with the risk assessment.

Caution hot surfaces

Risk rank group A

The temperature inside the product can be higher than > 60 °C.
The hot parts are shielded by mechanical devices. Before opening the products, they must be disconnected from the power supply and a cooling time of more than > 20 minutes must be observed. In general, for electrical and mechanical work on the product, wear personal protective equipment (PPE) in accordance with the risk assessment.

Caution electric shock

Risk rank group C

When installing high-power systems with nominal voltages of up to 1000 V, the requirements of VDE 0100 and their relevant standards and regulations must be observed!
This also applies to any connected alarm and control circuits. Before opening the products, they must always be disconnected from the power supply.

Gas hazard

Risk rank group A-B-C

The hazard potential mainly depends on the gas to be extracted.
If toxic gases, oxygen displacing or explosive gases are conveyed with the product, an additional risk assessment by the operator is mandatory.
In principle, the gas paths must be purged with inert gas or air before opening the gas-carrying parts.
The escape of potentially harmful gas from the open process connections must be prevented.
The relevant safety regulations must be observed for the media to be conveyed. If necessary, flush the gas-carrying parts with a suitable inert gas. In the event of a gas leakage, the product may only be opened with suitable PPE or with a monitoring system. Furthermore, the work safety regulations of the operator must be observed.

Caution crushing hazard

Risk rank group A
The work must be performed by trained personnel only.
This applies to products weighing less than < 40 kg [≈ 88.2 lbs]:
The product can be transported by 1 to 2 person(s). The instructions for appropriate personal protective equipment (PPE) must be observed.
The weight specifications are contained in the technical data of this product.
Furthermore, the work safety regulations of the operator must be observed.

26 Appendix

- Sample gas output dew point as a function of gas flow at 60 °C inlet dew point.
- Circuit diagram ECM-EX2 Drawing No.: **2456-5.01**
- Ex-certificates: ATEX

Find more product information on our home page:
www.mc-techgroup.com

- Data sheet: Threaded couplings for 'GL' glass connections
- Instruction Manual Peristaltic Pump Series SR®: SR25.1, SR25.2-G, SR25.1/Ex
- Data sheet: Automatic liquid drain AD-SS
- Data sheet: Automatic liquid drain AD-P
- Data sheet: Condensate vessel TG, TK

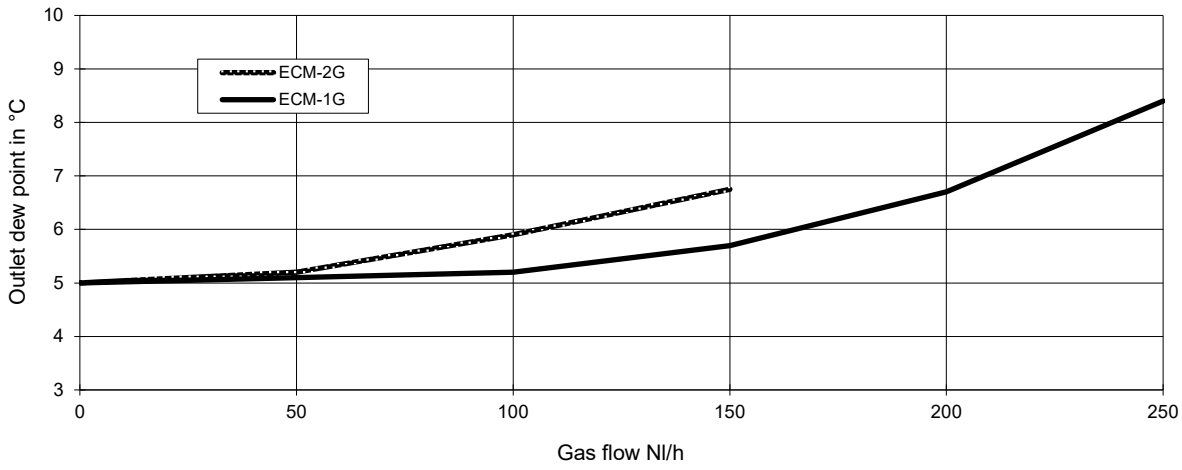


Figure 14 Sample gas output dew point as a function of gas flow at 60 °C inlet dew point

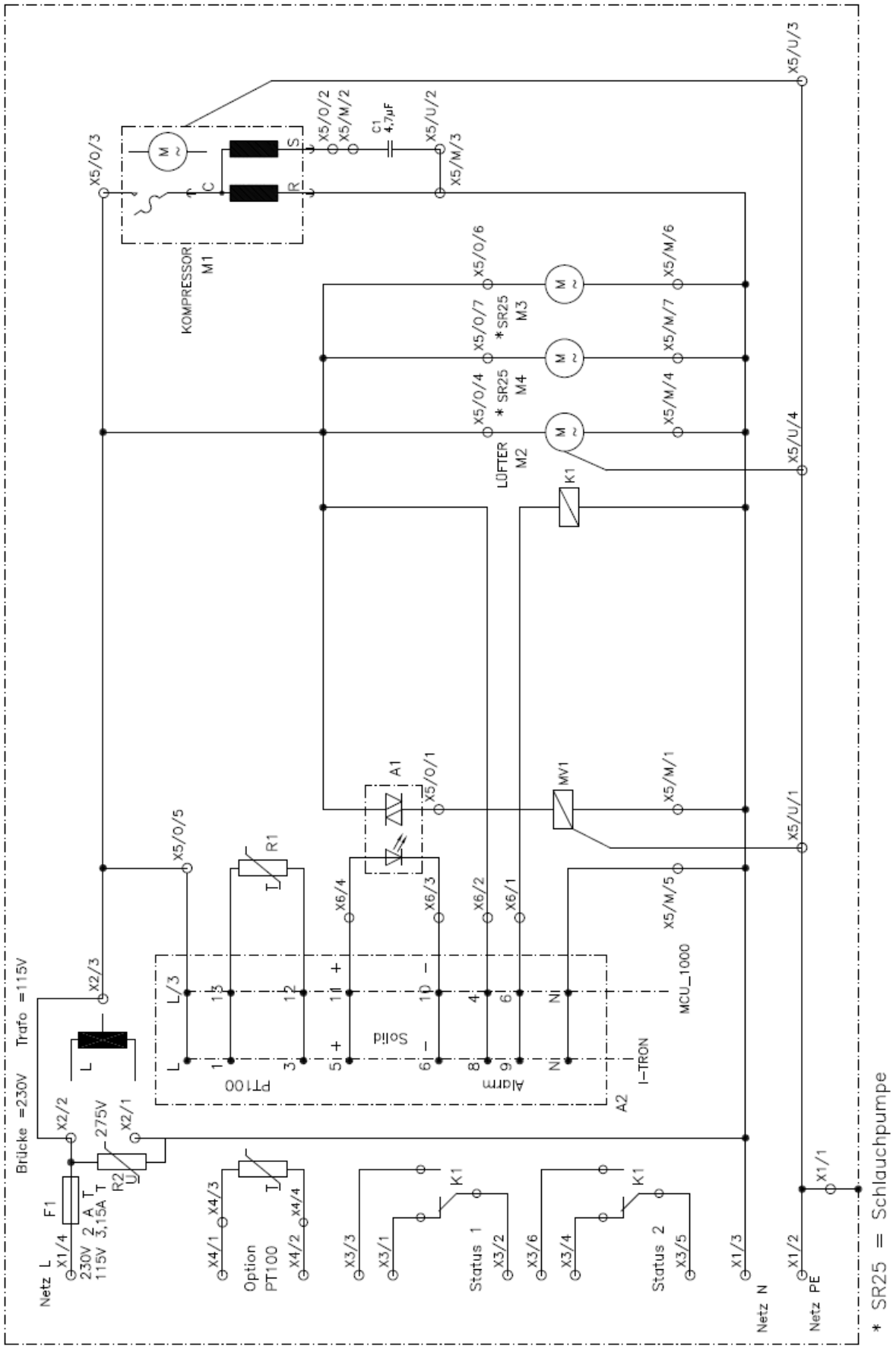


Figure 15 Circuit diagram ECM-EX2 (Drawing-No.: 2456-5.01)

Translation

1 # Type Examination Certificate

2 **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

3 Type Examination Certificate Number: **BVS 16 ATEX E 055 X**

4 Product: **Gas cooler type ECM-EXII**

5 Manufacturer: **M&C TechGroup Germany GmbH**

6 Address: **Rehhecke 79, 40885 Ratingen, Germany**

7 This product and any acceptable variations thereof are specified in the appendix to this certificate and the documents referred to therein.

8 DEKRA EXAM GmbH certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential Report No. BVS PP 16.2136 EU.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012 + A11:2013 **General requirements**
EN 60079-15:2010 **Type of Protection "n"**

Except in respect of those requirements listed under item 18 of the appendix.

10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the appendix to this certificate.

11 This Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12 The marking of the product shall include the following:

Ⓔx II 3G Ex nA nC IIC T4 Gc

DEKRA EXAM GmbH
Bochum, 2016-08-08

Signed: Dr. Franz Eickhoff
Certifier

Signed: Ute Hauke
Approver

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

13 **Appendix**

14 **Type Examination Certificate**
BVS 16 ATEX E 055 X

15 **Product description**

15.1 **Subject and type**

Gas cooler type ECM-EXII

15.2 **Description**

The gas cooler type ECM-EX II is used for the dew point of humid sample gases in the Analysis technology to prevent condensation in analysers.

The gas cooler may be provided with one or two heat exchangers and with one or two condensate pumps.

The gas cooler type ECM-EXII consists of a hermetically sealed cooling circuit of the type of protection nC with an electrical connection of type of protection nA.

The functional components of the control unit are also carried out in type of protection n.

15.3 **Parameters**

15.3.1 Electrical data

Rated voltage	115/230 VAC, 50-60 Hz
Rated current	4.5/ 2.5 A
Rated powermax.	200 VA

15.3.2 Thermal data

Ambient temperature range	+10 °C up to +50 °C
Maximum sampling gas input temperature	130 °C

15.3.3 Other data

Maximum coolant operating pressure	18 bar
Coolant	R134a

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telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

16 **Report Number**

BVS PP 16.2136 EU, as of 2016-08-08

17 **Special Conditions for Use**

The equipment has to be installed in a protective enclosure which meets the requirements for IP54 defined in EN 60079-0 clause 26.4.

18 **Essential Health and Safety Requirements**

The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 **Drawings and Documents**

Drawings and documents are listed in the confidential report.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
Bochum, dated 2016-08-08
BVS-Pe/Nu A 20160276

Certifier

Approver

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

Baumusterprüfbescheinigung

Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen Richtlinie 2014/34/EU

3 Nr. der Baumusterprüfbescheinigung: **BVS 16 ATEX E 055 X**

4 Produkt: **Gaskühler Typ ECM-EXII**

5 Hersteller: **M&C TechGroup Germany GmbH**

6 Anschrift: **Rehhecke 79, 40885 Ratingen, Deutschland**

7 Die Bauart dieses Produktes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

8 Die Zertifizierungsstelle der DEKRA EXAM GmbH bescheinigt, dass das Produkt die wesentlichen Gesundheits- und Sicherheitsanforderungen für die Konzeption und den Bau von Produkten zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.
Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfprotokoll BVS PP 16.2136 EU niedergelegt.

9 Die wesentlichen Gesundheits- und Sicherheitsanforderungen werden erfüllt durch Übereinstimmung mit den Normen:

EN 60079-0:2012 + A11:2013 Allgemeine Anforderungen
EN 60079-15:2010 Zündschutzart "n"

10 Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Produktes hingewiesen.

11 Diese Baumusterprüfbescheinigung bezieht sich nur auf den Entwurf und Bau der beschriebenen Produkte.
Für den Herstellungsprozess und die Abgabe der Produkte sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

12 Die Kennzeichnung des Produktes muss die folgenden Angaben enthalten:

Ex II 3G Ex nA nC IIC T4 Gc

DEKRA EXAM GmbH
Bochum, den 08.08.2016

Zertifizierer

Fachzertifizierer

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Deutschland
Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

13 **Anlage zur**

14 **Baumusterprüfbescheinigung**
BVS 16 ATEX E 055 X

15 **Beschreibung des Produkts**
15.1 **Gegenstand und Typ**

Gaskühler Typ ECM-EXII

15.2 **Beschreibung**

Der Gaskühler Typ ECM-EXII dient zur Taupunktabsenkung von feuchten Messgasen in der Analysetechnik, um Kondensation in Analysegeräten auszuschließen.

Der Gaskühler kann mit ein oder zwei Wärmetauschern und mit bis zu zwei Kondensatpumpen bestückt werden.

Der Gaskühler Typ ECM-EXII besteht aus einem hermetisch verschlossenen Kühlkreislauf in der Zündschutzart nC mit einem elektrischen Anschluss in der Zündschutzart nA.

Die Funktionskomponenten der Steuerung sind ebenfalls in der Zündschutzart n ausgeführt.

15.3 **Kenngrößen**

15.3.1 Elektrische Daten

Bemessungsspannung		115/230 VAC, 50-60 Hz
Bemessungsstromstärke		4,5/ 2,5 A
Bemessungsleistung	max.	200 VA

15.3.2 Thermische Daten

Umgebungstemperaturbereich	+10 °C bis +50 °C
Maximale Messgaseintrittstemperatur	130 °C

15.3.3 Weitere Daten

Maximaler Betriebsdruck Kältemittel	18 bar
Kältemittel	R134a

16 **Prüfprotokoll**

BVS PP 16.2136 EU, Stand 08.08.2016

17 **Besondere Bedingungen für die Verwendung**

Das Gerät muss in ein Schutzgehäuse eingebaut werden, dass dem Schutzgrad IP54 nach EN 60079-0, Abschnitt 26.4 entspricht.

18 **Wesentliche Gesundheits- und Sicherheitsanforderungen**

Die wesentlichen Gesundheits- und Sicherheitsanforderungen sind durch die unter Abschnitt 9 gelisteten Normen abgedeckt.

19 **Zeichnungen und Unterlagen**

Die Zeichnungen und Unterlagen sind in dem vertraulichen Prüfprotokoll gelistet.

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