Embracing Challenge

Electric Gas Cooler Series EC®

ECS-SS HF EX2
Ⓔx II 3 G Ex nA nC IIC T4 Gc

Instruction Manual
Version 1.00.00

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 our products in German and English.

Version 1.00.00

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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 EC 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 appendix II.

RoHS Directive

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

EMC-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.
The compliance with this EU directive has been examined according to DIN EN 61010.

Declaration of conformity

The EU Declaration of conformity can be downloaded from the **M&C** homepage or directly requested from **M&C**.

3 SAFETY INSTRUCTIONS

Follow these basic safety procedures when using this equipment:

Read these operating instructions carefully before start-up and use of the equipment! The information and warnings given in these operating instructions must be heeded.

Work on electrical equipment is only to be carried out by trained specialists as per the regulations currently in force.

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. Also EN 60079-14 has to be fulfilled.

For use in hazardous area observe the relevant national and international instructions and regulations.

Check the details on the type plate to ensure that the equipment is connected up to the correct mains voltage.

Protection against touching dangerously high electrical voltages. Before opening the equipment, it must be switched and hold no voltages. This also applies to any external control circuits that are connected.

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

Use the device only in permitted temperature and pressure ranges.

Opening the enclosure is only permitted in an Ex-free environment.

Check that the location is weather-protected. It should not be subjected to either direct rain or moisture.

Installation, maintenance, monitoring and any repairs may only be done by authorised personnel with respect to the relevant stipulations.

4 INFORMATION AND SAFETY INSTRUCTIONS FOR USING THE COOLER IN HAZARDOUS AREAS

The compressor cooler **ECS-SS HF EX2** is suitable for use in hazardous area category 3G.
Type of explosion protection: Ⓔx II 3 G Ex nA nC IIC T4 Gc

Any change in the standard configuration with unspecified or not M&C approved parts, as well as repair and service with unspecified parts will result in the loss of Ex certification.

In case of doubt, please contact **M&C** or your **M&C** distributor directly.

5 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.

Return deliveries must be made in appropriate and proper protective packaging. Please do not send glass heat exchanger with the unit.

6 USED TERMS AND SIGNAL INDICATIONS

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.

Attention

‘Attention’ indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 damages which might be caused by high voltages.

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

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

Contains gas under pressure. Do not open container!
Check pressure before opening container, and adjust pressure to atmosheric pressure.

Wear protective gloves!
Working with chemicals, sharpe objects or extremly high temperatures requires wearing protective gloves.

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

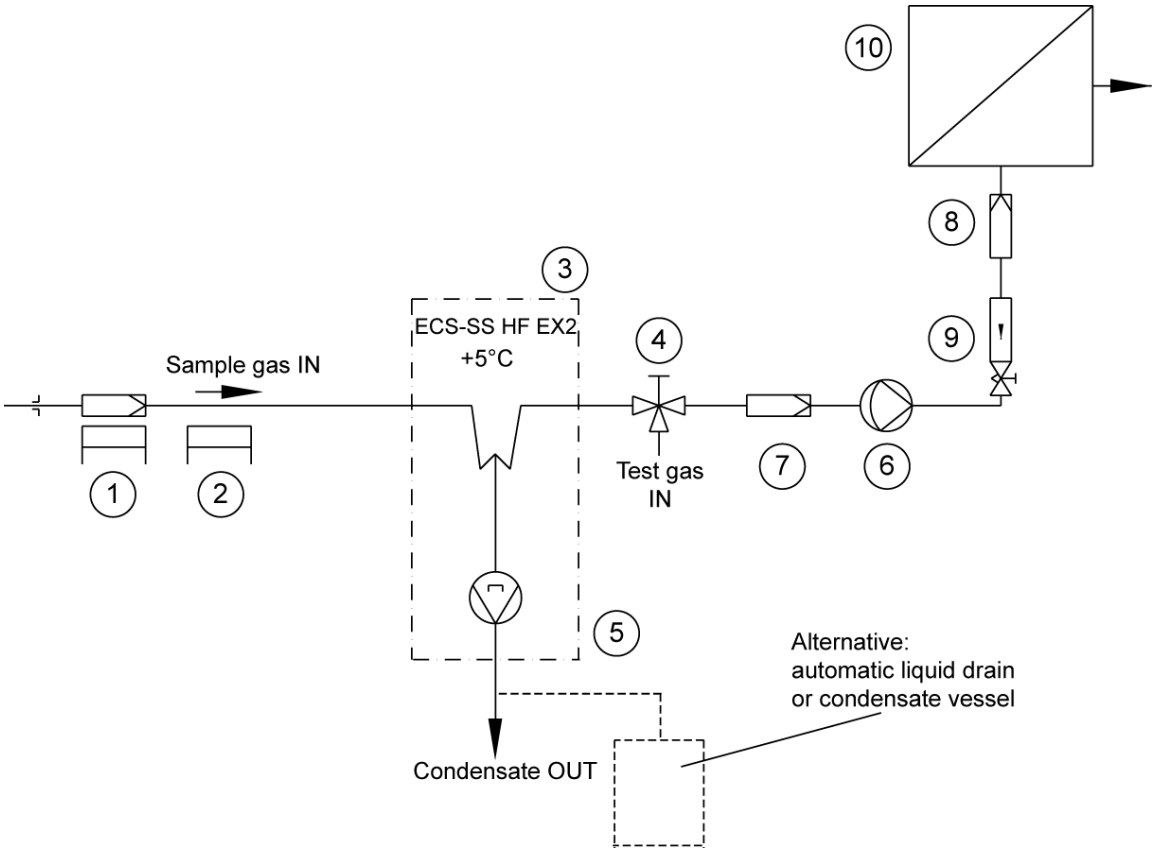
Wear protective clothes!
Working with chemicals, sharpe objects or extremly high temperatures requires wearing protective clothes.

7 INTRODUCTION

The **ECS-SS HF EX2** gas cooler is used in gas analysis to lower the dew point of high flow rates of humid gases to avoid condensation in the analyzer for applications where fast response times are requested. An extremely stable gas dew point avoids water vapor cross sensitivity and volumetric errors.

8 APPLICATION

Figure 1shows a typical example of an application for installation of an **ECS-SS HF EX2** gas cooler unit.



①Gas sample probe **SP...**
②Heated sample line
③**ECS-SS HF EX2** cooler
④3-way ball valve
⑤Peristaltic pump**SR25.6**
⑥Diaphragm pump **MP**
⑦Ultrafine filter **FP...**
⑧Aerosol filter **CLF**
⑨Flow meter **FM**
⑩Analyser

Figure 1 Example of application of ECS-SS HF

The gas to be measured is extracted with a gas sample pump ⑥ via a gas sample probe ① and a heated sample line ② and cooled down in the gas cooler **ECS-SS HF EX2** ③ to a dew point of +5 °C [41 °F]. The emerging condensate is removed by a peristaltic pump or a collecting vessel ⑤. The ultrafine filter ⑦ located afterwards removes solid particles. For increased operating safety of the entire system we recommend installing an ultrafine filter ⑦ with a liquid alarm sensor. If required an aerosol filter ⑧ can be installed downstream the flow meter ⑨. The gas thus treated can now be passed into the analyzer ⑩. For calibration of the analyzer a ball-valve ④ is existing.

9 TECHNICAL DATA

Gas Cooler Series EC®	**ECS-SS HF EX2**
Protection class	⟨Ex⟩ II 3 G Ex nA nC IIC T4 Gc
Number of heat exchanger	1
Gas flow rate	1500 Nl/h* for gas inlet dew point 70 °C [158 °F] and 1000 Nl/h* for gas inlet dew point 80 °C [176 °F]
Ambient temperature	+5 to +40 °C [41 to 104 °F]
Storage temperature	-20 to +60 °C [-4 to 140 °F]
Sample outlet dew point	Range of adjustment: 0 to +7 °C [32 to 44.6 °F], factory setting: +5 °C (±1°C) [41 °F (±1.8 °F)]
Dew point stability	At constant conditions ±0.2 °C [±0.36 °F]
Sample inlet temperature	Max. 180 °C* [356 °F*]
Sample inlet dew point	Max. 80 °C* [176 °F*]
Total cooling power	Max. 1400 KJ/h (390 W) at 25 °C [77 °F] ambient temperature
Power consumption	450 VA
Main connection	230 V ±10%, 50 Hz, optional 115 V ±10 %, 60 Hz
Ready for working	Approx. 10 min at ambient temperature
Electrical connection	2,5 mm^2 terminals cable entry: 2 x M20 x 1,5, clamping range: 6 to 12 mm
Status alarm	1 free configurable status alarm with 2 potential free changeover contacts switching point: ±3 °C [±5.4 °F] to set point, Contact rating: 250 V, 2 A, 500 VA, 50 W
⟨Ex⟩	230 V or 115 V: ⟨Ex⟩ II 3 G Ex nA nC IIC T4 Gc
Case protection	IP20; EN 60529
Electrical standard	EN 61010
Case color	RAL 9003
Method of mounting	Wall mounting
Dimension/Weight	84HP x 7U x 360 mm [14.2“]/ 28 kg [61.7 lbs]
Material of heat exchanger	Stainless steel 316Ti
Gas pressure	Max. 5bar or 2 bar abs. with built-in peristaltic pumps
Sample gas connection	G 1/4’’ i
Condensate connection	G 3/8’’ i
ΔP at 100 l/h	6 mbar
Dead volume per heat exchanger	0,85 l
Options	
01P9150	Extra charge for 1-piece peristaltic pump SR25.6 integrated in the front plate of the cooler, completely mounted, cooler weight plus 0.6 kg [1.3 lb]. Sample gas pressure with built-in peristaltic pumps max. 2 bar abs.

* 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].

(a) Addition to part number for execution in 115 V

10 DESCRIPTION

High-output, maintenance-free and self-controlling. Intelligent detailed solutions provide optimum cooling of the sample gas and direct separation of condensate to avoid contamination effects.

The new controlled compressor cooling system and the special design of the jet stream heat exchanger guarantee an optimum dew point reduction to a low, stable value. An additional pre-drainage device is not necessary in standard applications.

The condensate should be removed with integrated small peristaltic pump SR25.6 or optionally by external condensate traps AD... respectively collection vessels TG../TK…

The digital display in the front plate indicates the present cooling temperature.
A temperature deviation of ±3 °C [±5.4 °F] triggers an alarm that can be controlled externally via the alarm contact. The gas coolers are self-controlling and maintenance-free in operation.

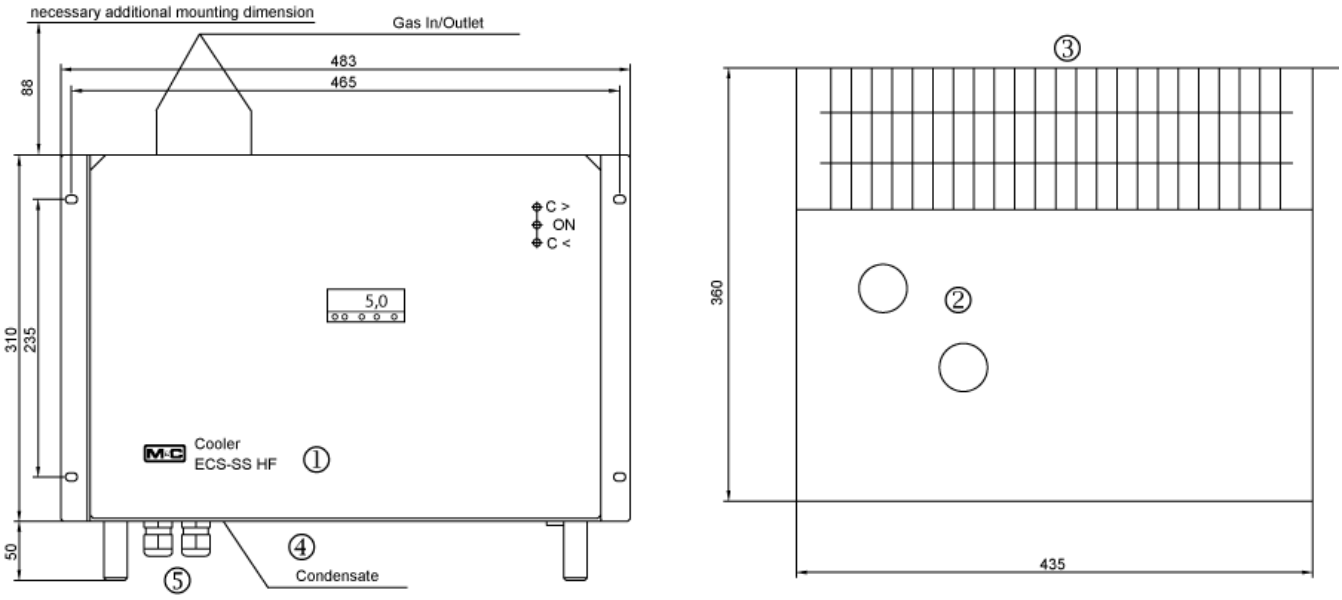


Figure 2 ECS-SS HF EX2

The **ECS-SS HF EX2** ① is suitable for wall mounting.
On top of the cooler housing there are cutouts for sample gas in- and outlet.
In the back part of the cooler housing the condenser ③ for compressor waste heat dissipation is visible.
Power supply, electronic control board and contact output of the status alarms are located behind the dismountable front plate of the cooler housing.

At the bottom of the housing there are the following standard connections:

④ Standard-condensate outlet of the heat exchanger;
⑤ Cable bushings 2 x M20 x 1.5, clamping range: 6 to 12 mm.

The condensate removal takes place at excess pressure operation with automatic liquid drainer e.g. type **AD-..** and at low pressure operation (pump downstream cooler) with peristaltic pump type **SR25.6** or with condensate collecting vessel.

11 FUNCTION

The especially for gas analysis designed **M&C ECS-SS HF EX2** gas cooler is a compressor cooler equipped with status alarm for safe continuous operation. The heat exchanger made of stainless steel works on the principle of Jet-Stream. The construction of the Jet-Stream-heat exchanger ensures a good condensate pre-separation and an optimal drying of the sample gas.
The compressor cooling system keeps the temperature on a constant value of +5 °C [41 °F]. The control of the compressor cooling system happens via contactless and therefore wear free electronic control.
Alarm warnings for excess- and low-temperature are given as a collective status alarm via a relay output with two potential-free changeover contacts. Alarm will be released if the current temperature is out of a range of ±3 °C [±5.4 °F] referring to the set-temperature (+5°C [41 °F]) .

12 RECEPTION AND STORAGE

The **ECS-SS HF EX2** gas cooler is a complete pre-installed unit.

- Remove the cooler and any special accessories immediately after arrival carefully from the shipping packaging, and check the scope of delivery according to the delivery note;
- Check the goods for possible transport damage and, if necessary, inform your transport insurance company immediately about any damage!

Note The cooler must be stored in a weather-protected frost-free area!

Note During transport and when in storage, the cooler must always be stood up with the transport feet positioned underneath so that the oil in the closed compressor circuit cannot run out of this compressor case. If the cooler is transported on its back by mistake, it must stood in the operating position for approx. 24 hours before it is switched on!

13 INSTALLATION INSTRUCTIONS

The **ECS-SS HF EX2** cooler is suitable for wall mounting.

Note Please state the desired type of mounting when ordering so that the LED function display can be positioned to match at the factory!

Note The operating position for this cooler is exclusively vertical. This is the only way to ensure proper separation and removal of condensate in the heat exchangers. During transport and installation, the cooler must always be stood up with the transport feet positioned underneath so that the oil in the closed compressor circuit cannot run out of the compressor case.

The cooler should be kept away from sources of heat and well ventilated when installed, so that condensation from warmth will not occur and interfere with operation.

The minimum installation dimensions (Figure 2) must be followed without fail. If the unit is installed in the open, the cooler must be installed in a housing that is frost-free in winter and adequately ventilated in summer. Avoid locating the unit in direct sunlight.

Unheated gas sample lines must be provided with slope up to the cooler. In that case pre-separation of the condensate is not required.

Connect the heated sample line with sufficient thermal decoupling to the cooler!

14 SUPPLY CONNECTIONS

14.1 HOSE CONNECTIONS

The connection for sample gas in- and outlet is located on the upper part of the heat exchangers at the G ¼" female threads. Correspondingly tube or hose connectors are optional available at **M&C**.

Note

Do not mix up the tube connections for sample gas inlet and outlet; connections are marked by arrows on the heat exchangers.

After connecting all lines, check the tightness of the connections.

To ensure free removal of the condensate, do not reduce the specified discharge cross sections!

Ensure that the connections are sealed adequately by noting the following:

- The correspondingly dimensioned tube fitting with connecting thread must be screwed in with PTFE sealing tape.
- For a functional and trouble-free installation, only use connections acc. to EN 10226-1 with tapered R-thread in conjunction with a suitable sealing tape/sealing fluid.

The connection of the condensate removal is located at the bottom of the cooler at the G 3/8" female thread of the heat exchanger by means of an adequate hose resp. tube fitting (fig.2).

Condensate removal is done by customer according to the type of operation with:

- Automatic float-type condensate traps **AD-...** only for over-pressure operation,

Note

If the stainless steel heat exchanger with G 3/8" condensate connection is used, the automatic liquid drainer AD-SS can be mounted directly using a threaded adapter, article no. FF 11000 (1/2" NPT to G 3/8" i). This eliminates the otherwise necessary wall mounting!

- Condensate collecting vessels with manual condensate discharge,
- peristaltic pump.

Option: automatic condensate removal with peristaltic pump SR25.6

In case of peristaltic pumps type **SR25.6**, is built-in to the front plate, the condensate outlet 4/6 mm tube is provided directly at the corresponding pump.

14.2 ELECTRICAL CONNECTIONS

Warning

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

Cooler versions with 115 V or 120 V have a built-in transformer to generate an internal current of 230 V. That means, device internal live parts have a current of 230 V not 115 V/120 V.

Warning

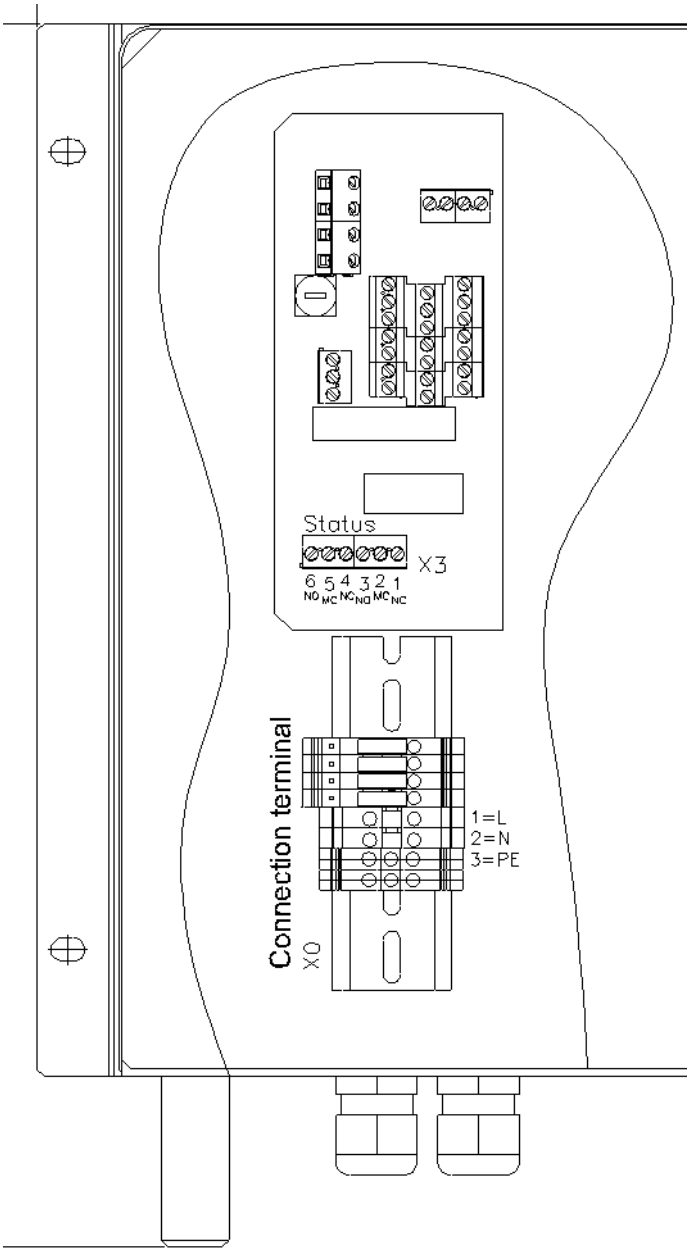
Only carry out work on live parts, when the area has been proved to be „safe“.

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

NOTE!

Attention must be paid to the requirements of IEC 364 (DIN VDE 0100) when setting high-power electrical units with nominal voltages of up to 1000 V, together with the associated standards and stipulations.

The main circuit must be equipped with a fuse of $10A_T$ (wire protection, protection against short circuits). A motor circuit braker is integrated in the device !



Power : 230 V 50/60 Hz or 115 V 50/60 Hz (s. type plate)

Status alarm : 2 potential free change over contacts

Switching capacity : 250 V, 2 A, 500 VA or 250 V, 2 A, 50 W

Figure 3 Electrical connection ECS-SS HF EX2

The power connections are located behind the removable front plate of the cooler housing at terminal X0. The potential free contact outputs of the collective status alarm are to be connected at terminal X3. For the cable bushings through the bottom plate of the cooler housing 2 cable glands 2 x M20 x 1.5, clamping range 6-12 mm are available (see Figure 2).

15 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 **ECS-SS HF EX2** is carried out only by authorised 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 automatic control electronics of the **ECS-SS HF EX2** permit automatic start-up of the cooler.

The following description is valid for start-up of the gas cooler for an ambient temperature > 8 °C [46.4 °F].

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.

Note

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

Warning

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

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

- Connect the cooler unit to the mains power supply; Check that the equipment is connected to the correct mains voltage, 115 V or 230 V, as shown on the type plate!
- Lead the status contacts for reporting of low- and excess-temperature to the measuring station;

Note

The status contacts must be connected to the external sample gas pump or to a valve in the sample gas line to protect the entire analysis system by immediately cutting off the gas supply in the event of error messages from the cooler!

16 CLOSING DOWN

Note

The site where the cooler is installed, must also remain frost-free even when the unit is switched off.

No special measures need to be taken if the cooler is taken out of service for a short time.

If the cooler is to be taken out of service for a longer period, we recommend flushing it with inert gas or air. Residual condensate should be completely removed from the cooler.

Aggressive condensate is possible.

May cause chemical burns due to aggressive media!

Wear protective gloves and protective glasses!

Wear proper protective clothing!

17 MAINTENANCE

Qualified personnel

The inspections and maintenance 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 ECS-SS HF EX2 is carried out only by authorised 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.

Warning

High Voltage.
Before opening the enclosure, disconnect the cooler from the power supply!

Do not open in hazardous areas.
When opening the electronics housing (pressure-resistant enclosure), make sure that the transmission paths of an internal ignition (blank surfaces and threads on the enclosure base and cover) are absolutely clean and undamaged. If the surface or thread is damaged, the enclosure must be replaced.

The **ECS-SS HF EX2** cooler does not require any special maintenance intervals.

Depending on the degree of contamination of the ambient air, the cooling fin block must be cleaned from time to time with compressed air.

When using an automatic condensate disposal system with peristaltic pumps, depending on the operating conditions, the pump tubing must be checked quarterly or semi-annually and replaced if necessary. Refer to the corresponding **SR25.6** instruction manual for instructions on how to replace the tubing.

17.1 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 from time to time. The following steps are recommended:

- Shut off the gas flow;
- Take off the cooler of the mains
- Clean the fins carefully with compressed air;

17.2 MAINTENANCE OF THE OPTIONAL MOUNTED PERISTALTIC PUMP, TYPE SR25.6

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

Warning

Dangerous voltage!

Disconnect power supply before opening the device for access.
Make sure that all external power supplies are disconnected.
The plug is only allowed to be pulled in case the cooler has been taken off the mains or the surrounding area is declared as “safe” area.

Warning

Inhalation hazard possible, if using toxic or asphyxiant gases!

Purge peristaltic pump with inert gas or air before opening! If the pump 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.

Aggressive condensate possible!

Media residues in tubing!
Chemical burns caused by aggressive media possible!

Wear protective gloves and protective glasses!

Wear proper protective clothing!

Peristaltic pump is under pressure! Do not open housing!

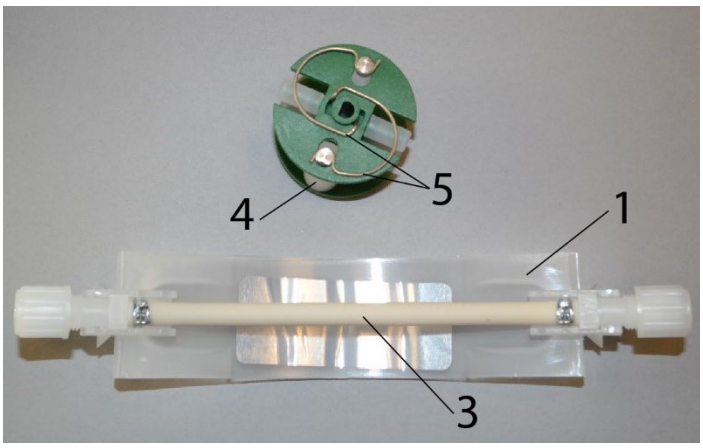
A peristaltic pump might be part of a system, which is under pressure. Check pressure before opening peristaltic pump, and adjust pressure to atmosheric pressure.

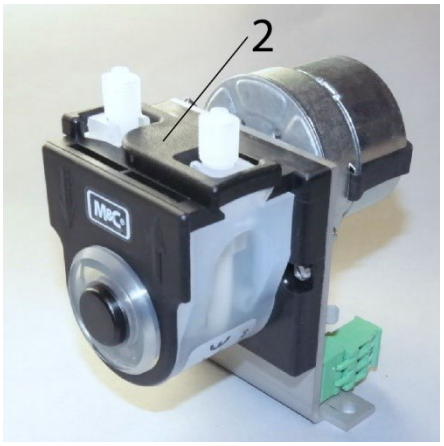
Flexible tube, conveying belt, contact pulleys and contact springs are the only parts of the pump subject to wear. They are simple to change.

Note

If you send back the peristaltic pump to the M&C service for repair, please let us know what kind of condensate has been pumped.
Before sending the pump back clean all parts from dangerous or highly aggressive contaminants.

17.2.1 CHANGING THE PUMP TUBING





1 *Conveying belt* 2 *S-bolt* 3 *Tubing set*
4 *contact pulley* 5 *springs*

Figure 4 Changing the pump tubing

For changing the pump tubing please proceed as follows:

- Unplug the pump from the mains voltage. The device needs to be voltage free.
- Open tube connections at the pump;
- Press conveying belt ① at the recessed grips and turn S-bolt ② clockwise up to limit stop;
- Take away conveying belt ① and remove the old tubing set ③ from the guides by pulling on the tube connectors;
- Press the two contact pulleys ④ and check whether the spring pressure is still sufficient, if not, the contact springs have to be changed (see chapter 17.2.2);
- Put the new tubing set ③ with the tube connectors into the guides of the conveying belt ① ;

Note

Only the usage of the original tubing set guarantees a proper functionality.
Never lubricate the tube.
Before mounting the pump check all parts for contaminations and clean if necessary.

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

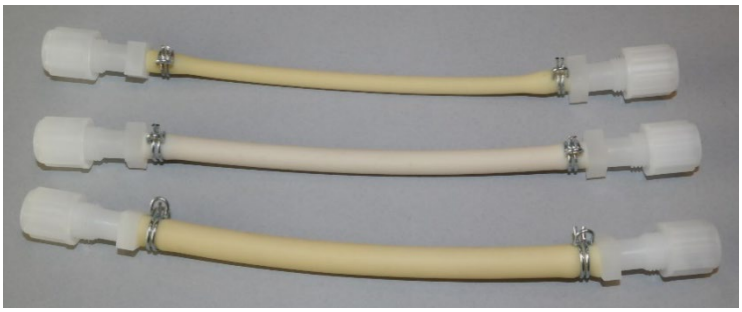


Figure 5 Different pump tube sizes

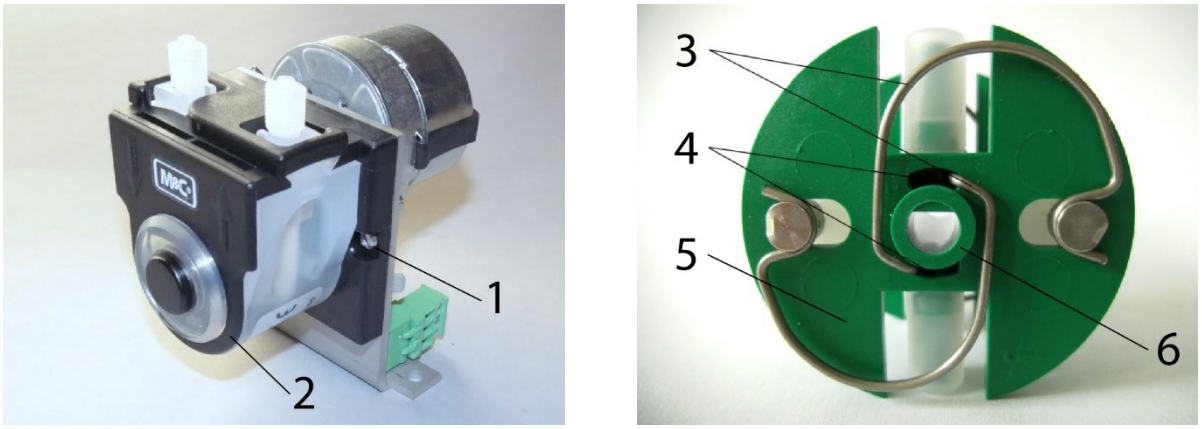
17.2.2 CHANGING CONTACT PULLEYS AND SPRINGS

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:

- Disconnect the peristaltic pump from power supply
- 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 6 Disassembly of pump head and driver

- Remove the pump head ② from the motor shaft
- Now the driver can be removed from the pump head and is ready for maintenance
- 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
- 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 **7**).

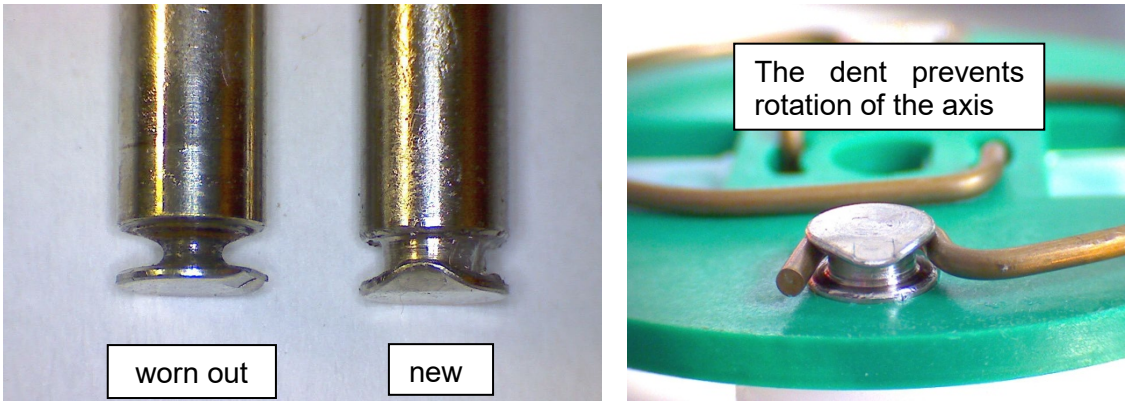


Figure 7 Check of axes and rolls

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 FPM-, 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.

- 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 6. Please pay attention to the alignment of the dent.

17.2.3 REASSEMBLY OF THE DRIVER

Reassemble the driver in reverse order:

- Insert the roll carrier back into the pump head
- Push the pump head with the roll carrier onto the motor shaft ②
- 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 6) faces towards the front of the pump head while mounting the roll carrier.
Use genuine spare parts only!

17.2.4 CLEANING THE PUMP HEAD

- When changing flexible tube or other parts, inspect all parts for dirt before assembling the pump head and clean them if necessary.
- We recommend to clean 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 possible!

Media residues in tubing!
Chemical burns caused by aggressive media possible!

Wear protective gloves and protective glasses!

Wear proper protective clothing!

18 OPERATING OF THE BUILT-IN ELECTRONIC TEMPERATURE CONTROLLER

Note

Only use temperature controller with Part No. 01B8365.

Only carry out any work at 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.
Make sure to close and secure the protective cover in front of the temperature controller after usage. The protective cover must be closed during operation.

In normal operation the display of the temperature controller shows the actual cooling temperature. Figure 8 shows the front view of the temperature controller.

Figure 8 Front view of the temperature controller

18.1 CHANGING THE SET VALUE

To change the set value the P-key has to be pushed < 2 sec. The company fixed value of 5 °C [41 °F] appears. With the two arrow keys the value can be changed. This value should not be adjusted lower than +1°C [33.8 °F], because otherwise the heat exchanger will freeze up. Is the value adjusted higher than the ambient temperature the cooler will not work.

18.2 CHANGING THE TEMPERATURE ALARM WINDOW

The exact description of changing the temperature alarm window can be found in the manual of the temperature controller.

19 TROUBLE SHOOTING

The following table shows possible reasons for error and how to correct them (not applicable for the running-up phase of the cooler).

Error	Possible reason	Check/Repair
Condensate in the gas outlet	Ambient temperature < 5 °C Cooler 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; Keep the operational data (chapter 9); Change peristaltic pump; Change the tubing (chapter 17.2.1); Clean the fins of the condenser (chapter 17.1); Check the vent; Check the safety distance to other heated components; Secure sufficient ventilation; Thermal load caused by the sample gas resp. ambient is too high; Clean the fins of the condenser (chapter 17.1); Keep the operational data (chapter 9); Let the cooler cool down before restarting it;
Gas flow blocks up reading	Contamination of the sample gas way	Optimize the dust pre-separation upstream the cooler; Clean the gas ways and the cooling system; Check corrosivity of the cleaning medium; Before restart purge with inert gas (e.g. Nitrogen);
Wrong temperature	Temperature sensor defective Temperature controller defective Circuit of cooling agent leaky	Check the NiCr-Ni-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 defective; Motor protection switch defective	Send the cooler for repair;

20 SPARE PARTS LIST

Wear, tear and replacement part requirements depend on specific operating conditions.
The recommended quantities are based on experience and are not binding.

Electric gas cooler ECS-SS HF					
(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**
90K0035	Fan ECP 230 V, 50 Hz	C	-	-	1
97K0300	ECS HF Ringkerntransformator 115/230 V, 500 VA.	R	-	-	-
90K1110	Mantel-Thermoelement NiCr-Ni Typ K Mantelmaterial: Inconel· Durchmesser 1.5 mm, Länge: 250 mm	S	-	-	1
01B8365	Elektronischer PID-Temperaturregler Ex	S	-	-	1

Schlauchpumpe SR25.6					
(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**
90P1003	Tubing set SR 25.6, 4.8 x 1.6 mm material: Novoprene	C	1	2	4
90P1020	Driver SR25, complete	S	-	1	1
90P1010	1 set (4 pcs) contact springs SR25 for driver ⑤	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
01P1350	Peristaltic pump SR25.6, complete 230/115 V, 50/60 Hz pump capacity: 0.8 l/h, pressure range: 200 mbar – 2.2 bar abs., hose nipple 5 mm. material: Novoprene, power: 230/115 V, 50/60 Hz.	R	-	-	1
90P1030	Head peristaltic pump SR25, complete without motor and gears	S	-	-	1

21 APPENDIX

- Sample output dew point (ambient temperature 20 °C [68 °F]) depending on gas flow rate
- Circuit diagram ECS-SS HF EX2

Further product documentation can be seen and downloaded from our home page:
www.mc-techgroup.com

- Instruction manual peristaltic pump **SR25.2, SR25.3, SR25.6**
- Automatic liquid drain **AD-SS**
  Data sheet: 6.13M
- Automatic liquid drain **AD-P**
  Data sheet: 6.12
- Condensate vessel **TG**, **TK**
  Data sheet: 6.14

Sample output dew point (ambient temperature 20 °C [68 °F], inlet dew point 60 to 80°C [140 to 176 °F], sample temperature 150 °C [302 °F]) depending on gas flow rate

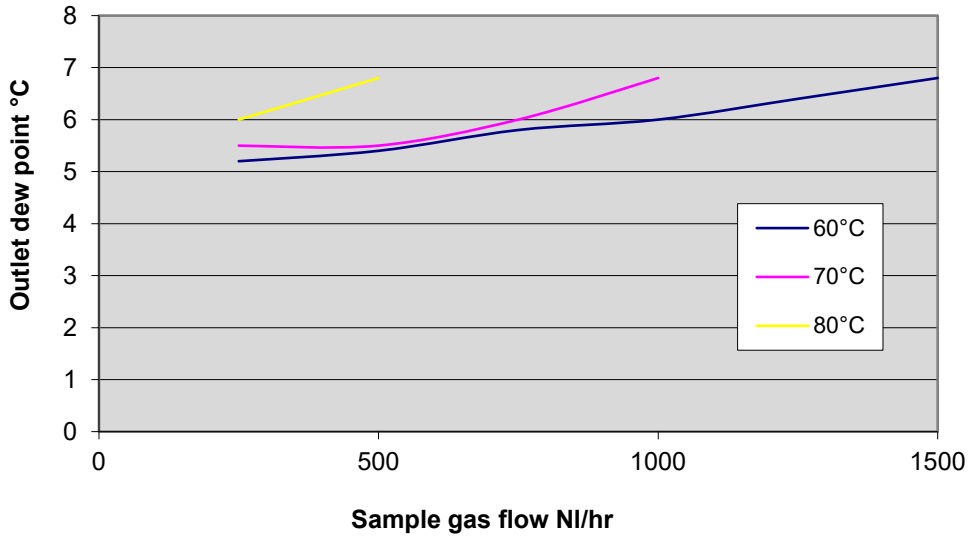


Figure 9 Sample gas outlet dew point characteristics

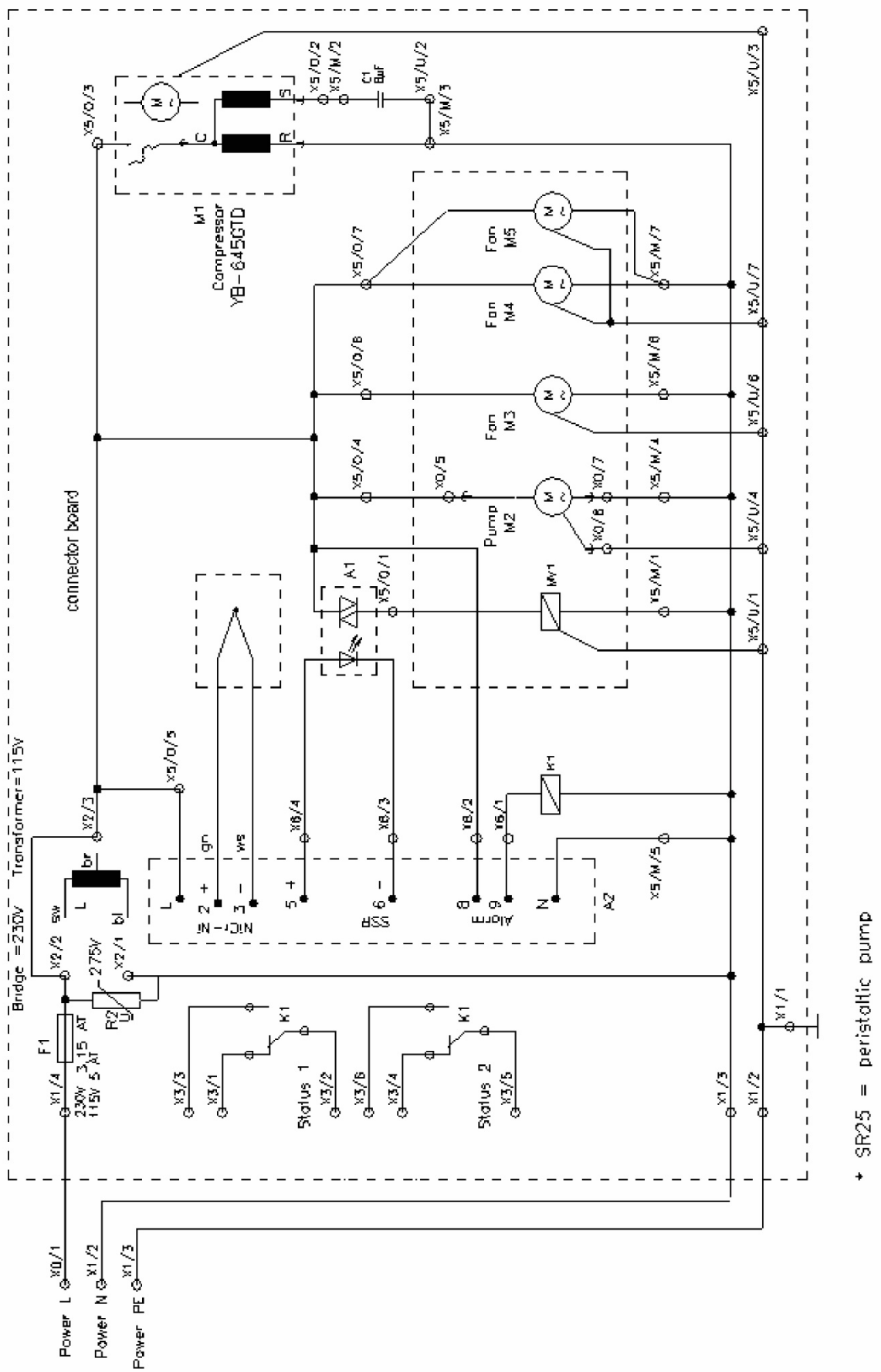


Figure 10 Circuit diagram ECS-SS HF EX2

Embracing Challenge M&C®

EU – Konformitätserklärung *EU Declaration of conformity*

im Sinne der Vorschriften nachfolgend genannter EU Richtlinien
according to the following EU directives

Die **M&C TechGroup Germany GmbH** erklärt hiermit, dass nachfolgende Produktgruppen, des Types
With this document, the M&C TechGroup Germany GmbH confirms, that the following product types of these product groups

Produktgruppen *Product groups*	Kompressor Gaskühler / *Compressor gas cooler*
Types *Product types*	ECS-SS/HF EX2 Ⓔx II 3 G Ex nA nC IIC T4 Gc

den grundlegenden Anforderungen der nachfolgenden Richtlinien entsprechen
comply with the essential requirements of the following directives

EU-Richtlinie 2014/30/EU *EU-Directive 2014/30/EU*	Elektromagnetische Verträglichkeit (EMV) *Electromagnetic compatibility (EMC)*
EU-Richtlinie 2014/35/EU *EU-Directive 2014/35/EU*	Niederspannung *Low voltage (LVD)*
EU-Richtlinie 2014/34/EU *EU-Directive 2014/34/EU*	Explosionsschutz *ATEX directive*

Sowie die Übereinstimmung mit nachfolgenden Normen:
As well as in compliance with the following standards:

EN 61010-1:2010
EN 61326-1 Klass B : 2006
EN *61326-1 Tabelle 2 : 2006*

EN 60079-15 : 2016
EN 60079-0 : 2014

Ratingen, den 25.02.2019

M&C TechGroup Germany GmbH ppa. TechGroup Germany GmbH Rehhecke 79 D-40885 Ratingen www.mc-techgroup.com ppa. Rumm ..... Hans-Jörg Rumm, Technical Director

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherungen von Eigenschaften im rechtlichen Sinne.
This declaration certifies conformance with the above mentioned directives. Affirmation of attributes in a legal sense is not included.
Die Sicherheitshinweise und Installationsanweisung der mitgelieferten Produktdokumentation sind zu beachten.
The safety declarations and installation instruction of the accompanying product documentation need to be considered.

CE Konformitätserklärung **96051_20000** **Ursprungsdatum: 06.08.2010**

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Figure 11 EC declaration of conformity