Gas Conditioning Unit Series CSS®

CSS
19” with temperature controller
70304

Instruction Manual
Version 1.00.01
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Dear customer,

we have made up this operating manual in such a way that all necessary information about the product can be found and understood quickly and easily.
Should you still have any question, please do not hesitate to contact M&C directly or go through your appointed dealer. Respective contact addresses are to be found in the annexe to this operating manual.
Please also contact our homepage www.mc-techgroup.com for further information about our products. There, you can read or download the data sheets and operating manuals of all M&C products as well as further information in German, English and French.

This Operating Manual does not claim completeness and may be subject to technical modifications.
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Version: 1.00.01
1 GENERAL INFORMATION

The product described in this operating manual has been examined before delivery and left our works in perfect condition related to safety regulations. In order to keep this condition and to guarantee a safe operation, it is important to heed the notes and prescriptions made in this operating manual. Furthermore, attention must be paid to appropriate transportation, correct storage, as well as professional installation and maintenance work. All necessary information a skilled staff will need for appropriate use of this product are given in this operating manual.

2 DECLARATION OF CONFORMITY

CE - Certification

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

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. 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

Please take care of the following basic safety procedures when mounting, starting up or operating this equipment:

Read this operating manual before starting up and use of the equipment. The information and warnings given in this operating manual must be heeded.

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

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

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

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

The device is only to be used within the permitted range of temperatures and pressures.

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

The device must not be used in hazardous areas.

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

4  WARRANTY

If the equipment fails, please contact M&C directly or else go through your M&C authorised dealer. We offer a one year warranty as of the day of delivery as per our normal terms and conditions of sale, and assuming technically correct operation of the unit. Consumables are hereby excluded. The terms of the warranty cover repair at the factory at no cost or the replacement at no cost of the equipment free ex user location. Reshipments must be send in a sufficient and proper protective packaging.
5 USED TERMS AND SIGNAL INDICATIONS

⚠️ DANGER! This means that death, severe physical injuries and/or important material damages will occur in case the respective safety measures are not fulfilled.

⚠️ WARNING! This means that death, severe physical injuries and/or important material damages may occur in case the respective safety measures are not fulfilled.

⚠️ CARE! This means that minor physical injuries may occur in case the respective safety measures are not fulfilled.

⚠️ CARE! Without the warning triangle means that a material damage may occur in case the respective safety measures are not met.

ATTENTION! This means that an unintentional situation or an unintentional status may occur in case the respective note is not respected.

☑️ NOTE! These are important information about the product or parts of the operating manual which require user’s attention.

SKILLED STAFF These are persons with necessary qualification who are familiar with installation, use and maintenance of the product.
6 INTRODUCTION

This M&C unit provides completely pre-installed sample gas conditioning for continuous use and can be excellently integrated within analysis systems. It is equipped with:

- 1 sample gas inlet;
- Electric gas cooler;
- Sample gas pump;
- Condensation pump;
- Micro fine filter with glass-fibre element (0.1µm);
- External or manual switching for testing with zero or span gas by 3-way and 2-way solenoid valves;
- Status alarm with display for cooler temperature, flow alarm and liquid alarm;
- 2 sample gas outlets with flow meters incl. needle valve (70 l/h or rather 250 l/h);
- PTFE hosing;

**Optional:** electronic temperature controller for heated sample lines.

Its compact construction means that it takes up little space. The CSS unit is ready for use within a matter of a few minutes. This at last makes the usual time consuming procurement of individual components and assembly superfluous.

6.1 SERIAL NUMBER

The type plates bearing the serial number are located on the back panel of the 19"-rack-housing. Always quote the device’s serial number when making inquiries and ordering spare parts.

6.2 POWER SUPPLY

Depending on the version, the CSS is operated with 115 or 230 V AC. Precise details can be found on the device’s type plate.

In dependence of the cooler type, the power supply and the version .../C -test gas to the probe- the following types of the CSS can be distinguished:

<table>
<thead>
<tr>
<th>Part number</th>
<th>Type</th>
<th>Cooler - gas flow [l/h]</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 G 1000</td>
<td>CSS 230V</td>
<td>ECP 1000 - 140l/h</td>
<td>230V 50/60Hz</td>
</tr>
<tr>
<td>03 G 1000a</td>
<td>CSS 115V</td>
<td>ECP 1000 - 140l/h</td>
<td>115V 60Hz</td>
</tr>
<tr>
<td>03 G 1100</td>
<td>CSS/C* 230V</td>
<td>ECP 1000 - 140l/h</td>
<td>230V 50/60Hz</td>
</tr>
<tr>
<td>03 G 1100a</td>
<td>CSS/C* 115V</td>
<td>ECP 1000 - 140l/h</td>
<td>115V 60Hz</td>
</tr>
<tr>
<td>03 G 2000</td>
<td>CSS-2 230V</td>
<td>ECP 2000 - 2 x 140l/h</td>
<td>230V 50/60Hz</td>
</tr>
<tr>
<td>03 G 2000a</td>
<td>CSS-2 115V</td>
<td>ECP 2000 - 2 x 140l/h</td>
<td>115V 60Hz</td>
</tr>
<tr>
<td>03 G 3000</td>
<td>CSS-3 230V</td>
<td>ECP 3000 - 350l/h</td>
<td>230V 50/60Hz</td>
</tr>
<tr>
<td>03 G 3000a</td>
<td>CSS-3 115V</td>
<td>ECP 3000 - 350l/h</td>
<td>115V 60Hz</td>
</tr>
<tr>
<td>03 G 3100</td>
<td>CSS-3/C* 230V</td>
<td>ECP 3000 - 350l/h</td>
<td>230V 50/60Hz</td>
</tr>
<tr>
<td>03 G 3100a</td>
<td>CSS-3/C* 115V</td>
<td>ECP 3000 - 350l/h</td>
<td>115V 60Hz</td>
</tr>
</tbody>
</table>

**Options**

- 03 G 9000  Extra charge for CSS... with integr. temp. controller 70304 f. heated sample line
- 03 G 9020(a) Extra charge for CSS... with altogether 3 check valves
- 03 G 9025(a) Extra charge for CSS... with altogether 4 check valves
- 03 G 9030(a) Extra charge for CSS... with altogether 5 check valves

* Version CSS.../C: test gas to sample probe
(a) : 115V-Version
# TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas flow rate**</td>
<td>CSS(/C) : max. 140l/h</td>
</tr>
<tr>
<td></td>
<td>CSS-2 : max. 2 x 140l/h</td>
</tr>
<tr>
<td></td>
<td>CSS-3(/C) : max. 350l/h</td>
</tr>
<tr>
<td>Flow meter</td>
<td>CSS(/C), CSS-2: 2 x with needle valve, adjustable to 70l/h, flow meter FM1 with flow alarm sensor</td>
</tr>
<tr>
<td></td>
<td>CSS-3(/C) : 2 x with needle valve, adjustable to 250l/h, flow meter FM1 with flow alarm sensor</td>
</tr>
<tr>
<td>Gas pressure</td>
<td>0,7bar to 1,4bar abs.</td>
</tr>
<tr>
<td>Sample inlet temperature**</td>
<td>max. 150°C</td>
</tr>
<tr>
<td>Sample inlet dew point**</td>
<td>max. 80°C</td>
</tr>
<tr>
<td>Sample outlet dew point**</td>
<td>range of adjustment: +2 °C ...... +15 °C, factory setting: +5 °C</td>
</tr>
<tr>
<td>Dew point stability</td>
<td>at constant conditions &lt; ± 0,1 °C</td>
</tr>
<tr>
<td>Gas filter F-0,1GF50</td>
<td>Glass fiber, retention rate 99,99% for particles &gt; 0,1µm</td>
</tr>
<tr>
<td>Ambient temperature**</td>
<td>+5°C to +45°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-25°C to +65°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>&lt; 80%</td>
</tr>
<tr>
<td>Housing</td>
<td>19&quot;-rack housing mounting 6 U, depth 350mm</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP20, DIN40050</td>
</tr>
<tr>
<td>Weight</td>
<td>CSS(/C) : approx. 15kg</td>
</tr>
<tr>
<td></td>
<td>CSS-2, CSS-3(/C): approx. 16,5kg</td>
</tr>
<tr>
<td>Connections</td>
<td>G 1/4 i* - DIN ISO 228/1</td>
</tr>
<tr>
<td>Power supply</td>
<td>230V 50/60Hz or 115V 60Hz, CSS : 150VA</td>
</tr>
<tr>
<td></td>
<td>CSS-2/3: 250VA</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Power terminals max. 4 mm² (4 x PG 13,5)</td>
</tr>
<tr>
<td></td>
<td>Alarm-/Control signal 15 pin Sub-D-Connector</td>
</tr>
<tr>
<td>Warm up time</td>
<td>approx. 10 min.</td>
</tr>
<tr>
<td>Material of sample contacting parts</td>
<td>PVDF, glass, Viton®, Novoprene®, PTFE</td>
</tr>
<tr>
<td>Status signal for</td>
<td>Measure/Check, cooler temperature, liquid alarm, flow alarm: potential free change over contact, max. 24V/1A</td>
</tr>
<tr>
<td>Test gas inlet - 2 x</td>
<td>solenoid valve actuated by manual or external switch</td>
</tr>
<tr>
<td>Option: Electronic PID temperature controller for heated sample lines</td>
<td>front panel mounting</td>
</tr>
<tr>
<td></td>
<td>control range : 0°C to 200°C</td>
</tr>
<tr>
<td></td>
<td>sensor inlet : PT 100 and Fe-CuNi</td>
</tr>
<tr>
<td></td>
<td>controlling outlet : 10A solid state relay #</td>
</tr>
<tr>
<td></td>
<td>status alarm : integrated into the status signal parameter : free adjustable</td>
</tr>
<tr>
<td>Electrical equipment standard</td>
<td>EN 60204-1 (DIN VDE 0113 Teil 1/02.86)</td>
</tr>
</tbody>
</table>

* other connections on request

** Maximum values in technical datas must be rated in consideration of total cooling capacity at 25 °C ambient temperature and an outlet dew point of 5 °C.

# standard for max. 20m heated sample line at 110W/m
8 DESCRIPTION

The components of the M&C gas conditioning sampling system type CSS are mounted in a 19" rack housing. The CSS may also be configured with an optional wall-mounting-bracket (Part-No. 03G9005).

Figure 1 Front view of the CSS

The front plate (1) displays the following components:

(1.1) operation and control board;
(1.2) flow components sub panel;
(1.3) option*—temperature controller for heated sample line (Part No. 03G9000);
(1.4) handles.

* If the temperature controller option is not chosen a plastic plate will cover the opening.
Figure 2 shows the operation and control board (1.1). The different functions are selected by toggle switches and indicated with LED's. The internal or external function is configured through the wiring in the Sub-D-Plug (see 4.1) and indicated by a dual coloured LED on the operation and control board.

**LED:**
- rot/red
- grün/green
- gelb/yellow
- rot/grün
- red/green

**Figure 2  Operation and control board**
The following chart describes the functions of the operation and control board.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Switch</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Control</td>
<td>control of the CSS with operation and control board; link between pin 1 and 9 (connector X2, s. 10.2.2); control power supply;</td>
<td></td>
<td>(dual coloured) green</td>
</tr>
<tr>
<td>External Control</td>
<td>external control with Sub-D-Plug X2 (s. 10.2.3), switches of the operation and control board out of function; control power supply after switching the CSS on;</td>
<td></td>
<td>(dual coloured) red</td>
</tr>
<tr>
<td>On</td>
<td>internal control activated;</td>
<td>X</td>
<td>green*</td>
</tr>
<tr>
<td>Off</td>
<td>switches CSS off</td>
<td></td>
<td>no LED</td>
</tr>
<tr>
<td>Status</td>
<td>no alarm: CSS ready for operation; alarm: cooler-/temperature-controller alarm; flow alarm; liquid alarm.</td>
<td></td>
<td>green* red*</td>
</tr>
<tr>
<td>Cooler-Alarm</td>
<td>no alarm: CSS ready for operation; alarm: CSS not ready for operation, temperature of cooler &lt;2°C or &gt;8°C, or optional temperature-controller: controller not in range</td>
<td></td>
<td>green* red*</td>
</tr>
<tr>
<td>Flow-Alarm</td>
<td>no alarm: CSS in operation; alarm: no gas flow (i.e. inlet or outlet is blocked), sample gas pump not in operation, liquid alarm, cooler-/temperature-controller alarm;</td>
<td></td>
<td>green* red*</td>
</tr>
<tr>
<td>Liquid-Alarm</td>
<td>no alarm: CSS ready for operation alarm: condensate alarm;</td>
<td></td>
<td>green* red*</td>
</tr>
<tr>
<td>Pump Off</td>
<td>sample gas pump off;</td>
<td>X</td>
<td>red</td>
</tr>
<tr>
<td>Pump On</td>
<td>sample gas pump on;</td>
<td>X</td>
<td>green*</td>
</tr>
<tr>
<td>Measure</td>
<td>CSS in sample mode, signal contact available;</td>
<td>X</td>
<td>yellow*</td>
</tr>
<tr>
<td>Check</td>
<td>CSS in test mode, signal contact available;</td>
<td>X</td>
<td>yellow*</td>
</tr>
<tr>
<td>Sample Gas</td>
<td>3-way solenoid valve open for sample mode;</td>
<td>X</td>
<td>yellow*</td>
</tr>
<tr>
<td>Test Gas</td>
<td>3-way solenoid valve open for test mode;</td>
<td>X</td>
<td>yellow*</td>
</tr>
<tr>
<td>Zero Gas</td>
<td>2-way solenoid valve open for Zero Gas;</td>
<td>X</td>
<td>yellow*</td>
</tr>
<tr>
<td>Span Gas</td>
<td>2-way solenoid valve open for Span Gas;</td>
<td>X</td>
<td>yellow*</td>
</tr>
</tbody>
</table>

* LED display also for external control
All of the maintenance components are mounted on the flow components sub panel (1.2) (s. Fig. 1 and 3) and are easily accessed by removing front panel mounting screws. These are:

(1.2.1) Gas-Filter FPF-0,1GF;
(1.2.2) Peristaltic pump SR25.1;
(1.2.3) Liquid-Alarm-Sensor LA1 with Flow-Chamber LS;
(1.2.4) Flow-Meter 1 FM40, measuring range 7-70l or 25-250l**
(1.2.5) Optical bi stable Flow-Alarm-Sensor FA-1.bi;
(1.2.6) Flow-Meter 2 FM40, measuring range 7-70l or 25-250l**;
(1.2.7) Gas Pump N3 KPE or N9 KPE**;
(1.2.8) Terminal X8

(** with version CSS-3... and CSS-3/C...)

Figure 3  Plan view of the components mounted on the Flow components sub panel

For maintenance it is possible to pull out the rack housing (1.2), without dismounting the complete unit.
Figure 4 Components mounted in the 19” rack housing

The gas cooler (10) is fixed on the back panel of the 19” rack housing. With respect to the maximum flow rate required, the following versions are available:

<table>
<thead>
<tr>
<th>Cooler</th>
<th>max. flow rate [l/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECP 1000</td>
<td>140</td>
</tr>
<tr>
<td>ECP 2000</td>
<td>2 x 140</td>
</tr>
<tr>
<td>ECP 3000</td>
<td>350</td>
</tr>
</tbody>
</table>

Ambient air enters the chassis through the slots in the bottom (8) and top plate (9) of the 19” rack housing. This allows ventilation and cooling of the internal components including the gas cooler. The cooler fan exhausts air out of the cut out in the side wall (6) of the 19” rack housing.

The PSS must be stored in a weather-protected frost-free area! Allows adequate ventilation around the chassis!

The 3-way solenoid valve (14), for switching of the sample and test gas, is mounted in a special holder (13) on the back panel (5).

Sectional view A-A in illustration 4 shows the two 2-way solenoid valves (16) and (17), for zero and span gas. They are mounted with valve block (15) below the valve (14) on the back panel of the 19” rack housing. Additional 3 span gas valves are possible as option (see page 8). The span gas valves are preselected by snap switch 1.5 (Fig. 1).

The combined card for flow- and liquid alarm LFC-2 (20) is connected on the main circuit board (21). The CSS is protected by fuse (F1= 2A, see wiring diagram in appendix).
All the electrical and tube-/hose connections are located on the back panel of the 19" rack housing. These are:

(A) Sub-D-Plug X2 (see 10.2):

- external status inquiry
  - device status
  - measuring/test mode
- control functions
  - internal (the link between pin 1 and 9 is factory installed and must exist for the local control to function)
  - external (with potential free contacts)

(A1) Reserve

(B) electrical junction box X1 (see 10.1):
- power supply
  - option: connection heated sample line and temperature-sensor

(C)* sample gas inlet

(D) sample and test gas outlet 1 with Flow-Alarm

(E) sample and test gas outlet 2

(F) zero gas inlet

(G) span gas inlet

(H) condensate outlet

(I) test gas to the probe**

(J) ventilation**

(K) option: span gas 2 inlet, condensate outlet 2***

(L) option: span gas 3 inlet, sample gas outlet 3***

(M) sample gas inlet 2***

(N) option: span gas 4 inlet

---

**Figure 5** Back-panel of the 19" rack housing

* (C) - (M) are PVDF G 1/4" i fittings
** only version CSS.../C, test gas to probe
*** only version CSS-2
9  FUNCTION

The gas flow schematic of the CSS is shown in the following illustration.

Figure 6  Gas flow schematic

Principally, there are two main ways for gas to enter and flow through the CSS:

- sample gas flow (C, 4, 7, 9, 10, 12 and 13, D and E);
  (version CSS-2 additional: M, 7, K);
- test gas flow  (F or G, 5 or 6, 4, 7, 9, 10, 11, 12 and 13, D or E)
  (Version CSS.../C: F or G, 5 or 6, I, 2, C, 4, ... see above).

The gas sample pump (10) transports the sample gas via the gas sample probe, consisting of a sample tube (1) and a filter (2), to the CSS. The heated sample line (3) is connected at the sample gas inlet (C). In order to prevent early condensation of the sample gas, components (2) and (3) are heated.

In the measuring mode, the 3-way solenoid valve (4) allows the flow to the gas cooler (7).

The dew point of the gas is maintained at a stable value of +5°C +/- 0,1 °C (for further specifications see appendix).
The peristaltic pump (8) draws and removes the condensate via the condensation outlet (H) on back panel.

The liquid alarm sensor (9) which located after the gas cooler protects the gas analysers in the event of faulty gas drying. In the event of an alarm in the condensate removal, cooling or heating functions, the 3-way solenoid valve is automatically closed. Also the measuring pump is switched off so that no wet gases can reach the gas outlets (D) and (E). The alarm is shown on the operation and control board of the CSS and is available on Sub-D-Plug X2 (A) as a status contact outlet (see 10.2.2 and 10.2.3).

After the sample gas pump (10) is a gas filter (11) for precipitation of the finest particles.

After the filter, the sample gas flows through both flow meters: the flow meters FM1 (12) and FM2 (13), and the measuring outlets (D) and (E). Both flow meters are individually adjustable by a needle valve. In order to keep the gas outlet dew point of 5°C, the total flow rate should not exceed the specified maximum value (see 7.).

The minimum flow rate is determined by the sample gas pump (see 17.1). If the flow rate remains under the minimum value the pump membrane can be premature destroyed by over pressure.

The flow rate is controlled via needle valve on the flow meter FM1 and the optical bi stable flow sensor. The flow sensor can be moved on the flow meter glass and adjusted to an alarm value of your choice. The flow is below the alarm value, this effects a flow alarm which is shown on the operation and control board of the CSS and which is also available on Sub-D-Plug X2 (A) as a status contact (see 10.2).

In the test mode, the 3-way solenoid valve (4) is switched to allow zero or span gas to enter the system. The inlets (F) and (G) are then available and the 2-way valves (5) or (6) open respectively. Additional 3 span gas valves (K, L, N) are possible as option (see page 8). The span gas valves are preselected by snap switch 1.5 (Fig. 1).

The versions CSS.../C are configured in such a way that the test gases first flow via the sample gas probe and then via the sample gas inlet (C) to the gas cooler. Therefore, the CSS.../C is equipped with the additional inlet fittings (I) and (J). The test gas outlet (I) is connected with the test gas inlet of the sample gas probe.

In Version CSS-2 the gas cooler ECP2000 with two heat exchangers is mounted. Thus it is possible to operate with a second independent sample gas flow. The sample gas line for the second independent sample gas flow has to be connected to the inlet (M) and outlet (K) by customer. Condensate removal happens via the condensate outlet (L). Sample gas pump, condensate pump, gas filter and alarm sensors have to be installed extern by customer.

In case of alarm, the 3-way solenoid valve opens automatically the gas way (4) - (J) and closes the way (4) - (C). This guarantees that no sample gas or test gas can enter the system.

Zero and span gas both flow through the heat exchanger of the gas cooler. This configuration guarantees the same conditions during measuring and calibration.

The CSS gets its respective voltage via an electrical junction box X1 (B). Here, you can also find the connections for the option "heated sample line with temperature controller" (specification see 10.1).
10 ELECTRICAL CONNECTIONS

The electrical connections are located on the back panel of the 19" rack housing (see fig.5)

10.1 ELECTRICAL JUNCTION BOX X1

Figure 7 shows the possible connections of the electrical junction box X1 (B).

![Diagram of X1 junction box](image)

- **Power In 230V 50Hz, 150VA for CSS**
- **Option controller 70304 for heated sample line**
- **Power In 150V 60Hz, 1100VA for heated sample line**
- **Connection for the temperature sensor of the heated sample line**
  - PT100 / thermocouple +
  - PT100 / thermocouple -
  - PT100 (3-wire)
  - screening

For devices from 12/2001 to 01/2008 with controller 703: thermocouple + at terminal 11, thermocouple – at terminal 12

Figure 7 Electrical junction box X1 (B)

The CSS is protected by fuse (F1= 2A, see wiring diagram in appendix). The fuse is located on the main circuit board (see fig.4).
10.2  SUB-D-PLUG X2

To guarantee the function of the CSS, the SUB-D-Plug must be mounted!

NOTE

10.2.1 STATUS CONTACTS

Two potential free switches operating in ‘Safety-First’ function and guarantee an adequate signal for CSS being in test mode, alarm mode or loosen voltage.

For one of the above mentioned situations the circuit is closed by the contacts MC (master contact, 5 and 15) and NC (normal closed, 7 and 14). In case that the CSS is ready for operation the contacts MC and NO (normal open, 6 and 13) are switched.

CONTACTS

MC (master contact) ———— (5,15) ———— (7,14) ———— NC (normal closed)

Alarm, Modus ’Check’ ———— ok, Modus ’Measure’

NO (normal open) ———— (6,13)

Break capacity: maximum 24V 1A!

The kind of alarm is displayed on the operation and control board (see fig.2).
10.2.2 LOCAL CONTROL

For local control all functions of the CSS are effected by the operation and control board (functions see 8.).

For local control, the link between PIN 1 and 9 in the SUB-D-Plug is necessary!

The way for gas to enter the CSS is chosen by operating the adequate switch on the operation and control board (see 8.). All other possible gas ways will be automatically closed. This avoids measuring inaccuracy by simultaneous feeding the CSS with different gases.

For version CSS.../C -test gas to sample gas probe (see 9.)- pin 1 and 4 in the Sub-D-Plug are shorted-out.

Status-Contacts

<table>
<thead>
<tr>
<th>Status Connections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm MC</td>
</tr>
<tr>
<td>Alarm NO <em>ok</em></td>
</tr>
<tr>
<td>Alarm NC <em>Alarm</em></td>
</tr>
<tr>
<td>Measure/Check MC</td>
</tr>
<tr>
<td>&quot;Measure&quot;/Check NO</td>
</tr>
<tr>
<td>Measure/<em>Check</em> NC</td>
</tr>
</tbody>
</table>

CSS Local Control

<table>
<thead>
<tr>
<th>Control Connections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link 1-4 version CSS.../C</td>
</tr>
<tr>
<td>Link 1-9 local control</td>
</tr>
</tbody>
</table>

Figure 9 Plan of terminal connections in the Sub-D-Plug X2 (A) for local control of the CSS... and CSS.../C
10.2.3 EXTERNAL CONTROL

The external control off the CSS has to be realised by customer by means of potential free switches. The selector switch functions of the control board (s. 8.) are out of operation.

For external control, the link between PIN 1 and 9 in the D-SUB-Plug must be removed!
Operating error by feeding the CSS simultaneous with sample- and test gas must be excluded by customer!

NOTE!

Status–Contacts

<table>
<thead>
<tr>
<th>Status Connections:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm MC</td>
<td>5</td>
</tr>
<tr>
<td>Alarm NO *&quot;ok&quot;</td>
<td>13</td>
</tr>
<tr>
<td>Alarm NC *&quot;Alarm&quot;</td>
<td>14</td>
</tr>
<tr>
<td>Measure/Check MC</td>
<td>15</td>
</tr>
<tr>
<td><em>Measure</em>/Check NO</td>
<td>6</td>
</tr>
<tr>
<td>Measure*/Check* NC</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Connections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link 1–4 Version CSS.../C</td>
</tr>
<tr>
<td>1–10 CSS-On</td>
</tr>
<tr>
<td>11–10 Pump On</td>
</tr>
<tr>
<td>2–10 Sample Gas On</td>
</tr>
<tr>
<td>3–10 Zero Gas On</td>
</tr>
<tr>
<td>12–10 Span Gas On</td>
</tr>
</tbody>
</table>

Figure 10 Plan of terminal connections in the D-Sub-Plug X2 (A) for external control of the CSS... and CSS.../C

For version CSS.../C - test gas to sample gas probe a link between pin 1 and 4 in the D-Sub-Plug is mounted.
10.3 LIQUID- AND FLOW ALARM CARD LFC-2

The LFC-2 is a combined electronic card operating the flow alarm sensor FA1bi and the liquid alarm sensor LA1. Pulsating gas flow can release a unintentional flow alarm. To avoid this the LFC-2 is equipped with slow operation -time lag to eliminate the alarm- and slow release -alarm with time lag. Times in between 3 and 13 seconds (3 seconds are factory-aligned) are continuously adjustable by the potentiometers P5 and P6 (see Fig. 11, wiring diagram LFC-2). For more specific information about the liquid alarm sensor LA1 and the flow alarm sensor FA1bi please see the data sheets 5-6.10.1 and 5-5.1.1. The plan of terminal connections is displayed in the following chart.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Path</th>
<th>Connections</th>
<th>Terminal</th>
<th>Path</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>d2</td>
<td>power 230/115V</td>
<td>L</td>
<td>d32</td>
<td>alarm contact 2</td>
<td>NC</td>
</tr>
<tr>
<td>z2</td>
<td>power 230/115V</td>
<td>N</td>
<td>d12</td>
<td>FA sensor</td>
<td>brown</td>
</tr>
<tr>
<td>z4</td>
<td>power 230/115V</td>
<td>PE</td>
<td>d16</td>
<td>FA sensor</td>
<td>green</td>
</tr>
<tr>
<td>d4</td>
<td>supply</td>
<td>+15V up to +24V DC</td>
<td>d14</td>
<td>FA sensor</td>
<td>white</td>
</tr>
<tr>
<td>z4</td>
<td>supply</td>
<td>0V DC</td>
<td>z16</td>
<td>FA sensor</td>
<td>yellow</td>
</tr>
<tr>
<td>d8</td>
<td>LA sensor</td>
<td>shielding</td>
<td>z22</td>
<td>alarm contact 1</td>
<td>MC</td>
</tr>
<tr>
<td>z8</td>
<td>LA sensor</td>
<td>white</td>
<td>d22</td>
<td>alarm contact 1</td>
<td>NO</td>
</tr>
<tr>
<td>z28</td>
<td>alarm contact 1</td>
<td>MC</td>
<td>z24</td>
<td>alarm contact 1</td>
<td>NC</td>
</tr>
<tr>
<td>d28</td>
<td>alarm contact 1</td>
<td>NO</td>
<td>d24</td>
<td>alarm contact 2</td>
<td>MC</td>
</tr>
<tr>
<td>z30</td>
<td>alarm contact 1</td>
<td>NC</td>
<td>z26</td>
<td>alarm contact 2</td>
<td>NO</td>
</tr>
<tr>
<td>d30</td>
<td>alarm contact 2</td>
<td>MC</td>
<td>d26</td>
<td>alarm contact 2</td>
<td>NC</td>
</tr>
<tr>
<td>z32</td>
<td>alarm contact 2</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Steckleiste DIN 41612 F-d/z

 braking/braking  grugwerk/breaking  red/red  weiss/white  gelb/yellow/gelb

D2/D8 D12 D14 Dioden 1N4148
V2-VS Transistor BC 233C
Relais K1/K2 max. 250V DC/AC 95W, 250VA, 1A
LFC-2 01E1385  T1=3,5VA Frontplatte 6TE
LFC-2CSS 03E2026  T1=7VA ohne Frontplatte

PS = switch-off-hysteresis 3-13 sec.
PS = Alarmreisegesamtverzögerung 3-13 sek.
From Version 03.2000

Figure 11 Circuit diagram LFC-2
11 DESCRIPTION OF THE OPTIONAL TEMPERATURE CONTROLLER 70304 FOR HEATED SAMPLE LINES

1. Actual value display
   - red, 10mm high, 4 digits

2. Active Setpoint
   - Factory setting SP1

3. Setpoint
   - Four digit, green; decimal place is configurable;
   - Also used for operator prompting (display of parameter and level symbols)

4. PGM-key
   - in order to select parameters
   - in order to change values
   - in order to change values

5. Exit-key
   - in order to leave the levels

6. Indication
   - yellow for
     - Switch status of binary outputs 1 – 6 (display lights up = on)
     - ramp/program function is active
     - manual operation is active

16-segment display for the unit °C / °F
   - factory setting °C

Figure 12 Display/control elements

12 OPERATING PRINCIPLE OF THE CONTROLLER 70304

Operating and programming of the controller takes place on two levels. On the first level for normal operation, alarms can be resetted or in case of startup a control circuit, self-optimising is activated. Underneath there is the user level. All important adjustments of the controller are combined on the user level and can be changed after removing the level inhibit.
12.1 PARAMETER OF THE USER LEVEL WITH FACTORY SETTING

- Setpoint SP, factory setting = 180°C
- Max. low temperature difference to the setpoint Lo-t, factory setting = 10°C. In case of falling below, an alarm signal takes place
- Function of the controller Fnct, factory setting = 0 : fixed-setpoint controller. Other values are not adequate for the operation of M&C products.
- Sensor type Sens, factory setting = 2: Resistance thermometer in 2-wire circuit
  1: Resistance thermometer in 3-wire circuit
  2: Resistance thermometer in 2-wire circuit
  4: Thermocouple
- Linearization Lin, factory setting = 1, Pt100
  1: Pt100
  9: Fe-CuNi J
  11: Fe-CuNi L
  12: NiCr-Ni K

Further information is in the separate manual 2-5.1.1ME of the controller 70304. The manual is available for download on the M&C-website www.mc-techgroup.com.

13 CHANGE OF PARAMETERS

To change parameters the level inhibit on the user level has to be removed.

⚠️ WARNING! ⚠️

Observe the maximum temperature of the device to be controlled to avoid damaging the same.

13.1 REMOVING AND ACTIVATING THE LEVEL INHIBIT

To remove the level inhibit, act as follows:

- Standard display (below setpoint, up actual value ) has to be visible
- Press key PGM and ⇨ simultaneously for 5sec.,
  display = Code 3 (all levels are locked)
- Press PGM
- Change value from 3 to 2 with key ⇨
- The value is blinking after 2sec. and the change is taken over
- The user level is unlocked now
- Press EXIT

To activate the level inhibit, act as follows:

- Standard display (below setpoint, up actual value ) has to be visible
- Press key PGM and ⇨ simultaneously for 5sec.,
  display = Code 2 (all levels are locked)
- Press PGM
- Change value from 2 to 3 with key ⇨
The value is blinking after 2sec. and the change is taken over
The user level is locked now
Press **EXIT**

13.2 MENUE STRUCTURE

Generally:
- Changing to the user level with PGM-key (display = User)
- To choose the first parameter press PGM-key again (display = SP)
- Changing to the next parameter with ▼-key
- Back to the standard display press EXIT-key (2x)

**Figure 13 Menue structure**
13.3 TIME OUT

If no operation takes place, the controller automatically returns to the standard display after about 2 minutes using any changed parameters.

14 RECEIPT OF GOODS AND STORAGE

The CSS is completely pre-installed and normally delivered in one packaging unit.

- Please take the gas conditioning system and possible special accessories carefully out of the packaging material immediately after arrival, and compare the goods with the items listed on the delivery note;

- Check the goods for any damage caused during delivery and, if necessary, notify your transport insurance company without delay of any damage discovered.

![NOTE!]

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

15 INSTALLATION INSTRUCTIONS

The compact construction of the CSS means that it takes up little space and that the 19" unit can be excellently integrated within analysis systems.

![NOTE!]

The equipment is to be used in a vertical position only. The perfect functioning of the separation and drainage procedures will only be guaranteed if the equipment is used in a vertical position.

The gas conditioning system should be installed in an area well away from any heat emitting sources in order to prevent damage caused by an accumulation of heat.

Pay attention to a non critical installation for individuals.

The compact gas conditioning system is preferably designed for mounting in a cabinet. When the cabinet is installed outside, ample protection against the effects of direct sunlight and dampness must be provided. In winter, the equipment must only be used in frost-free areas; pay attention to the protection class of the device.

In order to guarantee the operational safety of the gas conditioning system and the additionally connected analysers, and to avoid false alarms, the gas conditioning system should not be used at temperatures other than those specified.

It is of great importance that the analysers which have been additionally connected be used at temperatures well above the specified gas outlet dew point of +5°C. This prevents the gas in the connector lines from condensing completely.
In the event of the unheated sample gas lines being connected to the gas conditioning system on a slope, it is not necessary to carry out a preliminary condensate removal.

16 SUPPLY CONNECTIONS

16.1 HOSE CONNECTION

The CSS is equipped with G1/4“i connections. Do not mix up the hose connections: they are clearly marked. After all the hoses have been connected, the tightness of such leads should be checked.

NOTE!

Connection hoses with dimensions DN 4/6mm are utilised for all models. The following lines have to be connected (Fig. 5):

- sample gas line to connection (C) respectively to connection (M), operating with version CSS-2 (second independent gas flow);
- zero gas line to connection (F);
- span gas line to connection (G);
- line -test gas to sample gas probe (CSS.../C)- to connection (I);
- analyser(s) to outlets (D) and (E); maximum two sample gas outlets are available; with version CSS-2 an additional sample gas outlet (K) is available;
- connect the condensate hose to the outlet (H) respectively to the outlet (L), operating with version CSS-2 (second independent gas flow); the hose must be laid with slope to a ventilated sewer or reservoir; it is absolutely necessary to install the ventilation outside the analysers cabinet and analysers house;

NOTE!

The tightness of the connections can only be guaranteed if the connecting hose has a straight rim (hose cutter).

WARNING!

Aggressive condensate is possible. Wear protective glasses and proper protective clothing!
16.2 **ELECTRICAL CONNECTIONS**

**WARNING!** False supply voltage can damage the equipment. When connecting the equipment, please ensure that the supply voltage is identical with the information provided on the model type plate!

**NOTE!** For the erection of power installations with rated voltages up to 1000V, the requirements of VDE 0100 and relevant standards and specifications must be observed! The main circuit must be equipped with a fuse corresponding to the nominal current (over current protection); for electrical details see technical data.

- Connect power supply (optional heated sample line with temperature sensor) to the corresponding terminals of the electrical junction box X1 (Fig.7); intend for a main switch and a corresponding fuse protection; the dual coloured LED for local control shines green if the **CSS** is alive.

17 **STARTING**

Before starting the gas conditioning system please pay attention to the site-oriented and processor-oriented precautions.

The following description is valid for starting the device at ambient temperatures > +8°C. The following steps should be carried out before initial start-up:

- The function of the **CSS** is only guaranteed when the sub-D-plug X2 is mounted;
- For internal control of the **CSS** a bridge between contact 1 and 9 in the sub-D-plug is necessary;

For external control of the **CSS** operating errors caused by feeding test- and sample gas simultaneous have to be prevented by customer.

17.1 **MEASURE**

- Turn switch to 'On' (see fig.2, LED green); for external control the dual coloured LED shines red;

Switching the **CSS** into operation displays the following alarms:

**Cooler alarm (LED red):**

after the cooler is ready for operation (cooler temperature >2°C and <8°C) the alarm is eliminated (LED green). The 3-way solenoid (4) (see fig.6) opens automatically for sample gas and the sample gas pump (10) (see fig.6) is ready for operation.
Flow alarm (LED red):
up to now there is no gas flow. Even when the ball of the flow meter passes the alarm value the alarm is eliminated (LED green).
- Turn switch to ‘Measure’ (LED yellow); available as contact outlet (see Fig.9);

If the cooler alarm is eliminated:
- turn switch to ‘Pump on’ (LED green);
- adjust flow meter with needle valve to the demanded value;

NOTE!
Adjust the flow meter FM1 to a flow rate above the demanded alarm value. Because of breaking the outlet dew point (5°C) the total flow rate should not pass the specified maximum value (see 2.). The minimum flow rate is determined by the sample gas pump. This requires the following minimum values:

N3 KPE: approx. 60l/h;
N9 KPE: approx. 200l/h;

If the flow rate remains under the minimum value the pump membrane can be premature destroyed by over pressure!

17.2 CHECK/CALIBRATION
- turn switch to ‘Check’ (LED yellow); is available as contact outlet;
- turn switch to ‘Test gas’ (LED yellow);
- turn switch to ‘Zero gas’ (LED yellow);

After this calibration or checking the measuring range with zero gas can happen.
- turn switch to ‘Span gas’ (LED yellow);

Now calibration or checking the measuring range with span gas can be started.

For returning to the measuring mode:
- turn switch to ‘Sample gas’ (LED yellow);

If the analyser has reached the measuring range:
- turn switch to ‘Measure’ (LED yellow).
17.3 SELF-OPTIMISING (PID-FUNCTION) OF THE CONTROLLED SYSTEM

The controller type 70304 has the possibility of a self-optimisation-function if it operates as a PID-controller. In all M&C components this function is pre-adjusted. This means that a self-optimisation is necessary starting up the component.

For self-optimising of the control circuit, the heating of the heated sample line must be connected to the appropriate terminals of the CSS (s. 10.1).

WARNING!

Before connecting the heated sample line, isolate the unit from the supply!

The self-optimising function can be activated as follows:

- After cable connection (Figure 7), switch on the supply.
- When the actual value (top display, red indicator) reaches the setpoint value (bottom display, green indicator), press ▼ + ▲ keys simultaneously for longer than 2 seconds. The word “tUnE” now flashes in the setpoint value display and the self-optimising function is activated.
- Self-optimization has finished when the display changes to the standard display. The time of self-optimizing depends on the control circuit.

To cancel the self-optimization press the keys ▼ + ▲ simultaneously.

The heated sample line now works in optimized operation.

18 CLOSING DOWN

NOTE!

Before stopping the CSS, sample gas should be expelled with inert gas (Nitrogen or air).

The area in which the equipment is situated when not in use must be kept free of frost at all times.

For stopping the CSS carry out the following steps:

- turn switch to ‘Pump off’ (LED red); is not displayed on the control board in case of external control.
- switch the CSS off; for local control turn the switch ‘On’ left (LED extinguishes)
19 MAINTENANCE

Before the maintenance work is carried out, it is necessary that the specific safety procedures pertaining to the system and operational process be observed!

**WARNING!**

Dangerous voltage. It is necessary to take the equipment off the mains before any assembly, maintenance or repair work is carried out.

In order to do this the mains plug has to be removed from the mains plug socket!

The frequency of the maintenance work depends on the operational process and can therefore only be determined in each individual case. Maintenance instructions pertaining to individual components can be found in the instruction manual for individual components.

All parts which require maintenance work are housed in the gas conditioning system in such a way so that they are easily accessible. These are:

- The filter element of the preliminary filter FPF-0,1GF.

**NOTE!**

In order to protect the analysers which have been additionally connected, it is recommended that in the event of a condensation irruption the moist filter elements be replaced.

- The preliminary filter for the peristaltic pump PF2. If the condensate contains particle residue, the preliminary filter should be replaced at regular intervals. The ‘one-way’ filter is situated in the suction side of the pump hose and can be easily replaced;

- Hoses of the Condensate pump SR25.1. These should be checked every six months and, if necessary, replaced;

- Diaphragm of the sample gas pump N3KPE or N9KPE.. These should be checked every six months and, if necessary, replaced;

20 DISMOUNTING THE FLOW COMPONENTS SUB PANEL

The dismounting of the flow components sub panel is carried out stepwise as follows:

- check if the CSS is disconnected from all power supplies;
- loosen the fastening screw from the flow alarm sensor;
- remove the sensor from the flow meter glass;
- turn the union nut of the liquid alarm sensor left by hand (fix the sensor while loosen the nut);
- pull out the sensor of the flow chamber;
- unscrew the hose connections of the condensate pump;
**WARNING!**
Aggressive condensate is possible. Wear protective glasses and proper protective clothing!

- release the fastening screws from the flow components sub panel;
- pull out half the sub panel and lower so that the backside tube connections are accessible;

**NOTE!**
The flow components sub panel is not rail mounted!

- release the tube connections at the top of the flow meters FM1 and FM2;
- disconnect the tube ‘flow chamber/heat exchanger’ on the side of the chamber;
- pull out the hoses of the condensate pump through the guides in the sub panel;
- pull out the plug in connection from the connector block X8 (see fig.3).

Now the sub panel can be completely taken out of the 19” housing.

Mounting the sub panel happens in opposite order. Please pay attention to the following instructions:

- mounting the plug in connection look out for the sequence of numbers;
- after the implementation of the condensate hoses pay attention of possible folds;
- tighten the union nut of the liquid alarm sensor by hand;
- position the flow alarm sensor and tighten the fastening screw by hand.

### 21 ALARMS AND ELIMINATION
The alarms are displayed on the operation and control board (see fig.2) by LED’s. The alarms are available as a status contact in the Sub-D-Plug (s. 10.2.2 u. 10.2.3).

#### 21.1 VOLTAGE LOSS
At a voltage loss the operation and control board of the CSS is out of function and the LED’s are extinguished (see 8.). A signal is available at the alarm status contact in the Sub-D-Plug (s. 10.2.1).

Carry out the following controlling steps:

- check the position of the main switch;
- check the external fuse; if necessary exchange the fuse;
- check the fine fuse (F1=2A, see circuit diagram in the appendix) on the main board of the CSS; if necessary exchange the fuse.
21.2 COOLER ALARM/TEMPERATURE CONTROLLER ALARM

Cooler alarm is released if the cooler temperature is <2°C or >8°C, also in the period till the CSS is ready for operation. As well cooler alarm is released if the temperature controller (option) of the heated sample line is out of range. The operative cooler/temperature controller opens the 3-way solenoid valve and makes the function 'Pump On' possible.

For alarm elimination please check:

- the function of the cooler; see separate manual 3-1.1-MD;
- ambient temperature > 2°C ?
- the function of the temperature controller; see separate manual 2-5.1.2-MD.

21.3 FLOW ALARM

The gas flow is adjusted by the flow meter FM1 and observed by an optical bi stable flow alarm sensor. The sensor can be moved on the flow meter glass and adjusted to any alarm value. The sensor recognises the variation in direction of the ball in the flow meter. If the ball passes the alarm limit in the direction of increasing flow rates the alarm is eliminated. In opposite direction alarm is released.

Possible reasons for flow alarm are:

- period till the CSS is ready for operation;
- sample gas pump is out of order;
- the flow rate is adjusted below the alarm limit;
- cooler alarm/temperature controller alarm; the 3-way solenoid valve is automatically closed and the sample gas pump is switched out of order;
- liquid alarm; the 3-way solenoid valve is automatically closed and the sample gas pump is switched out of order;
- the tubes are blocked so gas flow isn’t possible;

The following steps are possible to eliminate the flow alarm:

- check if the adjusted flow rate is above the alarm limit;
- check if the sample pump is switched on (see fig.2, LED green);
- check if there is no other alarm; correction see 21.2 and 21.4
- check if the gas can passes the gas tubes.

If the alarm can not be eliminated in spite of the above mentioned steps the electronic card LFC-2 has to be checked.
21.4 LIQUID ALARM

The M&C liquid sensor alarm unit LA1 is useful whenever liquid can damage a gas analyser system. This may occur if a gas dryer unit or a drain system fails.

The M&C LA1 liquid sensor is constructed in the following way that any droplets of liquid in the sample gas are attracted under gravity to the sensor surface and even the smallest liquid droplets trigger a sure and rapid alarm.

In the event of an alarm the liquid alarm sensor switches the sample gas pump off and closes the 3-way solenoid valve for sample gas.

To eliminate the alarm carry out the following steps:

- switch the CSS off;
- disconnect the line to the analyser;
- open the sample gas inlet;
- check the hoses of the condensate pump SR25.1; if they are defective change hoses;
- switch power supply on and check the condensate pump if it works;
- let the condensate pump work, until no more condensate is conveyed;
- dismount the LA sensor;
- dry the sensor;
- remove the filter element from the gas filter FPF-0,1GF;
- before starting the CSS with sample gas the gas ways must be dry. For this the CSS must be sweeping about 1 hour with ambient air. The filter element remains dismounted and the sample gas inlet and outlets remain open, disconnected from the system.
- install dry or new filter element.

If the elimination of the alarm is not possible in spite of the above mentioned steps you should check the following components:

- gas cooler;
### SPARE PART LISTS

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

#### 19“ GAS CONDITIONING UNIT TYPE CSS...

(C) consumable parts, (R) recommended spare parts, (S) spare parts

<table>
<thead>
<tr>
<th>Artikel-Nr.</th>
<th>Bezeichnung</th>
<th>C/R/S</th>
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<tr>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
<td><strong>Cooler ECP-1000/ECP-2000, ECP-3000: 10 (s. Fig.4)</strong></td>
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<tr>
<td>93 K 1030</td>
<td>Jet-Stream heat exchanger ECP-1000/2000G 90°</td>
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<td>93 K 0150</td>
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<td>90 K 0115</td>
<td>Thermal conductivity paste, 50g</td>
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<td>93 K 0020</td>
<td>Power supply board compl. for ECP1000-3000</td>
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<td>93 K 0530</td>
<td>ECP-1000 Netzteilplatine kompl.</td>
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<td>93 K 0030</td>
<td>Fine fuse 0,8AT 5x20 ECP-1000</td>
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<td>93 K 0540</td>
<td>Fuse 5 X 20, 1,6 AT for ECP-2000/3000</td>
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<td>93 K 0050</td>
<td>ECP-1000 fan 12V DC</td>
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<td>93 K 0006</td>
<td>Diode ECP-1000</td>
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<tr>
<td>90 K 2010</td>
<td>Rectifier for cooler type ECP1000-3000</td>
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<td>90 K 2020</td>
<td>Power transistor BUZ11 for ECP1000-3000</td>
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<td>93 K 0040</td>
<td>PT-100 temperature sensor</td>
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<td>93 K 0045</td>
<td>ECP-1000 peltier element 4/4</td>
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<td>93 K 0520</td>
<td>ECP-2000/3000 peltier element 6/6</td>
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<td>90 K 0145</td>
<td>ECP-alarm relay DSP1</td>
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<td><strong>Peristaltic pump SR25: 1.2.2 (s. Fig.3)</strong></td>
<td><strong>Peristaltic pump SR25: 1.2.2 (s. Fig.3)</strong></td>
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<td><strong>Peristaltic pump SR25: 1.2.2 (s. Fig.3)</strong></td>
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<tr>
<td>90 P 1007</td>
<td>SR25 pump hose with PVDF tube connectors DN 4/6mm</td>
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<tr>
<td>90 P 1020</td>
<td>Driver complete for peristaltic pump SR25.1</td>
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<tr>
<td>90 P 1010</td>
<td>Set contact spring for SR25.1 (4 pcs.)</td>
<td>R</td>
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<tr>
<td>90 P 1045</td>
<td>Contact pulley(1 pc.) for (2 pcs./pump required)</td>
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<tr>
<td>90 P 1050</td>
<td>Conveying belt for SR25</td>
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<tr>
<td>90 P 1025</td>
<td>S-bolt</td>
<td>S</td>
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<tr>
<td>01 P 1000</td>
<td>Peristaltic pump complete, 230/115V 50/60Hz</td>
<td>R</td>
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<tr>
<td><strong>3-Way solenoid valve: 14 (s. Fig.4)</strong></td>
<td><strong>3-Way solenoid valve: 14 (s. Fig.4)</strong></td>
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<td><strong>3-Way solenoid valve: 14 (s. Fig.4)</strong></td>
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<tr>
<td>90 K 6040</td>
<td>3-Way solenoid valve, 230V f. CSS(/C)/CSS-3(/C)</td>
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<tr>
<td>90 K 6041</td>
<td>3-Way solenoid valve, 115V f. CSS(/C)/CSS-3(/C)</td>
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<tr>
<td><strong>2-Way solenoid valve: 16 (s. Fig.4)</strong></td>
<td><strong>2-Way solenoid valve: 16 (s. Fig.4)</strong></td>
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<td><strong>2-Way solenoid valve: 16 (s. Fig.4)</strong></td>
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<tr>
<td>90 G 3000</td>
<td>2/2-way solenoid valve 6011 for CSS 230V 50Hz</td>
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<tr>
<td>90 G 3005</td>
<td>2/2-way solenoid valve 6011 for CSS, 115V for CSS(/C) and CSS-3(/C)</td>
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<tr>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
<td><strong>Universal filter FFP-0.1: 1.2.1 (s. Fig.3)</strong></td>
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<td>90 F 0009</td>
<td>Filter element type F-0,1GF50 0,1µm</td>
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<td>90 F 0118</td>
<td>Filter glass F-45</td>
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<td>90 F 0044</td>
<td>Viton-O-ring, 35 for FPF-0.1</td>
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<td>90 F 0095</td>
<td>PVDF filter element clamp FPF-GF</td>
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</table>
### 19“ Gas Conditioning Unit Type CSS...

(C) consumable parts, (R) recommended spare parts, (S) spare parts

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<tr>
<th>Part</th>
<th>Description</th>
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<td><strong>Flowmeter FM40: 1.2.4 (s. Abb.3)</strong></td>
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<td>90 A 0015</td>
<td>Flow meter glass for FM40 range 7-70 l/h air for version CSS... and CSS.../C</td>
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<td>94 F 0015</td>
<td>Flow meter glass for FM40 range 25-250 l/h air for version CSS... and CSS.../C</td>
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<td>90 A 0018</td>
<td>Viton O-ring 9 für flow meter glass</td>
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<td>09 F 4000</td>
<td>Flow meter FM40 7-70l/h (compl.), for versions CSS... und CSS.../C</td>
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<td>90 E 1000</td>
<td>O-ring, Viton - 14, LA1</td>
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<td>90 E 1010</td>
<td>Ring, PVDF - 16, LA1</td>
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<td><strong>Fine-wire fuse CSS:</strong></td>
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<td>90 G 3010</td>
<td>Fuse 5 X 20mm, 2 AT for CSS</td>
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<td><strong>Internal tubing:</strong></td>
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<td>05 V 6600</td>
<td>Ferrule 4/6 PV</td>
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<td>05 V 6605</td>
<td>Union nut M10-4/6 PV</td>
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<td>02 B 1000</td>
<td>PTFE- tube NW 4/6, quantity per meter</td>
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<td>10 T 1000</td>
<td>Hose cutter</td>
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<td><strong>Diaphragm pump type N3 KPE/KP18; N5 KPE/KP18</strong></td>
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<td>90 P 2100</td>
<td>Square cap type D3 for N3-N5 KPE, PVDF, 1/8”i</td>
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<td>90 P 2120</td>
<td>Membrane type S3, Viton/PTFE for N3-N5KPE</td>
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<td>90 P 2115</td>
<td>O-Ring type O3, for N3-N5 KPE, 1pc., Viton, (2 pcs./pump)</td>
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<td>90 P 2110</td>
<td>Valve reed type V3, for N3-N5 KPE, 1 pc, material: Viton</td>
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<td>90 P 2105</td>
<td>Spacer type Z3, for N3-N5 KPE, material: PVDF</td>
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<td><strong>Diaphragm pump type N9 KPE/KP18</strong></td>
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<td>90 P 2200</td>
<td>Square cap type D9 for N9 KPE, PVDF, 1/8”i</td>
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<td>90 P 2220</td>
<td>Diaphragm type S9, for N9 KPE, material: Viton/PTFE</td>
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</table>
23 APPENDIX

- Pin assignment for external drive of the CSS

- Circuit diagram gas conditioning CSS, drawing number: 2443-5.01.5;

- CSS wit 4 x span solenoid valves, drawing number: 2443-5.03.0;

For further product documentation, please see our internet catalogue:
www.mc-techgroup.com

- Instruction manual electric gas cooler ECP 1000/2000/3000, document: 3.1.1-ME


- Instruction manual diaphragm pump series N, document: 6-1.2.1-ME

- Instruction manual Universal-Filter FPF-01, document: 5-0.1-ME

- Flowmeter FM 40, document: 5-6.1.10

- Optical bi-stable flow alarm sensor FA-1, bi, document: 5-6.10.1

- Liquid alarm sensor LA1..., document: 5-5.1.1

- Temperature controller 70304, document: 2-5.1.3-ME
Figure 14 Pin assignment for external drive of the CSS
Figure 15: Circuit diagram of gas conditioning CSS.
Figure 16  CSS with 4 x span solenoid valves