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1 Application

The Automatic Condensate Outlet CGKA 1 and CGKA 2 is used as a component of the gas conditioning systems of process analysis measurement facilities and systems. Its function is to automatically pump out condensate resulting from e.g. cooling of moist sample gas to below its dew point.

The following versions, all featuring the same functions, have been designed to enable diversified application of the Automatic Condensate Outlet CGKA 1 and CGKA 2.

Automatic Condensate Outlet CGKA 1
It is used as an attachment set for direct attachment to the Electric Sample Gas Cooler CGEK 5 as from Serial No. 1659.

Automatic Condensate Outlet CGKA 2
The version of the instrument is installed in a surface mounting case and is designed for connection to all types of sample gas coolers.

2 Technical Data

2.1 Instrument data

Designation, Design, Mounting, Connections

<table>
<thead>
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<th>CGKA 1</th>
<th>CGKA 2</th>
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<tr>
<td>Catalog No. (Basic version)</td>
<td>23220-4-085607. (+ 1-digit Version No.)</td>
</tr>
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<td>Mounting</td>
<td>Beneath the Electric Sample Gas Cooler CGEK 5</td>
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Degree of protection of case (to DIN 40 050)

- Wheel head with plastic cover: IP 20
- Motor case of the peristaltic pump: IP 32
- Dimensions (See also Figs. 12 and 13):
  - Height: 211 mm (incl. fasteners)
  - Depth: 316 mm (incl. peristaltic pump inlet)

Weight

- Electrical connections: Terminal strip

Cross-section of lead

- Ground: Max. 1.5 mm² (use flexible cable)
  - At protective conductor terminal of the above mentioned terminal strip

Material and color of the case:

- (only for CGKA 2) Polycarbonate; RAL 7032

Materials of the parts carrying sample gas or condensate:

- Verderprene, Norprene, PP (polypropylene), PVC (polyvinylchloride), LLDPE (polyethylene)

Condensate connections:

- Condensate inlet: Hose adapter with 13 mm outer Ø for hose with 9.5 mm inner Ø and 15.9 mm outer Ø
- Condensate outlet: Bulkhead fitting DN 4/6 for hose with 4 mm inner Ø and 6 mm outer Ø

Power supply (mains)

Voltage:

- Alternating voltage, either of the following can be supplied:
  - 220 V +10 %...-15 %; 50 Hz
  - 220 V +15 %...-5 %; 60 Hz
  - 110 V +10 %...-15 %; 50 Hz
  - 115 V +10 %...-10 %; 60 Hz

Power consumption:

- approx. 7 VA

Climatic capabilities

Climatic group:

- 2 Z (corresponding to DIN 40 040, LWE)

Ambient temperature:

For CGKA 1:

- +5...+50 °C in intermittent operation

For CGKA 2:

- +5...+50 °C in intermittent operation and with a run time of max. 5 min and a dead time of approx. 7.5 min (± 40 % cyclic duration factor)
- +5...+40 °C in intermittent operation and with cyclic duration factor > 40 %

For most applications – sample gas dew point ≤ 70 °C and sample gas throughput via the sample gas cooler ≤ 250 l/h – it is enough to set the dead time at 30 min with a run time of 5 min.

Transportation and storage temperature:

- -25...+65 °C

Relative atmospheric humidity:

- Annual average ≤ 75 %
- occasional and slight condensation tolerated
**Mechanical capabilities**

Transport:
- Impact: 30 g; 11 ms
- Vibration: 2 g; ± 0.17 mm; 5...150 Hz

In Operation:
- Vibration: 0.5 g; ± 0.04 mm; 5...150 Hz

**2.2 Measurement data**

Operating modes:
- CGKA 1 and CGKA 2 can be supplied for one of the following intermittent operating modes:
  - **Time controlled**
    - Basic instrument version with external time relay
  - **Demand controlled** (option)
    - Basic instrument version with built-in level controller

Inlet pressure (absolute pressure):
- 0.5...1.5 bar with unpressurized outlet

Outlet pressure (absolute pressure):
- 0.5...1.5 bar with unpressurized inlet

Flow rate:
- 1 l/h ± 10 %, max. 0.4 l/h
  - (10 % cyclic duration factor, demand or time controlled)

Capacity of the condensate collecting vessel (buffer vessel volume):
- With CGKA 1: 3.2 l
- With CGKA 2: 2.2 l

Condensate temperature:
- +1...+70 °C

Viscosity of the condensate:
- Approx. 50...175 Pa·s

Peristaltic pump rotational speed:
- 20 min⁻¹

Peristaltic pump hose (service life):
- As a preventive measure, replace the peristaltic pump hose every 6 months

Gas tightness:
- 0.5...1.5 bar absolute pressure between the pressure and suction side of the peristaltic pump at every setting of the wheel head

Auto-suction pressure (absolute pressure)
- ≤ 0.5 bar

**2.3 Data of the additional modules**

**Level indicator** (option; incorporated in CGKA 1 and CGKA 2)

Status signal "overflow":
- Floating Reed contact (ON Contact)

Rating:
- Direct voltage max. 24 V, max. 1 A

**Time relay** (externally fitted)

Run/dead time setting:
- 0.6 s...60 min

Degree of protection of case (to DIN 40 050):
- Instrument: IP 50, Base: IP 20

Weight:
- Approx. 125 g

Power supply:
- Voltage: direct or alternating voltage, either 12 V...240 V
- Frequency: 40...440 Hz
- Power consumption:
  - Approx. 3 VA

Output:
- Floating relay contact (changeover contact)

Rating:
- Alternating voltage max. 220 V, max. 8 A

**2.4 Note on standards and regulations**

The industrial standards and regulations (DIN, VDE, VDI etc.) as well as the directives, specifications and requirements governing explosion protection (ExEv, EX-RLE, VDE, DIN EN) referred to in this Operating Manual are applicable in the Federal Republic of Germany. When using this device outside the German Federal jurisdiction, the relevant specifications, standards and regulations applicable in the country where the device is used must be observed.
3 Design of the Automatic Condensate Outlet CGKA 1 and CGKA 2

3.1 General design

The Automatic Condensate Outlet CGKA 1 and CGKA 2 comprises:
- a peristaltic pump (1)1 with an electric motor drive,
- a condensate collecting vessel (7) and
- a terminal strip (12).

A level indicator (15) featuring the requisite electronics can be incorporated as an option.

The wheel head (1.1) – pump head – with the peristaltic pump hose (1.2) is located on the front of the instrument and is protected by a detachable, transparent plastic cover (3). This arrangement facilitates swift and simple replacement of the peristaltic pump hose (1.2) (see Section 6.2).

The condensate collecting vessel (7) is designed in such a manner that it can function as a buffer vessel (safety vessel) and can also accommodate increased condensate yield arising in the event of a disturbance.

The peristaltic pump is responsible for emptying the condensate collecting vessel; this is done, depending on the operating mode of the Automatic Condensate Outlet CGKA 1 and CGKA 2 acc. to a set time cycle or as needed (on reaching a maximum level).

The appropriate operating mode – time controlled or demand controlled condensate pumping out – can be selected by the combination "Basic instrument version" plus "Additional module" (= external time relay or built-in level controller) for activating the peristaltic pump motor (2) when ordering the unit (see Section 2.2 and 2.3). These two methods of regulating the cycle duration factor of the peristaltic pump significantly enhance the functional capabilities of the peristaltic pump hose (service life) and peristaltic pump motor.

The peristaltic pump ensures that, at a depression of ≤ 0.5 bar, no ambient air, which would distort the measurement result, is sucked into the process analysis measurement facilities and systems.

With the time control, active, the peristaltic pump conveys condensate and sample gas. Flammable or corrosive gases must then be eliminated in a manner which presents no danger.

3.2 Automatic Condensate Outlet CGKA 1

As already mentioned in Sections 1 and 2.1, this version of the instrument is designed for direct attachment to the Electric Sample Gas Cooler CGEK 5 – namely, as from CGEK 5 of the Serial no. 1569. The unit is mounted to the bottom of the sample gas cooler (see Figs. 4 and 11).

The figures 1 and 12 give an illustration of the design of this version as well as the arrangement of the condensate inlet, peristaltic pump inlet and outlet and condensate outlet.

The peristaltic pump (1) is mounted on the front panel (8). The rating plate (14) is situated above the detachable, transparent plastic cover (3). A recess in the front panel serves as an inspection window (8.1) to check the level of the condensate collecting vessel. The condensate collecting vessel (7) is mechanically connected to the front panel (8) by means of four crosshead screws (13) which are accessible from the front. The terminal strip (12) – and with a built-in level indicator (15) – the "level indicator electronics" circuit board (15.1) are located on the upper side of the condensate collecting vessel (7), behind the front panel (8).

3.3 Automatic Condensate Outlet CGKA 2

As mentioned also in Sections 1 and 2.1, the Automatic Condensate Outlet CGKA 2 designed for connection to all sample gas cooler types is accommodated in a polycarbonate surface-mounting case. Only the wheel head (1.1) with the peristaltic pump hose (1.2) – protected by the detachable, transparent plastic cover (3) – is positioned on the outside of the case lid (9.1), being hence of easy access even with the case closed (see Fig. 2). All the other modules are accessible only after opening the case, i.e. loosening the four crosshead screws (13) and opening the case lid downwards (9.1) (see Fig. 3).

The condensate collecting vessel (7) is installed in the case lower section (9.2). A dummy plug (7.1) closes the aperture in which an indicator level can be fitted into the condensate collecting vessel with demand control of the peristaltic pump.

In addition, there are four holes (10) – 6.1 mm hole Ø – for mounting the unit on a wall in the bottom of the case lower section. On the inside of the case lid (9.1) are located the peristaltic pump motor (2), terminal strip (12) and, with the appropriate equipment, the "level indicator electronics" circuit board (15.1).

The cables (power supply, level indicator status signal) are routed via the Pg 9 diaphragm nipple (11; 11a) on the right side of the case lid.

Figs. 2 and 3 show the layout of the condensate inlet, peristaltic pump inlet and outlet as well as the condensate outlet.

The rating plate (14) is situated to the right on the outside of the case lower section.

1 The numbers in parentheses are identical to the reference made in the diagrams of the Operating Manual.
2 The expressions "right", "left" etc. are always meant from the point of view of a person looking at the front of the case.
Fig. 1 Automatic Condensate Outlet CGKA 1 with level indicator

1. Peristaltic pump
1.1 Wheel head (pump head)
1.2 Peristaltic pump hose
1.3 Hose clamp
1.4 Antikink spring (coiled spring)
1.5 Knurled nut with clamp ring, "peristaltic pump inlet"
1.6 Knurled nut with clamp ring, "peristaltic pump outlet"
1.8 Wheel head springs
1.10 Wheel head roller
1.11 Wheel head pin

3 Detachable, transparent plastic cover
4 Condensate inlet; hose adapter with 13 mm outer φ
8 Condensate outlet; bulkhead fitting DN 4/6 for hose with 4 mm inner φ and 6 mm outer φ
6.2 Angled screw fitting DN 4/8; "peristaltic pump inlet"

7 Condensate collecting vessel (buffer vessel)
8 Front panel
8.1 Inspection window for checking the level of the condensate collecting vessel
12 Terminal strip (hidden)
13 Crosshead screw
14 Rating plate (with power supply specifications, Serial and Version Nos.)
15 Level indicator (option) (hidden)
Fig. 2 Automatic Condensate Outlet CGKA 2 without level indicator, closed

1 Peristaltic pump
1.1 Wheel head (pump head)
1.2 Peristaltic pump hose
1.3 Hose clamp
1.4 Antikink spring (coiled spring)
1.5 Knurled nut with clamp ring, "peristaltic pump inlet"
1.6 Knurled nut with clamp ring, "peristaltic pump outlet"
1.8 Wheel head springs
1.10 Wheel head roller
1.11 Wheel head pin
3 Detachable, transparent plastic cover
4 Condensate inlet; hose adapter with 13 mm outer ø for hose with 9.5 mm inner ø and 15.9 mm outer ø (hidden)
5 Condensate outlet; bulkhead fitting DN 4/6 for hose with 4 mm inner ø and 6 mm outer ø
9.1 Case lid
9.2 Case lower section

11 Pg 9 diaphragm nipple for routing the power supply line
13 Crosshead screw
14 Rating plate (with power supply specifications, Serial and Version Nos.)
Fig. 3  Automatic Condensate Outlet CGKA 2 without level indicator, opened

2  Peristaltic pump motor
4  Condensate inlet; hose adapter with 13 mm outer φ for hose with 9.5 mm inner φ and 15.9 mm outer φ
6.1 Bulkhead fitting DN 4/6 'peristaltic pump inlet'

7  Condensate collecting vessel (buffer vessel)
7.1 Dummy plug; connection for level indicator (option)
7.2 Connecting hose "condensate collecting vessel" - "peristaltic pump inlet"

9.1 Case lid
9.2 Case lower section
10 Hole for wall mounting (6.1 mm hole φ)
11 Pg 9 diaphragm nipple for routing the power supply line
12 Terminal strip
4 Mounting and connecting instructions

4.1 Unpacking, initial equipment supplied

Please bear the following points in mind when unpacking the instrument:

The Automatic Condensate Outlet CGKA 1 and CGKA 2 is packed fully assembled by the manufacturer. Remove the unit carefully from the packing material used for transportation and clean it.

The initial equipment supplied with the Automatic Condensate Outlet CGKA 1 includes a mounting set containing the entire mounting and connecting material required for attachment to the Electric Sample Gas Cooler CGEK 5.

4.2 Selecting the installation site; layout of the connections

Since dripping water can form on the unit the Automatic Condensate Outlet CGKA 1 and CGKA 2 must not be installed above modules featuring a degree of protection of case < IP 30.

The terminals of the instrument are arranged as follows (see also Figs. 1, 2, 3, 4, 11, 12 and 13):

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<tr>
<th>Terminals</th>
<th>CGKA 1</th>
<th>CGKA 2</th>
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<tbody>
<tr>
<td>Condensate inlet (4) – Hose adapter 13 mm outer Ø –</td>
<td>Instrument upper side; center, diagonally towards the back; section (9.2) rear left</td>
<td></td>
</tr>
<tr>
<td>Condensate outlet (5) – Bulkhead fitting DN 4/6 –</td>
<td>Instrument front; horizontal left</td>
<td></td>
</tr>
<tr>
<td>Power supply, if applicable level indicator status signal – terminal strip (12) –</td>
<td>Instrument upper side; routed in all cases via instrument upper side; case lid (9.1); routed in all cases via Pg9 diaphragm nipple (11; 11a) in the case lid; outer right</td>
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Outlet CGKA 1. The enclosed mounting set contains the necessary fastening and connecting material.

Mount, connect and install the connection lines in the following order (see also Figs. 1, 4, 11 and 12):

- Route the power supply line, which has not yet been connected to the mains – the level indicator status signal line also, if applicable – via the upper side of the unit to the terminal strip (12) and connect there acc. to the terminal assignment which has been laid down (see Section 4.4 as well as Figs. 1, 4, 5 and 6).
- Provide appropriate strain relief for these cables.
- To the condensate discharge pipe of the heat exchanger of the Electric Sample Gas Cooler CGEK 5 connect the connecting hose (21) – 9.5 mm inner Ø, 15.9 mm outer Ø – leading to the condensate inlet (4) of the Automatic Condensate Outlet CGKA 1 and secure it with 1 hose clamp (23). The length of this connecting hose (21) depends on whether the Automatic Condensate Outlet CGKA 1 is to be mounted at the left or right to the underside of the Electric Sample Gas Cooler CGEK 5 (see also Figs. 4 and 11).
- Left mounting – Connecting hose length 125 mm
- Right mounting – Connecting hose length 105 mm
- Then secure the Automatic Condensate Outlet CGKA as shown in Fig. 4 to the 4 locations provided for this purpose on the Electric Sample Gas Cooler CGEK 5.
- The connecting hose (21) which has already been connected to the condensate discharge pipe of the heat exchanger of the CGEK 5 in now pulled via the condensate inlet (4) of the Automatic Condensate Outlet CGKA 1 – hose adapter with 13 mm outer Ø and secured with 1 hose clamp (22).
- Connect the hose with 4 mm inner Ø and 6 mm outer Ø for condensate discharge to the condensate outlet (5) of the Automatic Condensate Outlet CGKA 1 – bulkhead fitting DN 4/6.
- Finally, fix on the side of the condensate collecting vessel the two devices for strain relief (see Fig. 4) for the above-mentioned discharge hose.

Since the Electric Sample Gas Cooler CGEK 5 is designed for a maximum of 2 sample gas paths, 2 CGKA 1 units can also be attached to the underside of the sample gas cooler (see Fig. 11).

4.3 Mounting the unit and installing the connection lines

4.3.1 Automatic Condensate Outlet CGKA 1

As frequently mentioned, this version of the instrument is designed for direct attachment to the bottom of the Electric Sample Gas Cooler CGEK 5.

Electric sample gas coolers as from Serial No. 1569 can be retrofitted or upgraded with the Automatic Condensate

---

1 The expressions “right”, “left” etc are, always meant from the point of view of a person looking at the front of the case.
4.3.2 Automatic Condensate Outlet CGKA 2

This version of the instrument which is designed for connection to all types of sample gas coolers is installed in a surface-mounting case and can be mounted on any vertical wall, which is not subject to vibrations, or in an analyzer cabinet. Here it is sufficient to align the unit by eye.

Mount, connect and install the connection lines in the following order (see also Figs. 2, 3 and 13):

- Undo 4 crosshead screws (13) on the front of the case lid (9.1).
- Now open downwards the case lid (9.1) which is connected via an outer joint with the case lower section (9.2).
- Now 4 holes (10) used for wall mounting – 6.1 mm hole Ø – become visible on the bottom of the case lower section (9.2).
- Using 4 suitable screws, mount the instrument.
- Route the power supply line, which has not yet been connected to the mains, via the Pg 9 diaphragm nipple (11), if applicable also the level indicator status signal line via a second, Pg 9 diaphragm nipple (11 a), to the terminal strip (12) and connect there acc. to the terminal assignment which has been laid down (see Section 4.4 as well as Figs. 2, 3, 5 and 6).

- Provide appropriate strain relief for these cables.
- Then open the case lid (9.1) upwards and close the surface mounting case again with the 4 crosshead screws (13).
- Finally connect the condensate inlet (4) of the Automatic Condensate Outlet CGKA 2 – hose adapter 13 mm outer Ø – with a hose with 9.5 mm inner Ø and 15.9 mm outer Ø to the condensate outlet of the sample gas cooler intended for this unit.
- Secure the ends of the hose connection with appropriate hose clamps.
- Connect hose with 4 mm inner Ø and 6 mm outer Ø for condensate discharge to the condensate outlet (5) of the Automatic Condensate Outlet CGKA 2 – bulkhead fitting DN 4/6.
4.4 Connecting the power supply

4.4.1 General instructions for connecting the power supply

The power supply must always be the last connection made, with the 2-pole on/off switch being switched off.

Please consult the rating plate (14) for the mains voltage, mains frequency and power consumption applicable for the unit; see Figs. 1 and 2 for the location of the rating plate.

Neither version of the Automatic Condensate Outlet CGKA 1 and CGKA 2 feature a built-in on/off switch. For safety reasons and to facilitate maintenance of the entire process analysis measurement facilities and systems it is necessary to install the power supply line of the Automatic Condensate Outlet CGKA 1 and CGKA 2 such that it can be switched off from the supply voltage; i.e. route the power supply line before the instrument terminals via an external 2-pole switch or use mains cable with a grounding connector. (This external switch or grounding connector is not included in the equipment supplied; the customer must provide it).

Use flexible cables with a cross-section of max. 1.5 mm² for connecting – (see also Section 2.1).

When selecting the lead material as well as when installing and connecting the power leads and leads for status signal generation local requirements such as VDE 0100 "Specifications for installation of Power Current Systems with Rated Voltages up to 1000 V" are to be observed.

4.4.2 Automatic Condensate Outlet CGKA 1 and CGKA 2, time controlled via an external time relay

These instrument versions are connected to the power supply (mains) via terminals L and N of the terminal strip (12) – see Figs. 3 and 5. See Section 4.4.4 for connection of the grounding conductor terminal.

Laying the cable

On laying the cables to the terminal strip (12) in these instrument versions bear in mind that the 3-conductor power supply line is routed first under the mounting panel of the terminal strip (12) in CGKA 1 from the strain relief clamp on the upper side of the condensate collecting vessel (7) in CGKA 2 from the Pg 9 diaphragm nipple (11) on the right side of the case lid (9.1) and only then are the three conductors connected to the respective terminals (see Fig. 3). In both versions mount a hose clamp at the terminals strip (12) or Pg 9 diaphragm nipple (11) to provide strain relief for the cables.

4.4.3 Automatic Condensate Outlet CGKA 1 and CGKA 2 demand controlled via a built-in level indicator

The instrument versions featuring demand control are also connected to the power supply (mains) via terminals L and N of the terminal strip (12) – see Fig. 6. In addition, these units have an alarm output, namely terminals 9 and 10. The floating reed contact of the level indicator – see Fig. 7 – for generating the status signal "overflow of the condensate collecting vessel" is routed to the outside via these terminals. See also Section 4.4.4 for connection of the grounding conductor terminal.

**Fig. 5** Electric connection diagram of the Automatic Condensate Outlet CGKA 1 and CGKA 2 without level indicator (Basic instrument version)

2 Peristaltic pump motor
12 Terminal strip
16 2-pole external switch for the power supply (on/off switch)
C2 Motor start-up capacitor
(see also Section 4.4.3 and Table 1)

**Fig. 6** Electric connection diagram of the Automatic Condensate Outlet CGKA 1 and CGKA 2 with level indicator

2 Peristaltic pump motor
12 Terminal strip
15 Level indicator
15.1 "Level indicator electronics" circuit board
16 2-pole external switch for the power supply (on/off switch)
C2 Motor start-up capacitor
(see also Section 4.4.3 and Table 1)
Laying the cable

On laying the cables to the terminals in these instrument versions bear in mind that both the 3-conductor power supply line and the 2-conductor level indicator status signal line

in CGKA 1 are routed first under the mounting panel of the terminal strip (12) from the two strain relief clamps on the upper side of the condensate collecting vessel (7) and only then are the conductors connected to the respective terminals;

in CGKA 2 they are routed from both Pg 9 diaphragm nipples (11; 11a) on the right of the case lid (3.1) directly to the terminal strip (12) and the conductors are connected to the respective terminals.

In both versions mount a hose clamp at the terminals strip (12) or Pg 9 diaphragm nipple (11; 11a) to provide strain relief for the cables.

“Level indicator electronics” circuit board

Fig. 7 shows the circuit diagram of the “Level indicator electronics” circuit board required for the activation (demand control) of the peristaltic pump motor which is governed by the condensate yield. The capacitance of the motor start-up capacitor C 2 is dependent on the mains voltage and mains frequency (see Table 1). A motor start-up capacitor C2 whose capacitance value is adapted to the mains voltage and mains frequency (see Table 1) as specified in the ordering information is supplied with the peristaltic pump motor in the instrument version without a level indicator (see Fig. 5 for connection). In the Automatic Condensate Outlet CGKA 1 and CGKA 2 with level indicator it is soldered onto the “Level indicator electronics” circuit board.

<table>
<thead>
<tr>
<th>Mains voltage</th>
<th>Mains frequency</th>
<th>Capacitance of C 2</th>
<th>Resistor values</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 V</td>
<td>50 Hz</td>
<td>0.82 µF/400 V AC</td>
<td>8.25 kΩ</td>
</tr>
<tr>
<td>115 V</td>
<td>60 Hz</td>
<td>0.68 µF/400 V AC</td>
<td>8.25 kΩ</td>
</tr>
<tr>
<td>220 V</td>
<td>50 Hz</td>
<td>0.22 µF/220 V AC</td>
<td>30.1 kΩ</td>
</tr>
<tr>
<td>220 V</td>
<td>60 Hz</td>
<td>0.18 µF/220 V AC</td>
<td>30.1 kΩ</td>
</tr>
</tbody>
</table>

Table 1 Capacitance values of the motor start-up capacitor C2 as a function of the mains voltage and frequency

4.4.4 Grounding

All versions of the Automatic Condensate Outlet CGKA 1 and CGKA 2 (see Sections 4.4.2 and 4.4.3) are to be grounded acc. to the applicable regulations. For this purpose, the protective conductor terminal located on the terminal strip (12) beside the terminals for the power supply is used (see Figs. 3, 5, and 6).

Before any other connection is made the protective ground terminal shall be connected to a protective conductor.

If the power supply is routed via a mains cable with grounding connector, please bear the following points in mind:

- The mains connector may be fitted only into a socket with a ground contact. The protective effect must not be negated by the use of an extension lead without a protective conductor.

5 Commissioning

The following applies for all versions of the Automatic Condensate Outlet CGKA 1 and CGKA 2:

Before switching on the apparatus make sure it is set to the voltage of the power supply.

Never operate the unit without the protective flap – transparent plastic cover (3), secured on the wheel head case (1.0) (see Figs. 1 and 2) – above the wheel head (1.1).

The peristaltic pump (1) produces an autosuction effect.

5.1 Automatic Condensate Outlet CGKA 1 and CGKA 2, time controlled via an external time relay

The run and dead time of the peristaltic pump (1) can be set between 0.5 s and 60 min using the time relay (Catalog No: 90805-4-0741 607) which is separate from the Automatic Condensate Outlet CGKA 1 and CGKA 2.

For the majority of applications – sample gas dew point ≥ 70 °C and sample gas throughput via the sample gas cooler ≤ 250 l/h – a dead time setting of 30 min is sufficient with a run time of 5 min (≥ 14.3 % cyclic duration factor). See Section 2.3 for further technical data of the time relay.

This instrument version is ready for operation once the power supply is switched on – by actuating the external 2-pole on/off switch (16) or fitting the mains connector into the grounding socket; the “switch ON and OFF cycle of the peristaltic pump” specified by the time relay begins.
5.2 Automatic Condensate Outlet CGKA 1 and CGKA 2, demand controlled via a built-in level indicator

In this instrument version the run and dead time of the peristaltic pump (1) is controlled on demand by the sensors of the level indicator (15) installed in the condensate collecting vessel (7) and those of the post connected electronics "Level Indicator electronics" circuit board (15.1).

The unit is ready for operation once the power supply is switched on (just as described in Section 5.1), the "Switch ON and OFF cycle of the peristaltic pump" determined by the condensate yield begins.

6 Maintenance

6.1 General maintenance instructions

The apparatus shall be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

Any adjustment, maintenance and repair of the opened apparatus under voltage shall be avoided as far as possible and, if inevitable, shall be carried out by a person who is aware of the hazard involved.

6.2 Replacing the peristaltic pump hose

The following measures and steps are also summarized by the manufacturer in the Service Information 43/23-671 EN "Automatic Condensate Outlet CGKA 1 and CGKA 2: Replacing the peristaltic pump hose". This Service Information is enclosed with each replacement hose.

Replace the peristaltic pump hose (1.2) – see Figs. 1, 2 and 8 – every 6 months, as described in Section 2.2, irrespective of the actual degree of wear of the hose so as to ensure reliable and correct operation of the Automatic Condensate Outlet CGKA 1 and CGKA 2.

Only a replacement hose of the type and size described in Section 6.2.1 and of the Catalog No. given there may be used.

Tools required for replacing the peristaltic pump hose:
- Hose cutter or scissors,
- Slide gauge,
- Measuring tape or folding rule (1 m length),
- Screwdriver.

Switch off the power supply of the instrument before replacing the peristaltic pump hose.

6.2.1 Technical data of the peristaltic pump hose or the replacement hose

Designation:
Replacement hose for peristaltic pump
Catalog No:
23205-4-0001 640
Dimensions:
Hose length: approx. 260 mm
Inner Ø: 3.2 mm
Outer Ø: 6.4 mm
Material and color:
Verderprene; beige

6.2.2 Dismantling the old peristaltic pump hose

The various steps are illustrated in Figs. 1, 2, 3, and 8.

- Remove the transparent plastic case (3) over the wheel head (1.1) from the wheel head case (1.0) by carefully pressing apart its triangular-shaped hinge lugs at each side. This grants access to the wheel head (1.1) – pump head – and peristaltic pump hose (1.2).

- Now loosen the two knurled nuts with clamp rings "peristaltic pump inlet" (1.5) and "peristaltic pump outlet" (1.6).

- Remove the peristaltic pump hose (1.2) from the bulkhead fittings DN 4/6 "condensate outlet" (5) in both instrument versions and remove "peristaltic pump inlet" (6.1) in the CGKA 2 or from the angled screw fitting DN 4/6 "peristaltic pump inlet" (6.2) in the CGKA 1.

- Then detach the peristaltic pump hose (1.2) from the two hose clamps (1.3) beneath the wheel head (1.1).

- By carefully turning manually and clockwise the wheel head (1.1) remove and withdraw the peristaltic pump hose (1.2).

- Then remove the above-mentioned knurled nuts (1.5; 1.6), together with their clamp rings and antikink springs (1.4) – coiled springs.

6.2.3 Checking the wheel head

Figs. 8, 9 and 10 illustrate the individual steps.

- By moving the wheel head (1.1) to and fro in all directions, check the extent of wear at the sliding bearing of the peristaltic pump shaft (gear driven shaft) and at the bearings of the gear drive shaft – rollers (1.10). Such a degree of wear can occur after an intermittent cyclic duty factor of the Automatic Condensate Outlet CGKA 1 and CGKA 2 of several 1000 hours of operation; it can lead to a reduction of the flow rate, to resusction of condensate and suction of infiltrated air owing to the peristaltic pump hose (1.2) being pressed together too little.
6.2.4 Fitting the new peristaltic pump hose

Fig. 8 illustrates the various steps.

- Remove replacement hose (3.2 mm inner Ø, 6.4 mm outer Ø) from its original packing material (spare parts bag).

- Using a fiber pen or ballpoint pen, make line marks "A", "B" and "C" according to the distances shown in Fig. 8, on the replacement hose.

- By turning manually and clockwise the wheel head (1.1) now insert this marked, new peristaltic pump hose acc. to Fig. 8 into the hose bed – (124 + 1) mm – in such a manner that the line marks (1.2S) coincide in the following manner:
  - "A" with the lower edge of the wheel head case (1.0);
  - "B" with the upper edge of the hose clamp (1.3) – inlet side of the peristaltic pump –;
  - "C" with the upper edge of the hose clamp (1.3) – outlet side of the peristaltic pump –.

The hose must follow the contours of the hose bed and must lie in the hose bed without tightening or waves.

- Remeasure the determined and marked distance "peristaltic pump hose beginning" (1.2A) – "lower edge wheel head case" (line mark "A") (60 ± 1 mm).

- Screw the newly inserted peristaltic pump hose (1.2) with the inlet and outlet hose clamps (1.3).

- Now push via the ends of the replacement hose the antikink springs (1.4), which were removed when dismantling the old peristaltic pump hose, as well as the knurled nuts with clamp rings "peristaltic pump inlet" (1.5) and "peristaltic pump outlet" (1.6). The antikink springs (1.4) must strike against the hose clamps (1.3).

- Then slide the ends of the new peristaltic pump hose (1.2) up to the limit stop into the bulkhead fittings DN 4/6 "condensate outlet" (5) – in both instrument versions – and "peristaltic pump inlet" (6.1) in the CGKA 2 or in the angled screw fitting DN 4/6 "peristaltic pump inlet" (6.2) in the CGKA 1.

- Tighten both knurled nuts with the clamp rings "peristaltic pump inlet" (1.5) and "peristaltic pump outlet" (1.6).

- Conduct the following final checks:
  - The line marks "A", and "B" and "C" must be in line with the lower edge of the wheel head case (1.0) or with the upper edge of the hose clamps (1.3).
  - With the Automatic Condensate Outlet CGKA 1 and CGKA 2 switched on, the small rollers of the wheel head (1.1) of the peristaltic pump must barely track. (Make bright line marks on these rollers for checking purposes.)

6.2.5 Checking the wheel head distance; setting the prestressing of the wheel head springs

Figs. 9 and 10 illustrate the individual steps.

- Turn wheel head (1.1) manually and clockwise to the position shown in Fig. 9.

- Using an appropriate measuring instrument, e.g. a slide gauge, measure the distance "s" – see Fig. 9 – above the wheel head spring (1.8) which is defined by the setting of its prestressing.
Then, by turning the wheel head (1.1) further manually and clockwise, place it in the position shown in Fig. 10. In this position the roller (1.10) of the wheel head is not in contact with the peristaltic pump hose (1.2).

In this position, remeasure the distance "s" above the wheel head spring (1.8) which has now been "relaxed". The distance "s" should now be greater by (0.5 ± 0.1 mm) than in the position (= operating range of the roller (1.10) shown in Fig. 9; i.e. the peristaltic pump hose is pressed together with a force corresponding to the prestressing set for the wheel head spring).

If this remeasurement produces another result for the distance, correct the distance "s" by readjusting the prestressing of the wheel head spring (1.8). This is done with the crosshead screw – setting screw (1.9) see Figs. 9 and 10 – which lies parallel to the wheel head pin (1.11) (there is one setting screw per wheel head spring).

These setting screws (1.9) which are difficult to turn because of a safety mechanism, can be reached with a screwdriver, with the wheel head (1.1) in an appropriate position, through a recess in the bottom of the wheel head case (1.0) between the peristaltic pump inlet and peristaltic pump outlet.

Remeasure the distance "s" and make any necessary corrections of the prestressing of the wheel head spring at both rollers (1.10) of the wheel head (1.1).

Having performed these tasks, turn the wheel head (1.1) further manually and clockwise or place the Automatic Condensate Outlet CGKA 1 and CGKA 2 in operation by switching on the power supply. The rollers (1.10) must visibly stand out from the peristaltic pump hose when turning the wheel head between the two positions shown in Figs. 9 and 10.

6.2.6 Mounting the plastic cover

Figs. 1, 2 and 8 illustrate the various steps.

Carefully press apart the triangular-shaped hinge lugs situated on both sides of the plastic cover (3).

Replace plastic cover (3) on the wheel head case (1.0) and make the hinge lugs engage in their holders.

6.2.7 Final check

Having accomplished all the tasks mentioned in Sections 6.2.2 to 6.2.6, recheck that the peristaltic pump hose (1.2) is laid in such a manner that it is not bent or tightened.

The peristaltic pump hose (1.2) must lie in the center of the hose bed without touching the wheel head pins (1.11) at the side.

7 Troubleshooting

Note

This unit has been built and tested in accordance with DIN 57 411, Part 1/VDE 0411 Part 1 "Safety Measures for Electronic Measurement Equipment", and left the factory in a safe condition. To maintain this state and assure safe operation, the user must follow the instructions and warning remarks contained in this Operating Manual.

Before any other connection is made the protective ground terminal shall be connected to a protective conductor.

Before switching on the apparatus make sure it is set to the voltage of the power supply.

Any interruption of the protective conductor inside or outside the apparatus or disconnection of the protective ground terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited.

When the apparatus is connected to its supply, terminals may be live, and the opening of covers or removal of parts except those which access can be gained by hand is likely to expose live parts.
- The apparatus shall be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

- Any adjustment, maintenance and repair of the opened apparatus under voltage shall be avoided as far as possible and, if inevitable, shall be carried out by a person who is aware of the hazard involved.

- Capacitors inside the apparatus may still be charged even if the apparatus has been disconnected from all voltage sources.

- Whenever it is likely that the protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation. It must be assumed that the protection has been impaired when:
  - the apparatus has visible signs of damage;
  - the apparatus no longer functions;
  - the apparatus has been stored in unfavorable conditions for a long time;
  - the apparatus has been subjected to adverse transport conditions.

### 7.1 Generalities

The faults summarized in Sect. 7.2 are intended to facilitate the location and elimination of faults. If the trouble cannot be eliminated, the customer service should be contacted or the Automatic Condensate Outlet CGKA 1 and CGKA 2 should be returned to the manufacturer for repairs.

If the instrument is returned for repair, the probable causes of the fault and other observations that may shed light on the fault must be described. In the event of complaints, the serial number (and order number if applicable) on the rating plate must be given.

### 7.2 Detection and elimination of faults (check list of fault diagnosis)

1. **The peristaltic pump (1) is functioning but it is not conveying any condensate**

   **Cause**
   Amount to be conveyed is too much.

   **Remedy**
   The peristaltic pump (1) can pump water to a height of approximately 10 meters (as a total of all values working in one direction, example: underpressure at a suction point, suction height at the peristaltic pump inlet, pumping height at the peristaltic pump outlet, counterpressure in the collecting vessel).

   **Cause**
   Suction line has a leak; the peristaltic pump (1) conveys only air.

   **Remedy**
   Eliminate the leak in the suction line.

### Cause
Suction line bent or clogged.

### Remedy
Replace hoses of suction line.

### Cause
Peristaltic pump hose (1.2) torn or stuck.

### Remedy
Replace peristaltic pump hose (1.2) (see Section 6.2). (For Catalog No. see Sect. 6.2.1 or Sect. 9)

### Cause
Peristaltic pump hose (1.2) is not pressed fully together.

### Remedy
Set the wheel head springs (1.8) in such a manner that each roller (1.10) of the wheel head stands out visibly (approx. 1 mm) from the peristaltic pump hose (1.2) when it turns around (see Section 6.2.5).

2. **Peristaltic pump (1) is not functioning**

   **Cause**
   Power supply switched off.

   **Remedy**
   Switch on power supply (see Sections 4.4 and 5).

### Cause
Peristaltic pump (1) is mechanically blocked.

### Remedy
Repair or replace peristaltic pump (1) (see Sect. 9 for Catalog No.)

### Cause in the case of a time controlled CGKA 1 and CGKA 2
The external time relay is functioning at present in the dead cycle.

### Cause in the case of the demand controlled CGKA 1 and CGKA 2
The condensate connecting vessel (7) – buffer vessel – with built-in level indicator (15) is being filled presently.

### Remedy in the case of the time-controlled CGKA 1 and CGKA 2
If necessary, reduce the dead time which has been set.

3. **Condensate congestion up to the sample gas cooler or condensate collecting vessel (7) – buffer vessel – is full.**

   **Cause**
   The built-in level indicator (15) is defective or incorrectly fitted.

   **Remedy**
   Check the electrical connections of the level indicator (15) and "level indicator electronics" circuit board (15.1); replace level indicator if necessary.

### Cause
Peristaltic pump (1) is not functioning.

### Remedy
See point 2 for cause and remedy.
Cause
Suction line and/or condensate discharge from the CGKA 1 and CGKA 2 is bent or clogged.

Remedy
Examine the hoses of the suction line and/or condensate discharge from the CGKA 1 and CGKA 2 and replace if necessary.

8 Packing instructions

Before removing and transporting the Automatic Condensate Outlet CGKA 1 and CGKA 2, close the condensate inlet (4), condensate outlet (5) as well as the Pg 9 diaphragm nipples (11; 11a) - the latter only with the CGKA 2 - with protective covers in order to prevent penetration of dust and other foreign bodies into the interior of the instrument and into the condensate conveying parts.

In addition, take appropriate measures in respect of packaging and covering to safeguard the wheel head case (1.0) with the detachable, transparent plastic cover (3) and the inspection window (8.1) for checking the level of the condensate collecting vessel - the latter only with the CGKA 1.

If the original packing is no longer available, the Automatic Condensate Outlet CGKA 1 and CGKA 2 must be wrapped in paper and packed in a sufficiently large crate lined with shock-absorbing material (excelsior, spun rubber or similar) for transportation. If excelsior is used, the packed layer should at least be 10 cm on all sides.

For overseas shipment the Automatic Condensate Outlet CGKA 1 and CGKA 2 must additionally be sealed airtight in 0.2 mm thick polyethylene together with a desiccant (e.g. silica gel). Furthermore, for this type of shipment the crate should be lined with a double layer of bitumen paper.

These packing instructions also apply when returning the instrument to the manufacturer (e.g. for repair).

9 Spare Parts List

The components listed below can be obtained as spare parts from the spare parts service of the manufacturer by specifying the designation and Catalog No. Whenever ordering spare parts or making complaints, please state the serial and product numbers given on the rating plate.

Note
All spare parts sales are handled by means of EDP; therefore ordering designation (= object), the ordering confirmation, the shipping note and the invoice are subject to the laws of automatic data processing. Verbal deviations in the paperwork of the manufacturer are possible.

The Catalog No. (B-Nr.) is the sole criterion!

<table>
<thead>
<tr>
<th>Serial Nos. in the Figs. 1, 2, 3 and 8</th>
<th>Designation (= object)</th>
<th>Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Peristaltic pump motor and gears for power supply</td>
<td></td>
</tr>
<tr>
<td>220 V, 50 Hz</td>
<td>23205-4-0741141</td>
<td></td>
</tr>
<tr>
<td>220 V, 60 Hz</td>
<td>23205-4-0741142</td>
<td></td>
</tr>
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<td>110 V, 50 Hz</td>
<td>23205-4-0741227</td>
<td></td>
</tr>
<tr>
<td>115 V, 60 Hz</td>
<td>23205-4-0741143</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Replacement hose for peristaltic pump</td>
<td></td>
</tr>
<tr>
<td>Hose length: approx. 260 mm</td>
<td>23205-4-0801640</td>
<td></td>
</tr>
<tr>
<td>Inner Ø: 3.2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer Ø: 6.4 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time relay (externally fitted)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90805-4-0741607</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run/dead time setting: 0.6 s...60 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power supply: Direct or alternating voltage, either 12...240 V</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Level indicator for installation in the CGKA 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23205-4-0742134</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Wheel head parts (pump head parts)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23205-4-0801630</td>
<td></td>
</tr>
</tbody>
</table>
Fig. 11  Dimensional drawing of the Automatic Condensate Outlet CGKA 1 with or without level indicator, attached to the underside of the Electric Sample Gas Cooler CGEK 5.

Attachment of a second CGKA 1 is outlined (dimensions in mm):

4  Condensate inlet; hose adapter with 13 mm outer ∅ for hose with 9.5 mm inner ∅ and 15.9 mm outer ∅
5  Condensate outlet; bulkhead fitting DN 4/6 for hose with 4 mm inner ∅ and 6 mm outer ∅
6.2  Angled screw fitting DN 4/6; "peristatic pump inlet"
7.1  Dummy plug; connection for level indicator (option) or
15  Level indicator (option)
17  Fastening set for mounting to the Electric Sample Gas Cooler CGEK 5 (part of the mounting set)
Fig. 12  Dimensional drawing of the Automatic Condensate Outlet CGKA 1 with or without level indicator (dimensions in mm)
1 Condensate inlet; hose adapter with 13 mm outer φ for hose with 9.5 mm inner φ and 15.9 mm outer φ
2 Condensate outlet; bulkhead fitting DN 4/6 for hose with 4 mm inner φ and 6 mm outer φ
3 Angled screw fitting DN 4/6 "peristaltic pump inlet" for hose with 4 mm inner φ and 6 mm outer φ
4 Power supply line
5 Fastening set for mounting to the Electric Sample Gas Cooler CGEK 5 (part of the mounting set)

Note
The reference numbers used here are identical to those of the original dimensional sheet and refer only to Fig. 12.

Fig. 13  Dimensional drawing of the Automatic Condensate Outlet CGKA 2 with level indicator (dimensions in mm)
1 Condensate inlet, hose adapter with 13 mm outer φ for hose with 9.5 mm inner φ and 15.9 mm outer φ
2 Condensate outlet, bulkhead fitting DN 4/6 for hose with 4 mm inner φ and 6 mm outer φ
3 Bulkhead fitting DN 4/6 "peristaltic pump inlet" for hose with 4 mm inner φ and 6 mm outer φ
4 Pg 9 diaphragm nipple for routing the power supply line
5 Pg 9 diaphragm nipple for the level indicator status signal line
6 Hole for wall mounting (6.1 mm hole φ)
7 External joint

Note
The reference numbers used here are identical to those of the original dimensional sheet and refer only to Fig. 13.