

# LC 108

Installation and operating instructions



## Original installation and operating instructions

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## 1. Symbols used in this document



Warning

If these safety instructions are not observed, it may result in personal injury.



Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

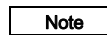


Warning

These instructions must be observed for explosion-proof pumps.



If these safety instructions are not observed, it may result in malfunction or damage to the equipment.



Notes or instructions that make the job easier and ensure safe operation.

## 2. General

The LC 108 controller is designed for the control of pumps in wastewater, water supply and drainage systems.

## Type key:

Example	LC	108	400	3	23	SD
LC = one-pump controller						
108 = type designation						
Phase voltage [V]						
1 = single-phase						
3 = three-phase						
Maximum operating current per pump [A]						
SD = Star-delta starting						



Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

## 2.1 Applications

The LC 108 enables:

- control of one pump based on signals from float switches or electrodes,
- selection of automatic test run during long periods of inactivity (every 24 hours),
- battery back-up in case of mains supply failure (accessory for certain variants),
- starting delay within the range from 0 to 255 sec. (random) after returning from battery operation to mains operation (resulting in an even mains load when several pumping stations are started up at the same time),
- selection of automatic alarm resetting,
- selection of automatic restarting,
- setting of stop delays matching the actual operating conditions,
- indication of liquid level,
- alarm indication of:
  - inadmissibly high liquid level,
  - overload (via motor protection relay),
  - overtemperature (via PTC resistance or thermal switch in motor),
  - wrong phase sequence (only certain variants),
  - mains supply failure (only certain variants),
  - defective float switch, electrode or flow switch,
  - dry running.

As standard, the LC 108 has one alarm output for common alarm. Certain variants have an additional alarm output for separate high-level alarm.

Furthermore, the controller incorporates a buzzer (only certain variants).

## 2.2 Variants

The actual controller type, voltage variant, etc. are stated in the type key on the nameplate situated on the side of the controller cabinet.

The LC 108 is available for either **direct-on-line** starting or **star-delta** starting.

The LC 108 can be connected and set to operation/control in 7 different ways, see sections 4. to 10.:

- Section 4. [Systems with 2 float switches](#). (Electrodes can also be used.)
- Section 5. [Systems with 3 float switches](#). (Electrodes can also be used.)
- Section 6. [Systems with 4 float switches](#). (Electrodes can also be used.)
- Section 7. [Systems with 2 electrodes](#).
- Section 8. [Systems with 3 electrodes](#).
- Section 9. [Systems for filling applications](#).
- Section 10. [Systems for drainage applications](#).

## 3. Location and mounting

### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

The installation must be carried out by authorized personnel in accordance with local regulations.

### 3.1 Location

#### Warning

The LC 108 controller and an EEx barrier, if required, must not be installed in explosion hazard areas.



Only float switches approved for use in explosion hazard areas may be used. The float switches must be connected via an EEx barrier, e.g. Grundfos number 96440300.

The LC 108 can be mounted at ambient temperatures ranging from -30 °C to +50 °C.

Enclosure class: IP65.

When installed outdoors, the LC 108 must be placed in a protective shed or cupboard.

The LC 108 must not be exposed to direct sunlight.

### 3.2 Mounting of LC 108 for direct-on-line starting

Before mounting, remove the transport protectors, if any, from inside the cabinet.

Mount the LC 108:

- on a plane wall surface,
- with the Pg cable entries pointing downwards (additional Pg cable entries, if required, must be fitted in the bottom plate of the cabinet),
- with four screws through the mounting holes in the back plate of the cabinet, see fig. 1. The mounting holes must be bored with a 4 mm bore. Fit the screws into the mounting holes and tighten securely. Fit the plastic caps supplied with the controller on the screws (IP65).

Figure 1 shows the *internal* construction of the LC 108 for direct-on-line starting.

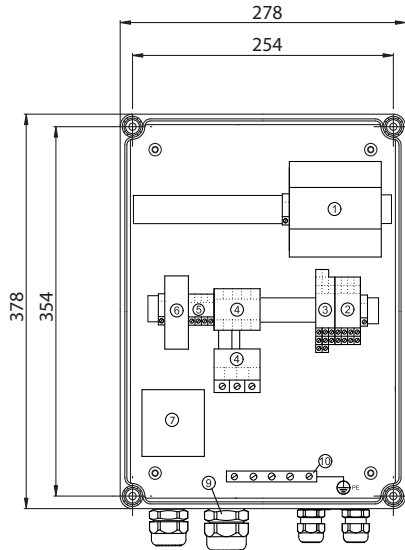


Fig. 1

Figure 2 shows the terminals listed under positions 2 and 3.

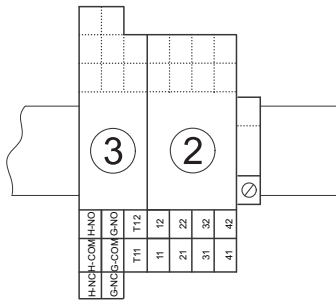


Fig. 2

Key to the symbols in figs 1 and 2:

Pos.	Description
1	Module CU 211.
2	Terminal block for level inputs (11-12, 21-22, 31-32, 41-42). Terminal block with: <ul style="list-style-type: none"> <li>input for the PTC resistance/thermal switch of the motor (T11-T21),</li> </ul>
3	<ul style="list-style-type: none"> <li>output for external alarm device for high-level alarm (H-NC, H-COM, H-NO) (only certain variants),</li> <li>output for external alarm device for common alarm (G-NC, G-COM, G-NO).</li> </ul>
4	Motor protection relay (contacts and thermal relay fitted).
5	Terminal block for electricity supply.
6	Fuse holders for control circuit fuses (1 to 3 depending on voltage/current variant).
9	Pg cable entries.
10	Earth bar (⊕ PE).

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

**Note**

In such cases, it is recommended to use float switches.

**Note**

Cables of up to 100 metres can be connected between the controller and the float switches.

### 3.3 Mounting of LC 108 for star-delta starting

Before mounting, remove the transport protectors, if any, from inside the cabinet.

Mount the LC 108:

- on a plane wall surface,
- with the Pg cable entries pointing downwards (additional Pg cable entries, if required, must be fitted in the bottom plate of the cabinet),
- with four screws through the mounting holes in the back plate of the cabinet, see fig. 3. The mounting holes must be bored with a 4 mm bore. Fit the screws into the mounting holes and tighten securely. Fit the plastic caps supplied with the controller on the screws (IP65).

Figure 3 shows the *internal* construction of the LC 108 for star-delta starting.

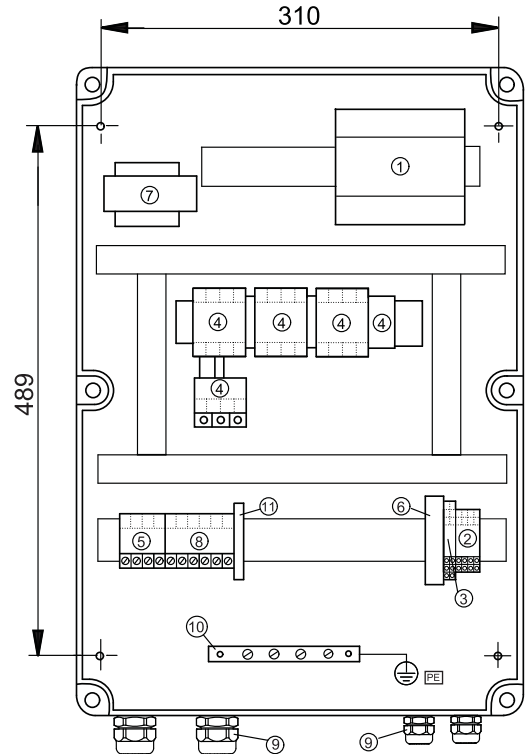


Fig. 3

Figure 4 shows the terminals listed under positions 2 and 3.

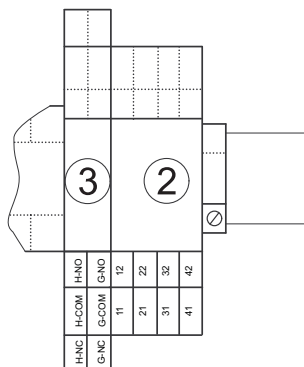


Fig. 4

#### Key to the symbols in figs 3 and 4:

Pos.	Description
1	Module CU 211.
2	Terminal block for level inputs (11-12, 21-22, 31-32, 41-42). Terminal block with: <ul style="list-style-type: none"> <li>output for external alarm device for high-level alarm (H-NC, H-COM, H-NO) (only certain variants),</li> <li>output for external alarm device for common alarm (G-NC, G-COM, G-NO).</li> </ul>
3	Contacts for star-delta starting and motor protection relay (contacts, thermal relay fitted and timing relay).
4	Terminal block for electricity supply.
5	Fuse holders for control circuit fuses (2 or 3 depending on voltage variant).
6	Isolating transformer.
7	Terminal block for connection of pump.
8	Pg cable entries.
9	Earth bar ( $\oplus$ PE).
10	Input for the PTC resistance/thermal switch of the motor (T11-T21).
11	

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

#### Note

In such cases, it is recommended to use float switches.

#### Note

Cables of up to 100 metres can be connected between the controller and the float switches.

## 4. Systems with 2 float switches

### Description (see also page 37 or 38):

The pump is controlled by the liquid level in the pit.

- The pump is started when the float switch, pos. 1, registers liquid.
- When the float switch, pos. 1, no longer registers liquid, the stop delay (can be set) is activated. After expiration of the stop delay, the pump is stopped.
- The upper float switch, pos. 2, activates the high-level alarm.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

## 4.1 Electrical connection

2 float switches, pages 37 and 38.

#### Warning



Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.

Any external voltage connected to the system must be switched off before work is started.

### Fig. 1 on page 37.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting*, 2 float switches.

### Fig. 2 on page 38.

The figure shows all electrical connections required to connect the LC 108 for *star-delta starting*, 2 float switches.



#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.

The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor. Further details can be found in the installation and operating instructions for the pump in question.

#### Warning



Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area.

Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.

Float switches of the same type as Grundfos product number 96003332 or 96003695, i.e. float switches with gold-plated contacts suitable for low voltages and currents (40 V / 100 mA), must be used. All EEx-approved float switches are also suitable.

#### Note

The float switches must be connected as NO contacts, i.e. brown and black leads, when float switches, Grundfos product number 96003332 or 96003695, are used.

### Key to the symbols in fig. 1 on page 37 and fig. 2 on page 38:

Pos.	Description	Terminal number
1	Float switch for start/stop of pump.	11-12
2	Float switch for high-level alarm.	31-32

## 4.2 Setting

2 float switches, pages 37 and 38.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 5.

**Caution** The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of stop delay (switches 5, 6 and 7),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

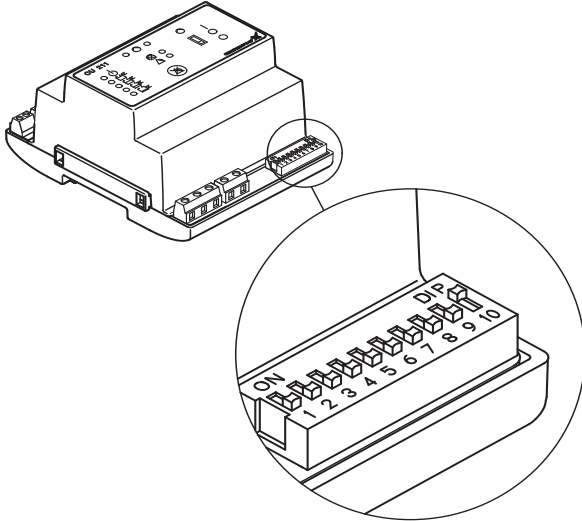


Fig. 5


Set the DIP switch as shown in fig. 5.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

**Note** The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches 1, 2 and 3, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

 This setting determines the actual application type (2 float switches, pages 37 and 38).

- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on *when* the liquid level is sufficiently high.

*Automatic test run carried out every 24 hours.*











After the electricity has been switched on, the pump will start immediately *when* the liquid level is sufficiently high.

*No automatic test run.*

- Switches 5, 6 and 7, stop delay:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **stop delay** is the time from the stop signal is given until the pump is stopped.  
It must be ensured that the pump is not running dry.

0 sec.		60 sec.	
15 sec.		90 sec.	
30 sec.		120 sec.	
45 sec.		180 sec.	

- Switch 8:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



Switch 8 has no function in connection with the actual application (2 float switches, pages 37 and 38), but this setting *must* be maintained!

- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.



At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 4.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.



When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!



At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 4.5).



When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 6.

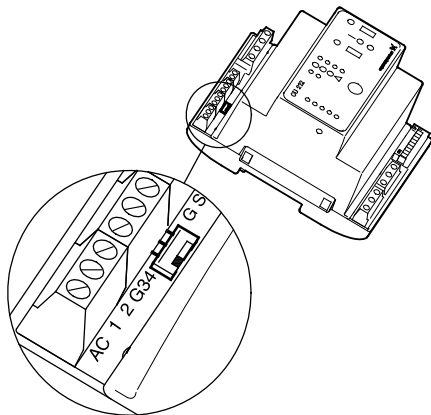


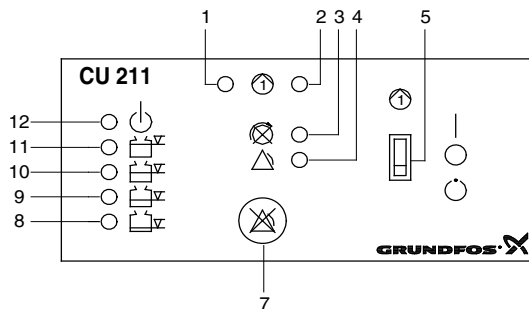
Fig. 6

TM02 5747 3902

**4.3 Control panel**

2 float switches, pages 37 and 38.

Figure 7 shows the control panel of the CU 211 module.



TM01 6425 3902

Fig. 7

Key to the symbols in fig. 7:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 4.5.
7	Reset button, push-button for manual resetting of alarm signals to <i>external</i> alarm devices and the built-in buzzer (only certain variants), see section 4.5.
8	Orange indicator light, which is activated by the float switch for start/stop of pump.
9, 10 and 11	3 orange indicator lights, which are activated by the float switch for high-level alarm. In case of high-level alarm, the top indicator light is flashing and the two other indicator lights are permanently on.
12	Green indicator light, indicating that the electricity supply has been switched on.

**Operation with electrodes and float switches:**

**Selector switch in position AC:**  
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.

**Operation with float switches:**

**Selector switch in position AC:**  
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.

**Operation with float switches:**

**Selector switch in position DC:**  
It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

**Note**

In such cases, it is recommended to use float switches.



#### 4.4 Battery back-up functions

2 float switches, pages 37 and 38.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the **red** indicator light is on - *cannot* be reset!
- If the *external* alarm device for common alarm is supplied from an external power source, this device will be active - *cannot* be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the liquid level in the pit rises above the level for high-level alarm, the top **orange** indicator light will be **flashing** and the second **orange** indicator light from the top will be permanently on.
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 4.2.

The table below shows the situations which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.

<p>CU 211</p>	<p>Mains supply failure:</p> <ul style="list-style-type: none"> <li>• The common alarm is active. The <b>red</b> indicator light is on.</li> <li>• The green indicator light (electricity supply switched on) is <i>off</i>.</li> </ul>
<p>CU 211</p>	<p>Mains supply failure <i>and</i> high-level alarm:</p> <ul style="list-style-type: none"> <li>• The common alarm is active. The <b>red</b> indicator light is on.</li> <li>• The top <b>orange</b> indicator light is <b>flashing</b>.</li> <li>• The second <b>orange</b> indicator light from the top is on.</li> <li>• The green indicator light (electricity supply switched on) is <i>off</i>.</li> </ul>



## 4.5 Reset button and ON-OFF-AUTO selector switch

2 float switches, pages 37 and 38.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

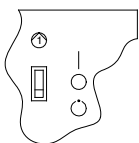
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 4.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (⊙), the alarm indication will be repeated immediately.

**AUTO (⊙)**, bottom position:

- The pump is controlled by the input signals from the float switches and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 4.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 4.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).

## 5. Systems with 3 float switches

### Description (see also page 39 or 40):

The pump is controlled by the liquid level in the pit.

- The float switch, pos. 2, starts the pump.
- The float switch, pos. 1, stops the pump. It is possible to set a "stop delay" which delays the stop of the pump.
- The top float switch, pos. 3, activates the high-level alarm.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

### 5.1 Electrical connection

3 float switches, pages 39 and 40.

#### Warning

Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.



Any external voltage connected to the system must be switched off before work is started.

#### Fig. 3 on page 39.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, 3 float switches*.

#### Fig. 4 on page 40.

The figure shows all electrical connections required to connect the LC 108 for *start-delta starting, 3 float switches*.

#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.



The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor. Further details can be found in the installation and operating instructions for the pump in question.

#### Warning

Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area.



Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.

#### Note

Float switches of the same type as Grundfos product number 96003332 or 96003695, i.e. float switches with gold-plated contacts suitable for low voltages and currents (40 V / 100 mA), must be used. All EEx-approved float switches are also suitable.

The float switches must be connected as NO contacts, i.e. brown and black leads, when float switches, Grundfos product number 96003332 or 96003695, are used.

Key to the symbols in fig. 3 on page 39 and fig. 4 on page 40:

Pos.	Description	Terminal number
1	Float switch for stop of pump.	11-12
2	Float switch for start of pump.	21-22
3	Float switch for high-level alarm.	31-32

### 5.2 Setting

3 float switches, pages 39 and 40.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 8.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of stop delay (switches 5, 6 and 7),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

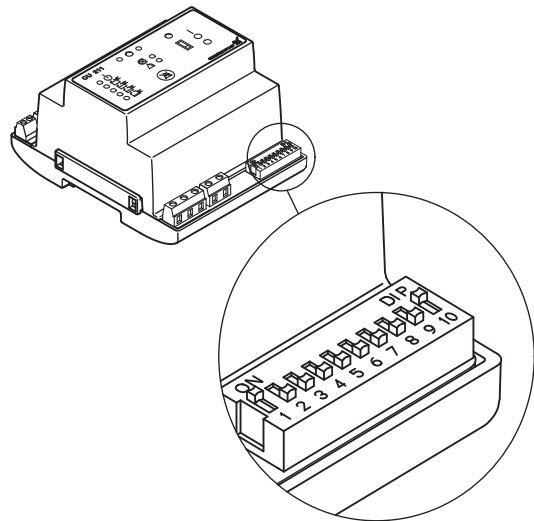


Fig. 8

Set the DIP switch as shown in fig. 8.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

#### Note

The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches 1, 2 and 3, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting determines the actual application type (3 float switches, pages 39 and 40).

- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on when the liquid level is sufficiently high.  
Automatic test run carried out every 24 hours.



After the electricity has been switched on, the pump will start immediately when the liquid level is sufficiently high.  
No automatic test run.

- Switches 5, 6 and 7, stop delay:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **stop delay** is the time from the stop signal is given until the pump is stopped.

It must be ensured that the pump is not running dry.

0 sec.		60 sec.	
15 sec.		90 sec.	
30 sec.		120 sec.	
45 sec.		180 sec.	

- Switch 8:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



Switch 8 has no function in connection with the actual application (3 float switches, pages 39 and 40), but this setting *must* be maintained!

- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.



At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 5.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.



When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!



At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 5.5).



When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 9.

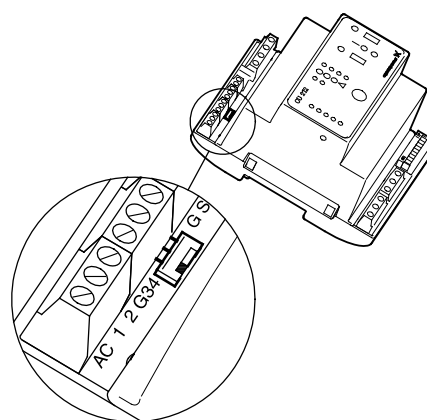
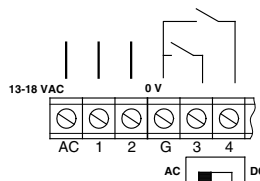


Fig. 9

**Operation with electrodes and float switches:**

**Selector switch in position AC:**

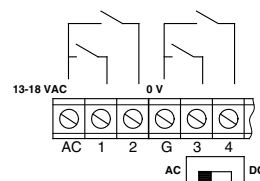
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position AC:**

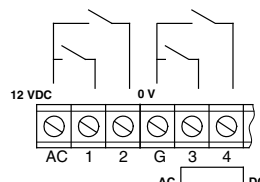
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position DC:**

It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.



**Note**

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

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### 5.3 Control panel

3 float switches, pages 39 and 40.

Figure 10 shows the control panel of the CU 211 module.

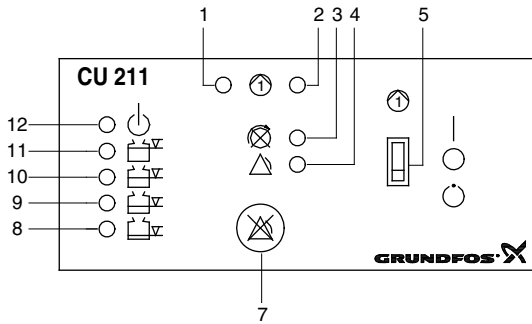


Fig. 10

Key to the symbols in fig. 10:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 5.5.
7	Reset button, push-button for manual resetting of alarm signals to <i>external</i> alarm devices and the built-in buzzer (only certain variants), see section 5.5.
8	Orange indicator light, which is activated by the float switch for stop of pump.
9	Orange indicator light, which is activated by the float switch for start of pump.
10 and 11	2 orange indicator lights, which are activated by the float switch for high-level alarm. In case of high-level alarm, the top indicator light is flashing and the other indicator light is permanently on.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 5.4 Battery back-up functions

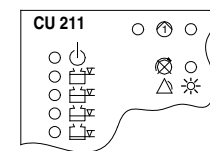
3 float switches, pages 39 and 40.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the **red** indicator light is on - *cannot* be reset!
- If the *external* alarm device for common alarm is supplied from an external power source, this device will be active - *cannot* be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the liquid level in the pit rises above the level for high-level alarm, the top **orange** indicator light will be **flashing** and the second **orange** indicator light from the top will be permanently on.
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 5.2.

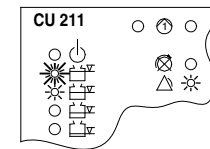
The table below shows the situations which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The **red** indicator light is on.
- The green indicator light (electricity supply switched on) is *off*.



Mains supply failure *and* high-level alarm:

- The common alarm is active. The **red** indicator light is on.
- The top **orange** indicator light is **flashing**.
- The second **orange** indicator light from the top is on.
- The green indicator light (electricity supply switched on) is *off*.

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## 5.5 Reset button and ON-OFF-AUTO selector switch

3 float switches, pages 39 and 40.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

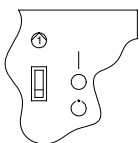
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 5.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (◐), the alarm indication will be repeated immediately.

**AUTO (◐)**, bottom position:

- The pump is controlled by the input signals from the float switches and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 5.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 5.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).

## 6. Systems with 4 float switches

### Description (see also page 41 or 42):

The pump is controlled by the liquid level in the pit.

- The float switch, pos. 3, starts the pump.
- The float switch, pos. 2, stops the pump. It is possible to set a "stop delay" which delays the stop of the pump.
- The top float switch, pos. 4, activates the high-level alarm.
- The bottom float switch, pos. 1, activates the dry-running alarm.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.



### 6.1 Electrical connection

4 float switches, pages 41 and 42.

#### Warning

Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.

Any external voltage connected to the system must be switched off before work is started.



#### Fig. 5 on page 41.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, 4 float switches*.

#### Fig. 6 on page 42.

The figure shows all electrical connections required to connect the LC 108 for *star-delta starting, 4 float switches*.

#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.



The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor.

Further details can be found in the installation and operating instructions for the pump in question.

#### Warning

Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area.

Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.



#### Note

Float switches of the same type as Grundfos product number 96003332 or 96003695, i.e. float switches with gold-plated contacts suitable for low voltages and currents (40 V / 100 mA), must be used. All EEx-approved float switches are also suitable.

The float switches must be connected as NO contacts, i.e. brown and black leads, when float switches, Grundfos product number 96003332 or 96003695, are used.

**Key to the symbols in fig. 5 on page 41 and fig. 6 on page 42:**

Pos.	Description	Terminal number
1	Float switch for dry-running alarm.	11-12
2	Float switch for stop of pump.	21-22
3	Float switch for start of pump.	31-32
4	Float switch for high-level alarm.	41-42

### 6.2 Setting

4 float switches, pages 41 and 42.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 11.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of stop delay (switches 5, 6 and 7),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

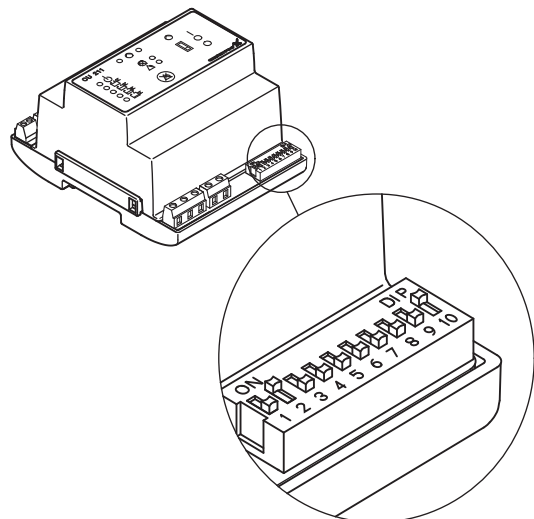


Fig. 11

Set the DIP switch as shown in fig. 11.




Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.


**Note** The DIP switch must not be set to other switch combinations than those described in this section.


Set the switches 1 to 10 as follows:

- Switches 1, 2 and 3, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

 This setting determines the actual application type (4 float switches, pages 41 and 42).









- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

 At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on when the liquid level is sufficiently high.  
*Automatic test run carried out every 24 hours.*


 After the electricity has been switched on, the pump will start immediately when the liquid level is sufficiently high.  
*No automatic test run.*

- Switches 5, 6 and 7, stop delay:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!


The **stop delay** is the time from the stop signal is given until the pump is stopped.  
It must be ensured that the pump is not running dry.


0 sec. 	60 sec. 
15 sec. 	90 sec. 
30 sec. 	120 sec. 
45 sec. 	180 sec. 

- Switch 8:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!


 Switch 8 has no function in connection with the actual application (4 float switches, pages 41 and 42), but this setting *must* be maintained!


- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!


 This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.


 At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 6.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

 This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.

 When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!

 At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 6.5).

 When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 12.

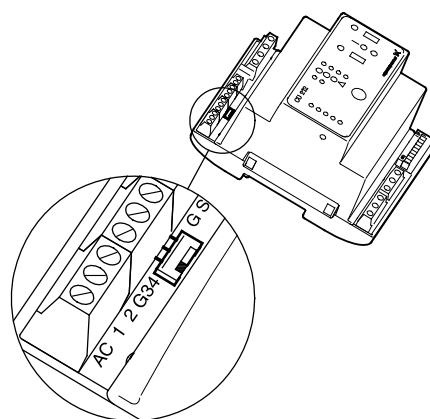
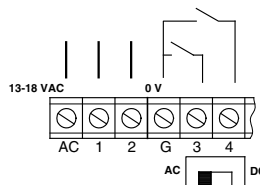


Fig. 12

**Operation with electrodes and float switches:**

**Selector switch in position AC:**

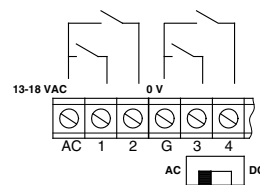
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position AC:**

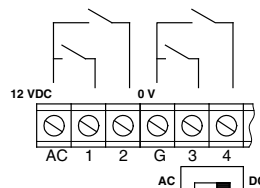
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position DC:**

It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.



**Note** If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

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### 6.3 Control panel

4 float switches, pages 41 and 42.

Figure 13 shows the control panel of the CU 211 module.

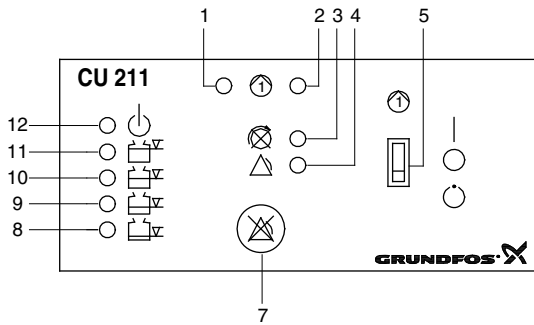


Fig. 13

Key to the symbols in fig. 13:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 6.5.
7	Reset button, push-button for manual resetting of alarm signals to external alarm devices and the built-in buzzer (only certain variants), see section 6.5.
8	Orange indicator light, which is activated by the float switch for dry-running alarm. In case of dry-running alarm, the indicator light is flashing. Under normal operating conditions, the indicator light is permanently on.
9	Orange indicator light, which is activated by the float switch for stop of pump.
10	Orange indicator light, which is activated by the float switch for start of pump.
11	Orange indicator light, which is activated by the float switch for high-level alarm. In case of high-level alarm, the indicator light is flashing.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 6.4 Battery back-up functions

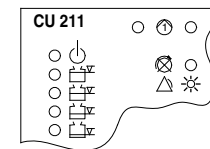
4 float switches, pages 41 and 42.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the **red** indicator light is on - *cannot* be reset!
- If the external alarm device for common alarm is supplied from an external power source, this device will be active - *cannot* be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the liquid level in the pit rises above the level for high-level alarm, the top **orange** indicator light will be **flashing** and the second **orange** indicator light from the top will be permanently on.
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 6.2.

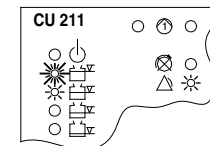
The table below shows the situations which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The **red** indicator light is on.
- The green indicator light (electricity supply switched on) is *off*.



Mains supply failure *and* high-level alarm:

- The common alarm is active. The **red** indicator light is on.
- The top **orange** indicator light is **flashing**.
- The second **orange** indicator light from the top is on.
- The green indicator light (electricity supply switched on) is *off*.

## 6.5 Reset button and ON-OFF-AUTO selector switch

4 float switches, pages 41 and 42.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

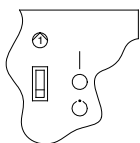
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 6.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (⊙), the alarm indication will be repeated immediately.

**AUTO (⊙)**, bottom position:

- The pump is controlled by the input signals from the float switches and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 6.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 6.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).

## 7. Systems with 2 electrodes

### Description (see also page 43 or 44):

The pump is controlled by the liquid level in the borehole.

- The electrode, pos. 1, is the reference electrode.
- When the electrode, pos. 2, registers liquid, the "waiting time" is initiated (can be set). After expiration of the waiting time, the pump is started.
- The pump is stopped when the electrode, pos. 2, does *not* register any liquid.
- The pressure switch, pos. 3, stops the pump if the discharge pressure exceeds the stop pressure of the pressure switch. Restarting at the starting pressure of the pressure switch is only effected if the electrode, pos. 2, registers liquid.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

### 7.1 Electrical connection

2 electrodes, pages 43 and 44.

#### Warning

Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.



Any external voltage connected to the system must be switched off before work is started.

#### Fig. 7 on page 43.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, 2 electrodes*.

#### Fig. 8 on page 44.

The figure shows all electrical connections required to connect the LC 108 for *star-delta starting, 2 electrodes*.

#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.



The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor.

Further details can be found in the installation and operating instructions for the pump in question.

#### Warning

Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area.



Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.

#### Note

The motor/pump housing must not be used as reference electrode.

The pressure switch, pos. 3, must be connected as an NC contact.

**Key to the symbols in fig. 7 on page 43 and fig. 8 on page 44:**

Pos.	Description	Terminal number
1	Reference electrode.	11
2	Electrode for start/stop of pump.	12
3	Pressure switch.	41-42

### 7.2 Setting

2 electrodes, pages 43 and 44.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 14.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of waiting time (switches 5, 6, 7 and 8),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

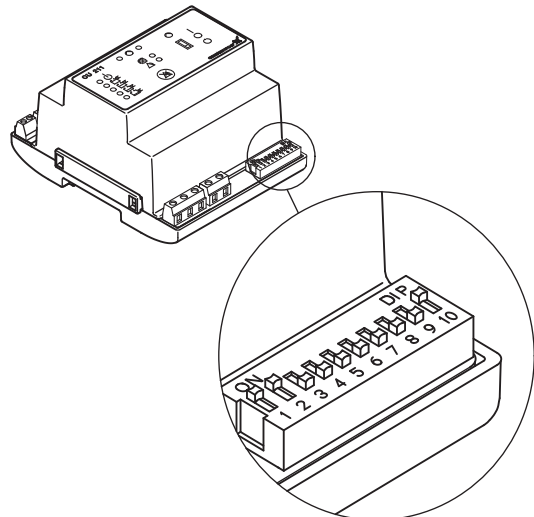


Fig. 14

Set the DIP switch as shown in fig. 14.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

#### Note

The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches 1, 2 and 3, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting determines the actual application type (2 electrodes, pages 43 and 44).

- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on when the liquid level is sufficiently high.  
*Automatic test run carried out every 24 hours.*



After the electricity has been switched on, the pump will start immediately when the liquid level is sufficiently high.  
*No automatic test run.*

- Switches 5, 6, 7 and 8, waiting time:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **waiting time** is the time from the electrode registers liquid until the pump starts (starting delay).

1 min.		30 min.	
2 min.		35 min.	
3 min.		40 min.	
5 min.		45 min.	
10 min.		50 min.	
15 min.		55 min.	
20 min.		60 min.	
25 min.		65 min.	

- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.



At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 7.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.



When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!



At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 7.5).



When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 15.

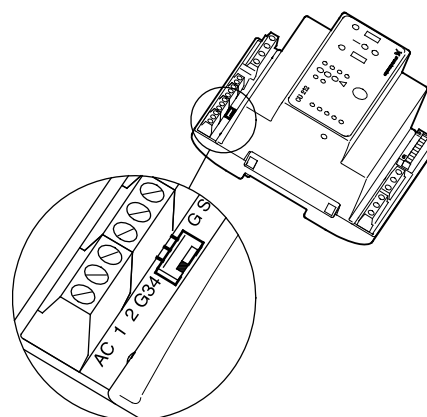
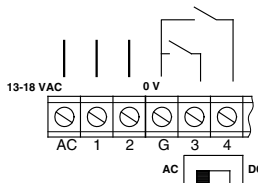


Fig. 15

**Operation with electrodes and float switches:**

**Selector switch in position AC:**

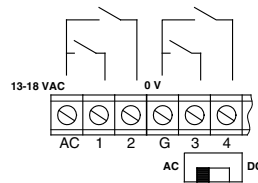
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position AC:**

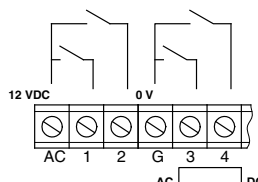
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position DC:**

It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.



**Note**

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

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### 7.3 Control panel

2 electrodes, pages 43 and 44.

For these applications, the foil supplied with the LC 108 must be attached to the CU 211 control panel as shown in fig. 16. The foil can be found inside the LC 108 cabinet at the bottom.

Figure 16 shows how the foil is attached to the CU 211 module.

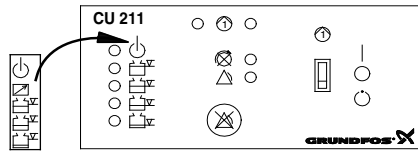


Fig. 16

Figure 17 shows the control panel of the CU 211 module.

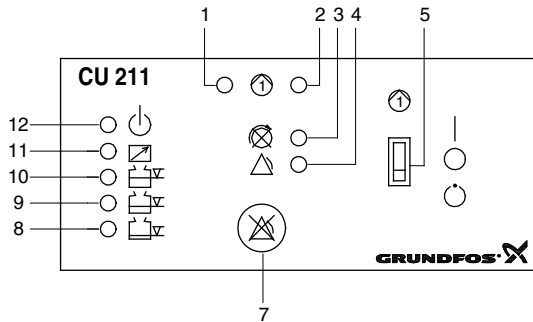


Fig. 17

Key to the symbols in fig. 17:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 7.5.
7	Reset button, push-button for manual resetting of alarm signals to external alarm devices and the built-in buzzer (only certain variants), see section 7.5.
8	Orange indicator light, which is activated by the electrode for start/stop of pump.
9 and 10	Have no function in connection with the actual application!
11	Orange indicator light, which is activated by the pressure switch in the discharge pipe. The pump is stopped if the pressure is higher than the stop pressure of the pressure switch (the indicator light is permanently on). The pump is started if the pressure is lower than the starting pressure of the pressure switch and the electrode for start/stop of pump (see pos. 8 above) gives a starting signal at the same time.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 7.4 Battery back-up functions

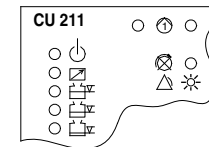
2 electrodes, pages 43 and 44.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the red indicator light is on - cannot be reset!
- If the external alarm device for common alarm is supplied from an external power source, this device will be active - cannot be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 7.2.

The table below shows the situation which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The red indicator light is on.
- The green indicator light (electricity supply switched on) is off.

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## 7.5 Reset button and ON-OFF-AUTO selector switch

2 electrodes, pages 43 and 44.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

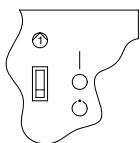
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 7.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (⊙), the alarm indication will be repeated immediately.

**AUTO (⊙)**, bottom position:

- The pump is controlled by the input signals from the electrodes and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 7.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 7.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).



## 8. Systems with 3 electrodes

### Description (see also page 45 or 46):

The pump is controlled by the liquid level in the borehole.

- The electrode, pos. 1, is the reference electrode.
- The electrode, pos. 3, starts the pump.
- The electrode, pos. 2, stops the pump. It is possible to set a "stop delay" which delays the stop of the pump.
- The pressure switch, pos. 4, stops the pump if the discharge pressure exceeds the stop pressure of the pressure switch. Restarting at the starting pressure of the pressure switch is only effected if the electrode, pos. 3, registers liquid.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

### 8.1 Electrical connection

3 electrodes, pages 45 and 46.

#### Warning

Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.



Any external voltage connected to the system must be switched off before work is started.

Fig. 9 on page 44.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, 3 electrodes*.

Fig. 10 on page 46.

The figure shows all electrical connections required to connect the LC 108 for *star-delta starting, 3 electrodes*.

#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.



The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor. Further details can be found in the installation and operating instructions for the pump in question.

#### Warning

Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area.



Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.

#### Note

The motor/pump housing must not be used as reference electrode.

The pressure switch, pos. 4, must be connected as an NC contact.

Key to the symbols in fig. 9 on page 45 and fig. 10 on page 46:

Pos.	Description	Terminal number
1	Reference electrode.	11
2	Electrode for stop of pump.	12
3	Electrode for start of pump.	22
4	Pressure switch.	41-42

### 8.2 Setting

3 electrodes, pages 45 and 46.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 18.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of stop delay (switches 5, 6 and 7),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

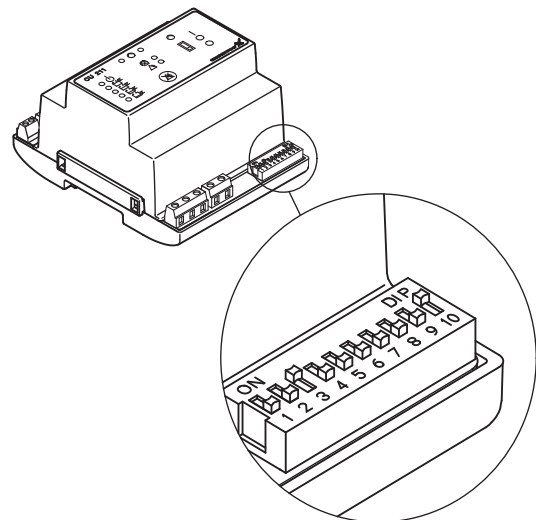


Fig. 18

Set the DIP switch as shown in fig. 18.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

#### Note

The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches **1, 2 and 3**, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting determines the actual application type (3 electrodes, pages 45 and 46).



- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on *when* the liquid level is sufficiently high.

*Automatic test run carried out every 24 hours.*



After the electricity has been switched on, the pump will start immediately *when* the liquid level is sufficiently high.

*No automatic test run.*

- Switches 5, 6 and 7, stop delay:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **stop delay** is the time from the stop signal is given until the pump is stopped.

It must be ensured that the pump is not running dry.

0 sec.		60 sec.	
15 sec.		90 sec.	
30 sec.		120 sec.	
45 sec.		180 sec.	

- Switch 8:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



Switch 8 has no function in connection with the actual application (3 electrodes, pages 45 and 46), but this setting *must* be maintained!

- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.



At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 8.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.



When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!



At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 8.5).



When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 19.

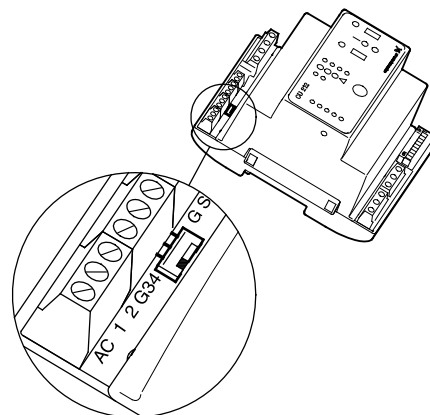


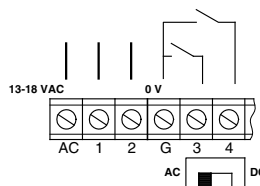
Fig. 19

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**Operation with electrodes and float switches:**

**Selector switch in position AC:**

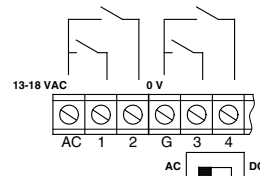
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position AC:**

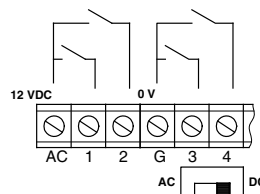
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position DC:**

It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.



**Note**

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

### 8.3 Control panel

3 electrodes, pages 45 and 46.

For these applications, the foil supplied with the LC 108 must be attached to the CU 211 control panel as shown in fig. 20. The foil can be found inside the LC 108 cabinet at the bottom.

Figure 20 shows how the foil is attached to the CU 211 module.

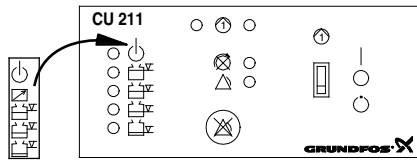


Fig. 20

Figure 21 shows the control panel of the CU 211 module.

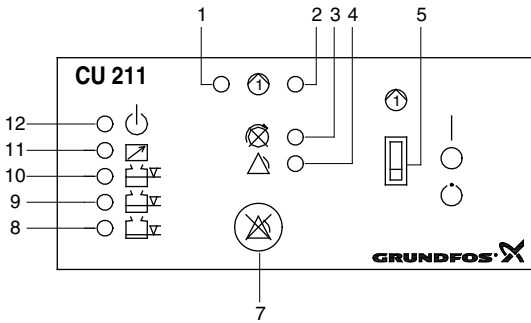


Fig. 21

Key to the symbols in fig. 21:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 8.5.
7	Reset button, push-button for manual resetting of alarm signals to external alarm devices and the built-in buzzer (only certain variants), see section 8.5.
8	Orange indicator light, which is activated by the electrode for stop of pump.
9	Orange indicator light, which is activated by the electrode for start of pump.
10	Has no function in connection with the actual application!
11	Orange indicator light, which is activated by the pressure switch in the discharge pipe. The pump is stopped if the pressure is higher than the stop pressure of the pressure switch (the indicator light is permanently on). The pump is started if the pressure is lower than the starting pressure of the pressure switch and the electrode for start of pump (see pos. 9 above) gives a starting signal at the same time.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 8.4 Battery back-up functions

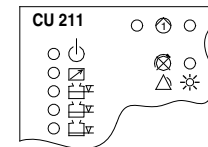
3 electrodes, pages 45 and 46.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the red indicator light is on - cannot be reset!
- If the external alarm device for common alarm is supplied from an external power source, this device will be active - cannot be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 8.2.

The table below shows the situation which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The red indicator light is on.
- The green indicator light (electricity supply switched on) is off.

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## 8.5 Reset button and ON-OFF-AUTO selector switch

3 electrodes, pages 45 and 46.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

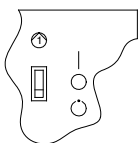
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 8.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (⊙), the alarm indication will be repeated immediately.

**AUTO (⊙)**, bottom position:

- The pump is controlled by the input signals from the electrodes and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 8.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 8.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).

## 9. Systems for filling applications

### Description (see also page 47 or 48):

The pump is controlled by the liquid level in the filling tank.

- The electrode, pos. 1, is the reference electrode.
- The electrode, pos. 2, starts the pump.
- The electrode, pos. 3, stops the pump. It is possible to set a "stop delay", which delays the stop of the pump.
- The float switch, pos. 4, activates the high-level alarm.
- The manual on/off switch, pos. 5, will stop the pump when the switch is set to position off.

#### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.



Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

### 9.1 Electrical connection

Filling application, pages 47 and 48.

#### Warning

Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.



Any external voltage connected to the system must be switched off before work is started.

Fig. 11 on page 47.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, filling application*.

Fig. 12 on page 48.

The figure shows all electrical connections required to connect the LC 108 for *star-delta starting, filling application*.

#### Warning

The LC 108 must be connected in accordance with the rules and standards in force for the application in question.



The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor. Further details can be found in the installation and operating instructions for the pump in question.

#### Warning

Float switches or electrodes placed in an explosion hazard area must be connected via an EEx barrier, e.g. Grundfos number 96440300. The EEx barrier must not be installed in the explosion hazard area. Equipment used in explosion hazard areas must in each individual case have been approved for this particular application. Furthermore, the cables into the explosion hazard area must be laid in accordance with local regulations.



#### Note

The motor/pump housing must not be used as reference electrode.

The pressure switch, pos. 5, must be connected as an NC contact.

Key to the symbols in fig. 11 on page 47 and fig. 12 on page 48:

Pos.	Description	Terminal number
1	Reference electrode.*	11
2	Electrode for start of pump.**	12
3	Electrode for stop of pump.**	22
4	Float switch for high-level alarm.	31-32
5	Manual on/off switch (or another external input).	41-42

\* Alternatively, float switches can be connected between terminals: 11-12 and 21-22.

### 9.2 Setting

Filling application, pages 47 and 48.

The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 22.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- selection of starting delay and automatic test run (switch 4),
- setting of stop delay (switches 5, 6 and 7),
- selection of automatic alarm resetting (switch 9),
- selection of automatic restarting (switch 10).

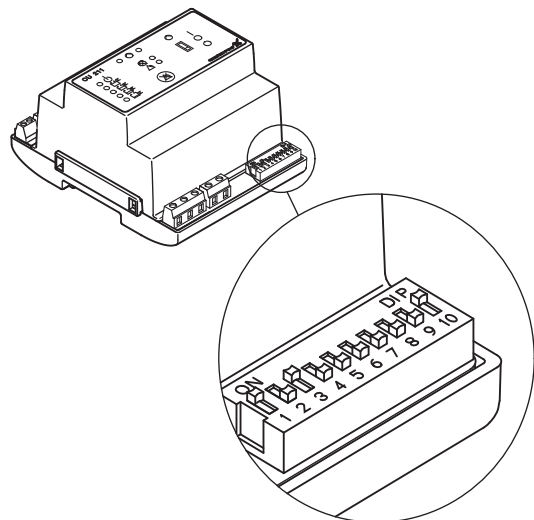


Fig. 22

Set the DIP switch as shown in fig. 22.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

#### Note

The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches 1, 2 and 3, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting determines the actual application type (filling application, pages 47 and 48).

- Switch 4, starting delay and automatic test run (only in the case of battery back-up):  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



At this setting, the start-up is delayed within the range from 0 to 255 sec. (random) after the electricity supply has been switched on *when* the liquid level is sufficiently high.

*Automatic test run carried out every 24 hours.*



After the electricity has been switched on, the pump will start immediately *when* the liquid level is sufficiently high.

*No automatic test run.*

- Switches 5, 6 and 7, stop delay:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **stop delay** is the time from the stop signal is given until the pump is stopped.

It must be ensured that the pump is not running dry.

0 sec.		60 sec.	
15 sec.		90 sec.	
30 sec.		120 sec.	
45 sec.		180 sec.	

- Switch 8:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



Switch 8 has no function in connection with the actual application (*filling application, pages 47 and 48*), but this setting *must* be maintained!

- Switch 9, automatic alarm resetting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting ensures automatic resetting of alarm signals to external alarm devices and the built-in buzzer. However, an alarm signal will only be reset if the cause of the fault no longer exists.



At this setting, the alarm signal must be reset manually by means of the reset button (the reset button is described in section 9.5).

- Switch 10, automatic restarting:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting enables automatic restarting after the PTC resistance/thermal switch of the motor has cut out the pump. Restarting will not be carried out until the motor has cooled to normal temperature.



When the pump connected is used in an explosion hazard area, switch 10 *must not* be in this position!



At this setting, the pump must be restarted manually after the PTC resistance/thermal switch of the motor has cut out the pump. To restart the pump, push the ON-OFF-AUTO selector switch into position OFF for a short period (the ON-OFF-AUTO selector switch is described in section 9.5).



When the pump connected is used in an explosion hazard area, switch 10 *must* be in this position!

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 23.

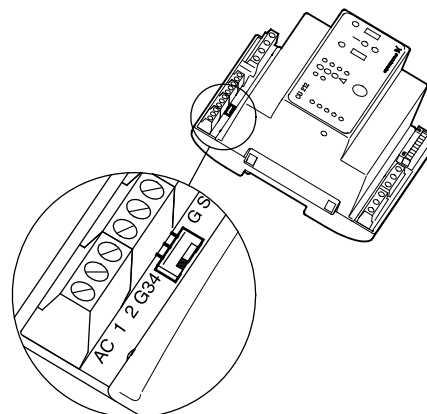


Fig. 23

**Operation with electrodes and float switches:**

**Selector switch in position AC:**  
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.

**Operation with float switches:**

**Selector switch in position AC:**  
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.

**Operation with float switches:**

**Selector switch in position DC:**  
It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

**Note**

### 9.3 Control panel

Filling application, pages 47 and 48.

For these applications, the foil supplied with the LC 108 must be attached to the CU 211 control panel as shown in fig. 24. The foil can be found inside the LC 108 cabinet at the bottom.

Figure 24 shows how the foil is attached to the CU 211 module.

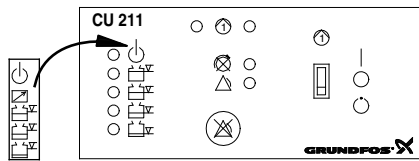


Fig. 24

Figure 25 shows the control panel of the CU 211 module.

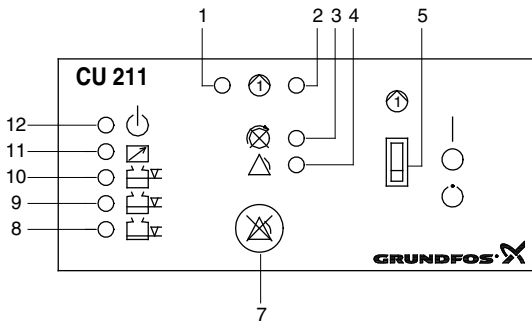


Fig. 25

Key to the symbols in fig. 25:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 9.5.
7	Reset button, push-button for manual resetting of alarm signals to external alarm devices and the built-in buzzer (only certain variants), see section 9.5.
8	Orange indicator light, which is activated by the electrode for start of pump.
9	Orange indicator light, which is activated by the electrode for stop of pump.
10	Orange indicator light, which is activated by the float switch for high-level alarm. In case of high-level alarm, the indicator light is flashing.
11	Orange indicator light, which is activated by the manual on/off switch. The pump is stopped when the switch is set to position off (the indicator light is permanently on). The pump is started when the switch is set to position on unless the electrode for stop of pump (see pos. 9 above) gives a stop signal at the same time.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 9.4 Battery back-up functions

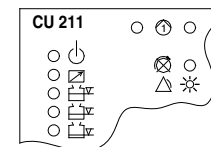
Filling application, pages 47 and 48.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the **red** indicator light is on - *cannot* be reset!
- If the external alarm device for common alarm is supplied from an external power source, this device will be active - *cannot* be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!
- If the liquid level in the pit rises above the level for high-level alarm, the second **orange** indicator light from the top will be **flashing**.
- If the starting delay function and automatic test run were selected (switch 4 of the DIP switch), the start-up will be delayed after the electricity supply has been switched on when the liquid level is sufficiently high, see section 9.2.

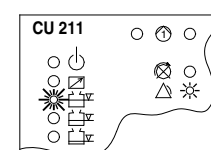
The table below shows the situations which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The **red** indicator light is on.
- The green indicator light (electricity supply switched on) is *off*.



Mains supply failure *and* high-level alarm:

- The common alarm is active. The **red** indicator light is on.
- The **orange** indicator light is **flashing**.
- The green indicator light (electricity supply switched on) is *off*.



## 9.5 Reset button and ON-OFF-AUTO selector switch

Filling application, pages 47 and 48.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

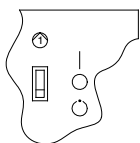
**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



In explosion hazard areas, switch 10 of the DIP switch *must* be set as stated in section 9.2. Consequently, the pump *cannot* be started when the PTC resistance/thermal switch of the motor registers overtemperature.



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (⊙), the alarm indication will be repeated immediately.

**AUTO (⊙)**, bottom position:

- The pump is controlled by the input signals from the electrodes/float switches and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset. Switch 9 of the DIP switch can, however, be set to manual resetting which is carried out by means of the reset button, see section 9.2.
- The pump will restart automatically when a given fault condition disappears. However, this is dependent on the setting of switch 10 of the DIP switch, see section 9.2.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).



## 10. Systems for drainage applications

### Description (see also page 49 or 50):

The pump is controlled by the flow switch, pos. 2, in the discharge pipe.

- The pump is stopped when the flow switch does *not* register any liquid flow.
- After a stop signal, the pump will attempt to restart when the "restarting time" (can be set) has expired. The restarting attempt will be interrupted if the flow switch does *not* register any liquid flow *before* the expiration of the "dead time" (can be set).
- The switch for manual restarting, pos. 1, will initiate a restarting attempt when the switch is set to position on (restarting).

#### Warning



Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

### 10.1 Electrical connection

*Drainage application, pages 49 and 50.*

#### Warning



Before starting work on the system, switch off the supply voltage and lock the mains switch in position 0.

Any external voltage connected to the system must be switched off before work is started.

#### Fig. 13 on page 49.

The figures show all electrical connections required to connect the LC 108 for *direct-on-line starting, drainage application, flow switch*.

#### Fig. 14 on page 50.

The figure shows all electrical connections required to connect the LC 108 for *start-delta starting, drainage application, flow switch*.

#### Warning



The LC 108 must be connected in accordance with the rules and standards in force for the application in question.

The operating voltage and frequency are marked on the controller nameplate. Make sure that the controller is suitable for the electricity supply on which it will be used.

All cables/wires must be fitted through the Pg cable entries and gaskets (IP65).

Maximum back-up fuse is stated on the controller nameplate.

If required according to local regulations, an external mains switch must be installed.

#### Caution

If the PTC resistance/thermal switch of the motor is connected, the factory-fitted short-circuit jumper must be removed (terminals T11-T21).

Single-phase motors must be connected to an external operating capacitor and in certain cases also to a starting capacitor. Further details can be found in the installation and operating instructions for the pump in question.

#### Warning



LC 108 must not be used for drainage applications (pages 49 and 50) in explosion hazard areas as the motor will restart automatically after the PTC resistance/thermal switch in the motor has caused a cutout. However, the motor will not restart until it has cooled to normal temperature.

The switch for manual restarting, pos. 1, must be connected as an NC contact.

The flow switch, pos. 2, must be connected as an NO contact.

**Key to the symbols in fig. 13 on page 49 and fig. 14 on page 50:**

Pos.	Description	Terminal number
1	Switch for manual restarting.	41-42
2	Flow switch.	11-12

### 10.2 Setting

*Drainage application, pages 49 and 50.*

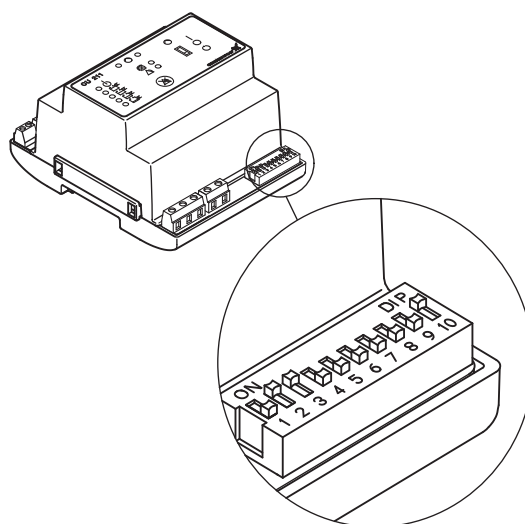
The CU 211 module has a 10-pole DIP switch in the bottom right corner, see fig. 26.

#### Caution

The controller must be off circuit to ensure the correct configuration during start-up after change of the DIP switch setting.

The DIP switch setting offers the following possibilities:

- setting of dead time (switches 4, 5 and 6),
- setting of restarting time (switches 7, 8, 9 and 10).



**Fig. 26**

Set the DIP switch as shown in fig. 26.

Each individual switch (1 to 10) of the DIP switch can be set to position OFF or ON.

#### Note

The DIP switch must not be set to other switch combinations than those described in this section.

Set the switches 1 to 10 as follows:

- Switches **1, 2 and 3**, application type:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!



This setting determines the actual application type (*drainage application, pages 49 and 50*).

- Switches 4, 5 and 6, dead time:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **dead time** is the time the pump is allowed to run after starting without a liquid flow being registered by the flow switch. The pump will be stopped again if the flow switch does not registers any liquid flow.

10 sec.		2 min.	
20 sec.		3 min.	
40 sec.		4 min.	
1 min.		5 min.	

- Switches 7, 8, 9 and 10, restarting time:  
When the DIP switch setting is changed, the controller must be switched off for at least 1 minute!

The **restarting time** is the time from the last stop signal until the pump attempts to restart.

No restarting*		15 min.	
1 min.		17 min.	
2 min.		20 min.	
3 min.		25 min.	
5 min.		30 min.	
7 min.		50 min.	
10 min.		70 min.	
12 min.		90 min.	

\* At the setting "no restarting", the pump can only be restarted by means of the switch for manual restarting.

**AC/DC selector:**

The AC/DC selector switch for electrodes and/or float switches is placed as shown in fig. 27.

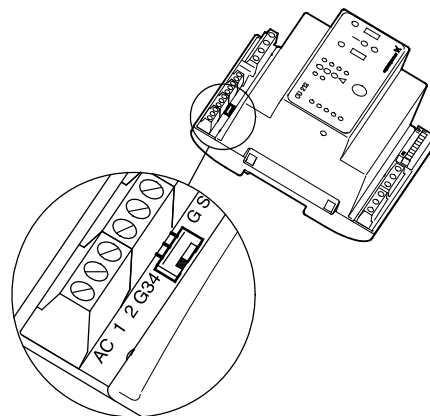


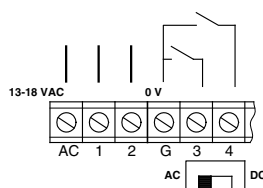
Fig. 27

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**Operation with electrodes and float switches:**

**Selector switch in position AC:**

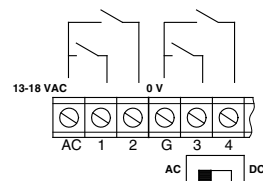
It is possible to connect 3 electrodes (1 as reference electrode) and 2 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position AC:**

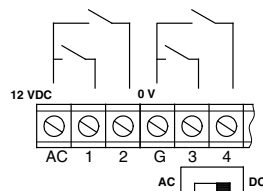
It is possible to connect 4 float switches. The controller transmits a 13-18 VAC signal.



**Operation with float switches:**

**Selector switch in position DC:**

It is possible to connect 4 float switches. Cables of up to 100 metres can be connected between the controller and the float switches. The controller transmits a 12 VDC signal.



**Note**

If the distance between the controller and pit exceeds 20 metres, it is not advisable to use electrodes as problems with the signal values sent back to the controller may arise.

In such cases, it is recommended to use float switches.

### 10.3 Control panel

Drainage application, pages 49 and 50.

For these applications, the foil supplied with the LC 108 must be attached to the CU 211 control panel as shown in fig. 28. The foil can be found inside the LC 108 cabinet at the bottom.

Figure 28 shows how the foil is attached to the CU 211 module.

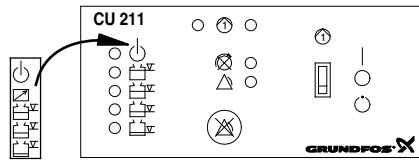


Fig. 28

Figure 29 shows the control panel of the CU 211 module.

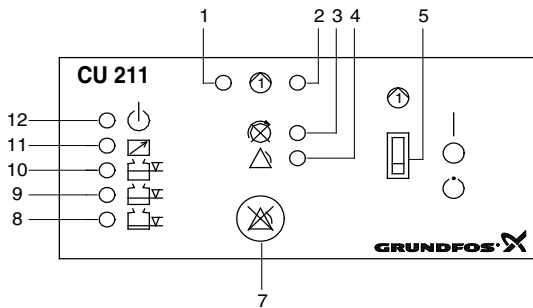


Fig. 29

Key to the symbols in fig. 29:

Pos.	Description
1	Green indicator light, indicating starting delay (flashing) and pump operation (permanently on).
2	Red indicator light, indicating pump fault. Flashing: Fault in PTC resistor/thermal switch. On: Fault in motor-protective circuit breaker.
3	Red indicator light, indicating wrong phase sequence (only certain variants and three-phase pumps only).
4	Red indicator light, indicating common alarm.
5	ON-OFF-AUTO selector switch, three positions, see section 10.5.
7	Reset button, push-button for manual resetting of alarm signals to <i>external</i> alarm devices and the built-in buzzer (only certain variants), see section 10.5.
8	Orange indicator light, which is activated by the flow switch. When the flow switch registers a liquid flow, the indicator light is permanently on. The pump is stopped <i>if</i> the flow switch does not register any liquid flow <i>and</i> the dead time has expired, see section 10.2.
9 and 10	Have no function in connection with the actual application!
11	Orange indicator light, which is activated by the switch for manual restarting. The pump is started when the switch is set to position on (restarting) (the indicator light is permanently on). The pump is stopped <i>if</i> the flow switch does not register any liquid flow <i>and</i> the dead time has expired, see section 10.2.
12	Green indicator light, indicating that the electricity supply has been switched on.

### 10.4 Battery back-up functions

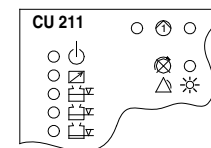
Drainage application, pages 49 and 50.

If a back-up battery for CU 211 (accessory for certain variants) is installed, the following functions will be carried out if the normal electricity supply to the LC 108 fails (see also the illustrations below):

- The common alarm is active, the **red** indicator light is on - *cannot* be reset!
- *If* the *external* alarm device for common alarm is supplied from an external power source, this device will be active - *cannot* be reset by means of the reset button!
- The built-in buzzer (only certain variants) is activated - can be reset by means of the reset button!

The table below shows the situation which may occur if the normal electricity supply to the LC 108 fails and a back-up battery is connected:

- = the indicator light is off.
- ⊗ = the indicator light is on.
- ⊛ = the indicator light is flashing.



Mains supply failure:

- The common alarm is active. The **red** indicator light is on.
- The green indicator light (electricity supply switched on) is *off*.

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## 10.5 Reset button and ON-OFF-AUTO selector switch

Drainage application, pages 49 and 50.



The **reset button** is a push-button for manual resetting of alarm signals to *external* alarm devices and the built-in buzzer (i.e. *not* for resetting of the alarm memory as this is reset by means of the ON-OFF-AUTO selector switch, see position OFF (○)).

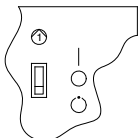
Even if the fault condition still exists, the *external* alarm devices and the built-in buzzer will be reset when the reset button is pressed.

The **ON-OFF-AUTO selector switch** has three different positions:

**ON (|)**, top position:

- The pump will start when the selector switch is pushed into this position (unless the motor protection relay has cut out the pump).
- If the PTC resistance/thermal switch of the motor registers overtemperature, the pump will *not* be switched off.

**Note:** It is the user's responsibility to decide how long the pump is to run with this fault indication. Over a long period, the pump will be damaged!



**OFF (○)**, middle position:

- The pump *cannot* start when the selector switch has been set to this position.
- The alarm memory is reset by pushing the selector switch into position OFF (○). The alarm memory is the light indication of a fault condition which has disappeared. If a fault condition still exists when the selector switch is pushed into position ON (|) or AUTO (○), the alarm indication will be repeated immediately.

**AUTO (○)**, bottom position:

- The pump is controlled by the input signals from the flow switch and the pump according to the selected DIP switch setting.
- Alarm signals will automatically be reset.
- The pump will restart automatically when a given fault condition disappears.
- When the pump starts automatically after a fault condition which has disappeared, the indicator light will continue to show the fault condition (alarm memory) and the indication can only be removed by resetting the alarm memory, see position OFF (○).

## 11. Start-up



### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

Prior to start-up, the connection and DIP switch setting must have been carried out according to sections 4. to 10.

Start-up must be carried out by authorized personnel.

Proceed as follows:

1. Check whether the float switches, electrodes or the flow switch have been connected according to the wiring diagram for the actual application.
2. Check that the pump inlet is submerged in the liquid to be pumped.
3. Set the motor protection relay to the rated current stated on the nameplate.
4. Warning:



### Warning

Set the motor-protective circuit breaker to the rated current stamped on the nameplate according to the values in the table.

**Conversion table for motor protection relay setting**

$I_N$	$I_{DOL}$	$I_{star-\Delta}$
10	10	5.8
13	13	7.5
17	17	9.6
22	22	12.4
28	28	16.1
36	36	20.7
46	46	26.8
60	60	34.6
77	77	44.7
100	100	57.7

5. Switch on the electricity supply.  
**Three-phase pumps only:** Check for wrong phase sequence (only certain variants) (the pump cannot be started if the phase sequence is wrong!).
6. Start the pump, see section 4.5, 5.5, 6.5, 7.5, 8.5, 9.5 or 10.5.
7. Check that the pump is not running dry. The risk of dry running can be eliminated by a renewed time setting by means of the DIP switch according to section 4.2, 5.2, 6.2, 7.2, 8.2 or 9.2 and/or by moving the float switches or the electrodes.
8. **Three-phase pumps only:** Check whether the direction of rotation of the pump is correct according to the installation and operating instructions for the pump in question.
9. Select the required operating mode by means of the ON-OFF-AUTO selector switch, see section 4.5, 5.5, 6.5, 7.5, 8.5, 9.5 or 10.5.

## 12. Maintenance



### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

During normal application and operation, the controller LC 108 is maintenance-free.

However, it is advisable to carry out minor checks of the LC 108 controller, pump pits, tanks, pumps, etc. at suitable intervals. These checks should be carried out by authorized personnel.

- Check the gaskets of the LC 108 cabinet front and those of the Pg cable entries.
- Check the cable entries for the explosion hazard area.
- Check for possible deposits/sludge build-up in the pump pit/tank. Sludge may settle in areas with almost stagnant liquid.
- Check for beginning sludge build-up around the float switches, electrodes or the flow switch.
- Check for possible blockage on the suction side of the pump. A blockage will typically be a large solid object.
- If the LC 108 has been installed in a particularly aggressive environment, it is advisable to check the motor protection contacts in order to identify possible chemical attack resulting in corrosion. In typical installations, the motor protection contacts will work for several years and do not require any inspection.

### Note

The above list is not complete. The LC 108 may be installed in systems, installations and/or environments which require thorough and regular maintenance.

## 13. Technical data

### Voltage variants, nominal voltages

- 1 x 230 V.
- 3 x 230 V.
- 3 x 400 V.

Voltage tolerances for LC 108

- 15 %/+ 10 % of nominal voltage.

See also installation and operating instructions for the pump in question.

### Mains frequency for LC 108

50/60 Hz.

See also installation and operating instructions for the pump in question.

### Supply system earthing

For TN systems and TT systems.

### Rated insulation voltage, $U_i$

4 kV.

### Rated impulse withstand voltage, $U_{imp}$

4 kV.

### Back-up fuse

Depending on variant, see nameplate.

### Control circuit fuse

*Direct-on-line starting:*

Fine-wire fuse: 250 mA / F / 32 mm x Ø6.

*Star-delta starting:*

Fine-wire fuse: 1 A / F / 32 mm x Ø6.

### Ambient temperature

- During operation: -30 to +50 °C  
(must not be exposed to direct sunlight).
- In stock: -30 to +60 °C.

### Enclosure class

IP65.

### EMC (electromagnetic compatibility)

According to EN 61000-6-2 and EN 61000-6-3.

### Cabinet LC 108 for direct-on-line starting

- External dimensions:  
Height = 410 mm, width = 278 mm, depth = 150 mm.
- Material: ABS (acrylonitrile butadiene styrene).
- Weight: Depending on variant, see nameplate.

### Cabinet LC 108 for star-delta starting

- External dimensions:  
Height = 650 mm, width = 500 mm, depth = 225 mm.
- Material: Glass-fibre-reinforced polycarbonate.
- Weight: Approx. 12 kg, depending on variant, see nameplate.

### Outputs for alarm devices

Max. 230 VAC / max. 2 A / min. 10 mA / AC1.



## 14. Fault finding chart



### Warning

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the LC 108 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

Fault	Cause	Remedy
1. The pump does not run.	a) No electricity supply. <b>Without battery back-up:</b> None of the indicator lights are on. <b>With battery back-up</b> (accessory for certain variants): See section <a href="#">4.4</a> , <a href="#">5.4</a> , <a href="#">6.4</a> , <a href="#">7.4</a> , <a href="#">8.4</a> , <a href="#">9.4</a> or <a href="#">10.4</a> .	Switch on the electricity supply.
	b) The ON-OFF-AUTO selector switch is in position OFF (○), see section <a href="#">4.5</a> , <a href="#">5.5</a> , <a href="#">6.5</a> , <a href="#">7.5</a> , <a href="#">8.5</a> , <a href="#">9.5</a> or <a href="#">10.5</a> .	Push the ON-OFF-AUTO selector switch into position ON ( ) or AUTO (○).
	c) Control circuit fuses are blown.	Check and eliminate the cause. Replace the control circuit fuses (see pos. 6 in fig. 1 or fig. 3).
	d) The motor protection relay has cut out the pump (the red indicator light for pump fault is permanently on).	Check the pump/pit.
	e) The PTC resistance/thermal switch has cut out the pump (the red indicator light for pump fault is flashing, see section).	Allow the pump to cool. After cooling, the pump will restart automatically unless the LC 108 has been set to manual restarting, see section <a href="#">4.2</a> , <a href="#">5.2</a> , <a href="#">6.2</a> , <a href="#">7.2</a> , <a href="#">8.2</a> or <a href="#">9.2</a> . If so, the ON-OFF-AUTO selector switch must be pushed into position OFF (○) for a short period. If the pump cutout was caused by choked-up float switches, electrodes or flow switch, these must be cleaned or replaced.
	f) The control circuit for the motor protection relay has been broken or fails (the green indicator light indicating pump operation is permanently on, see section <a href="#">4.3</a> , <a href="#">5.3</a> , <a href="#">6.3</a> , <a href="#">7.3</a> , <a href="#">8.3</a> , <a href="#">9.3</a> or <a href="#">10.3</a> ).	Check the control circuit.
	g) Motor/supply cable is defective.	Check motor and cable.
	h) The float switches, electrodes or the flow switch are/is defective.	Check cables, float switches, electrodes or the flow switch.
	i) The CU 211 module is defective.	Replace the CU 211 module.
	j) The new DIP switch setting does not work correctly.	Switch off the electricity supply to the controller for 1 minute and switch it on again (normal procedure). See section <a href="#">4.2</a> , <a href="#">5.2</a> , <a href="#">6.2</a> , <a href="#">7.2</a> , <a href="#">8.2</a> , <a href="#">9.2</a> or <a href="#">10.2</a> .
2. The pump is starting/stopping too frequently.	a) The float switches, electrodes or the flow switch are/is defective.	Check cables, float switches, electrodes or the flow switch.

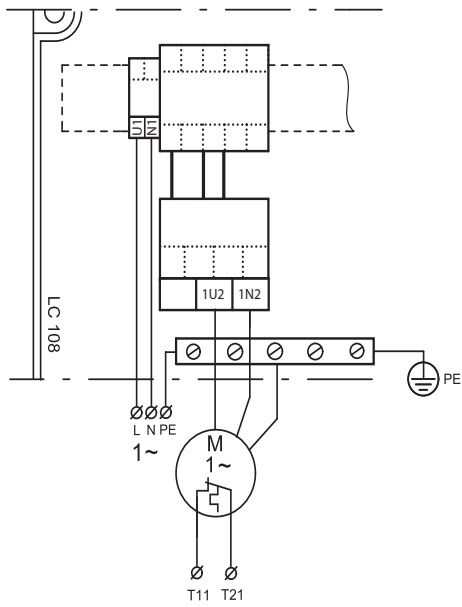
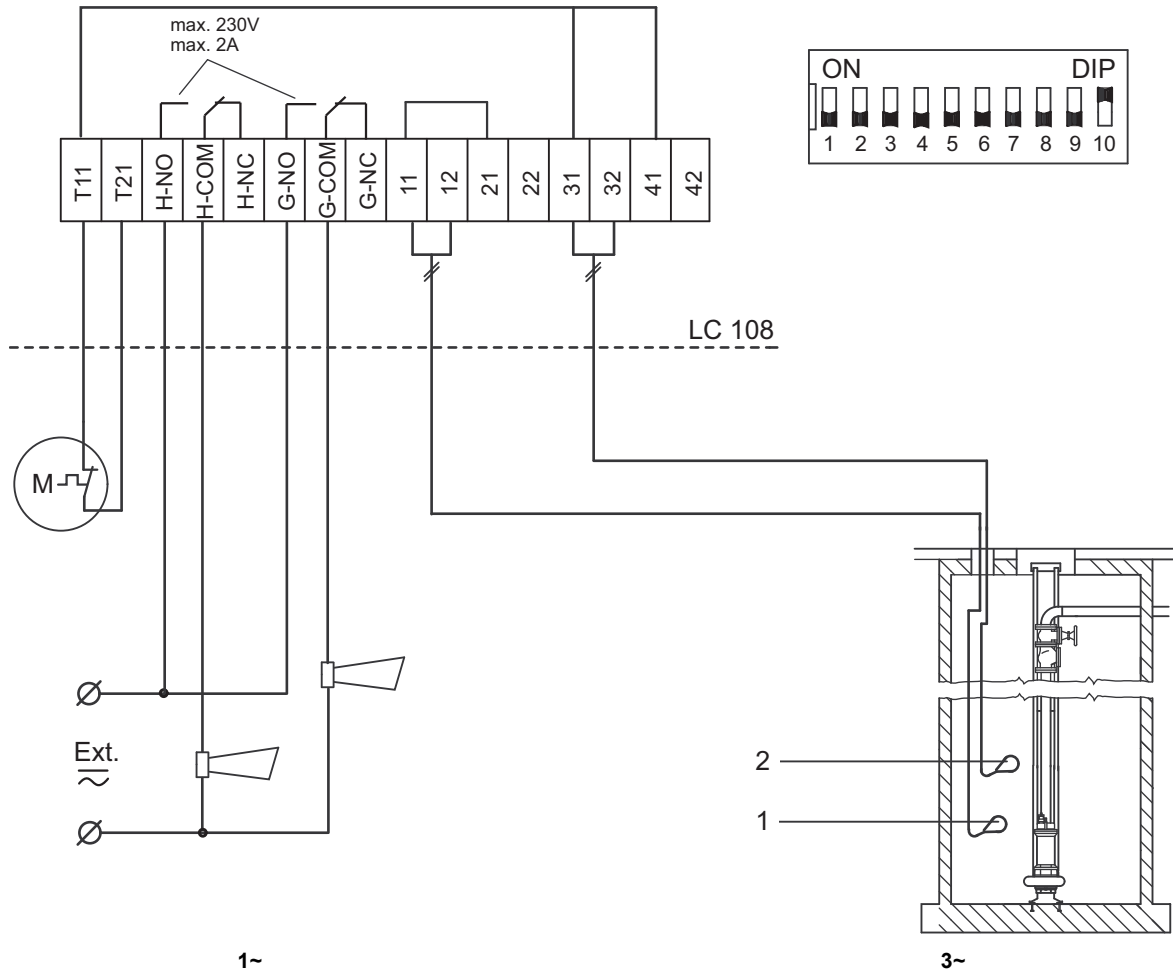
See also installation and operating instructions for the pump in question.

## 15. Disposal

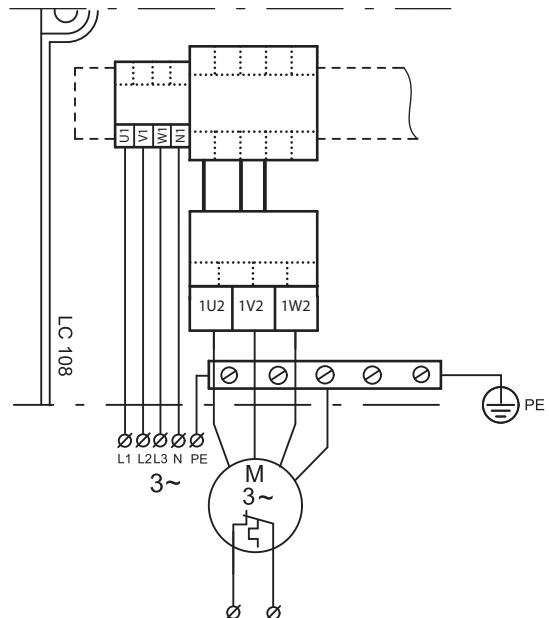
This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.



TM01 4864 1808



TM01 4862 1808

TM01 6882 1808

Fig. 1

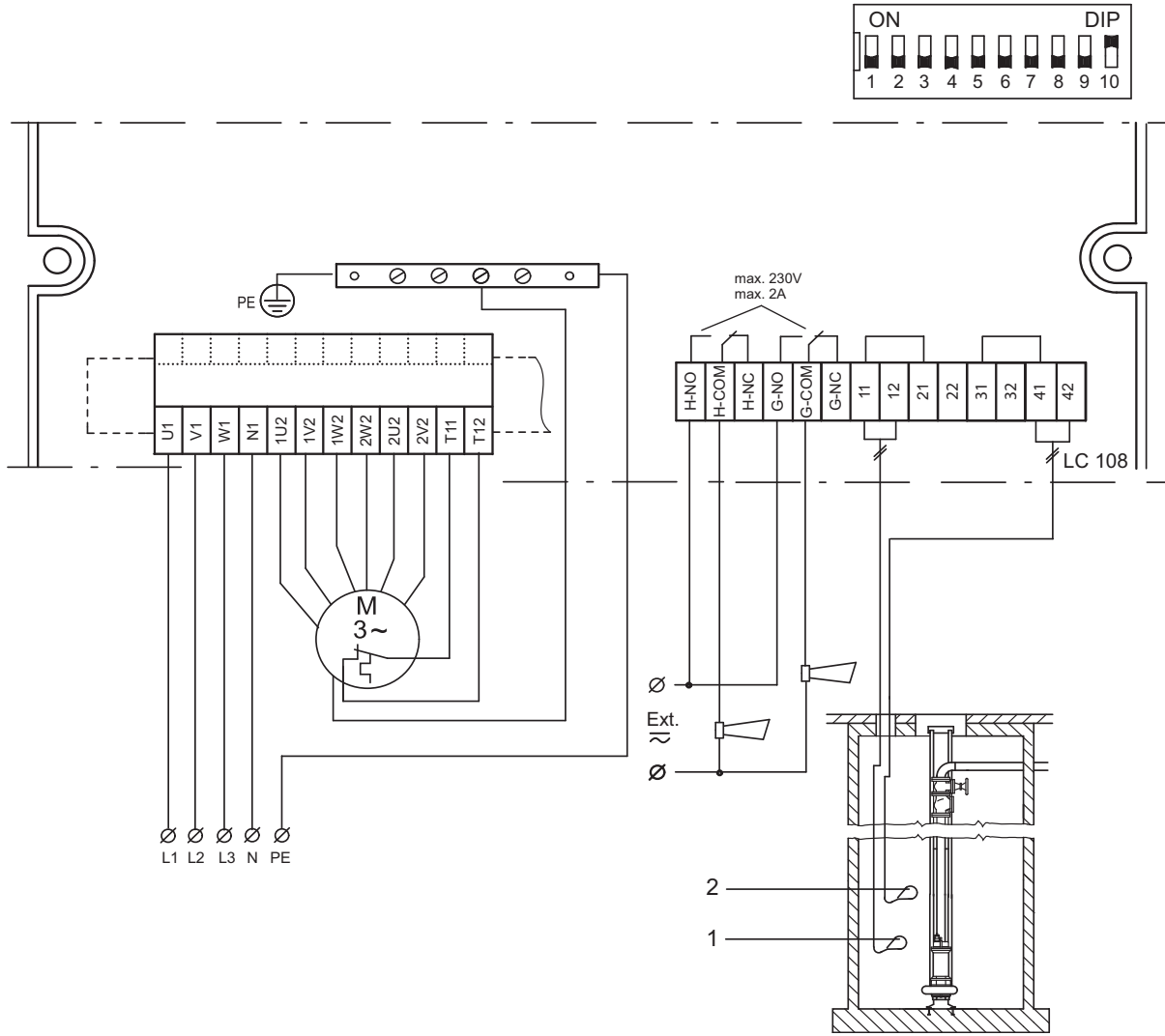
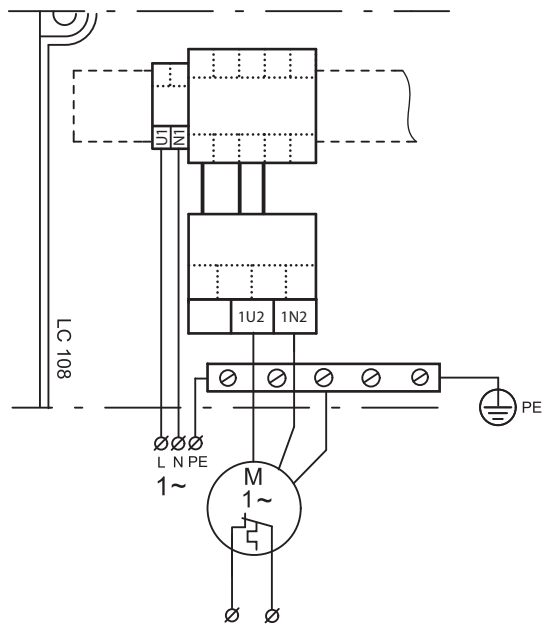
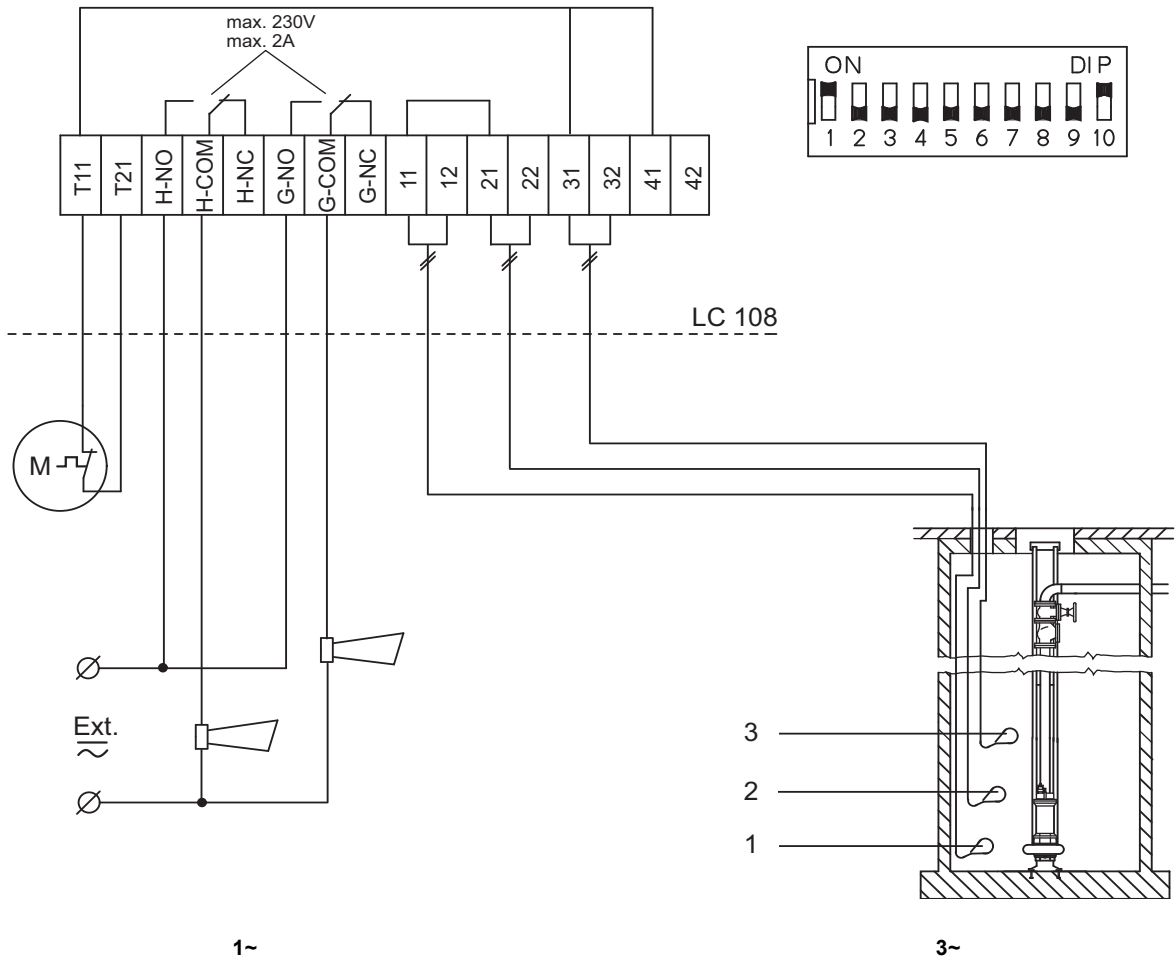
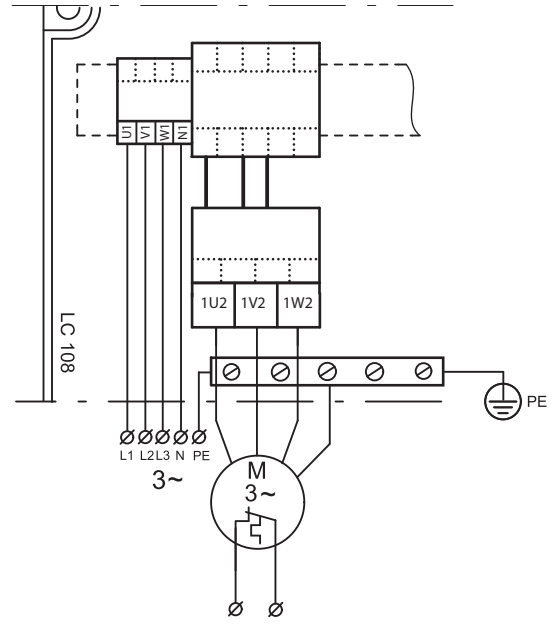


Fig. 2

TM01 7871 1808



TM01 4864 1808



TM01 4862 1808

Fig. 3

TM01 6619 1808

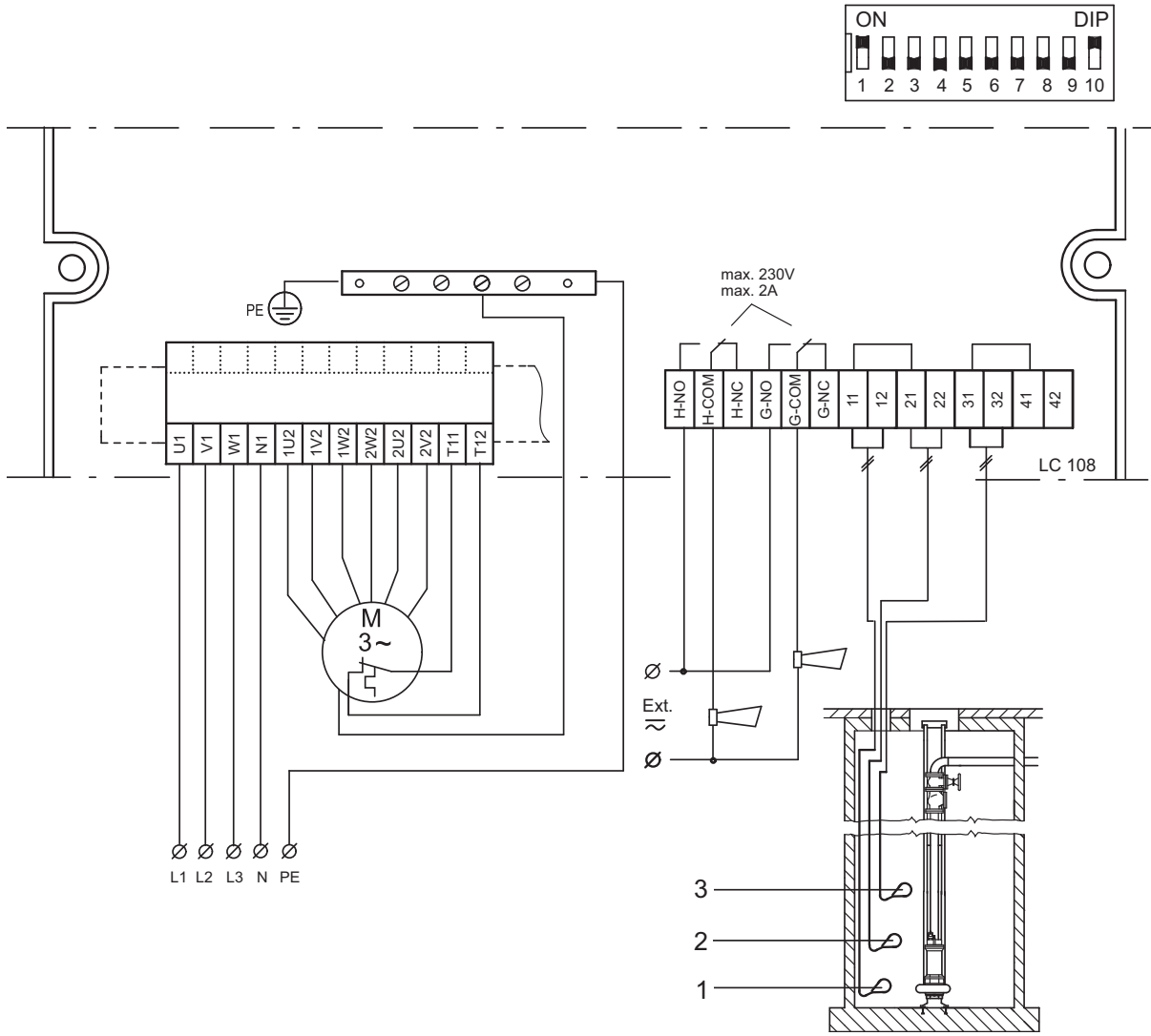
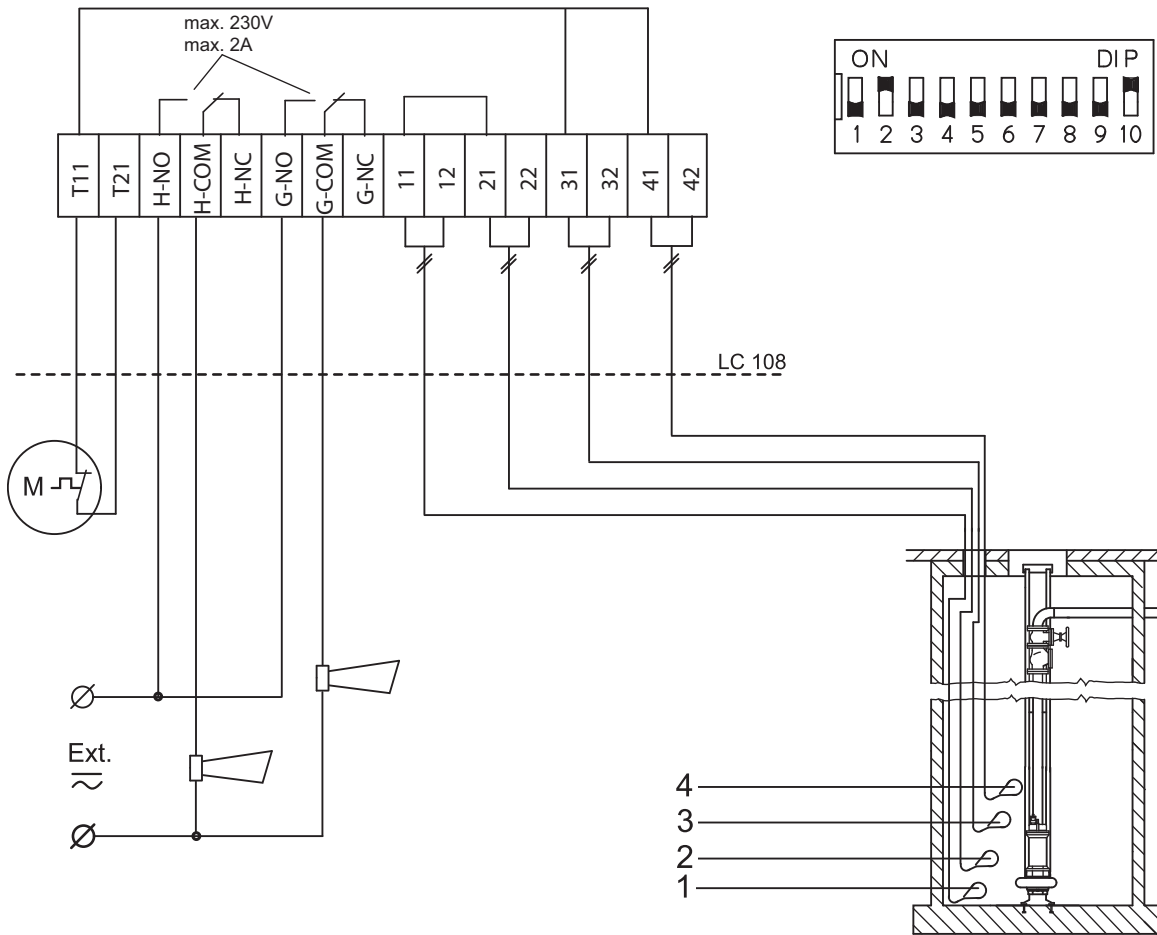
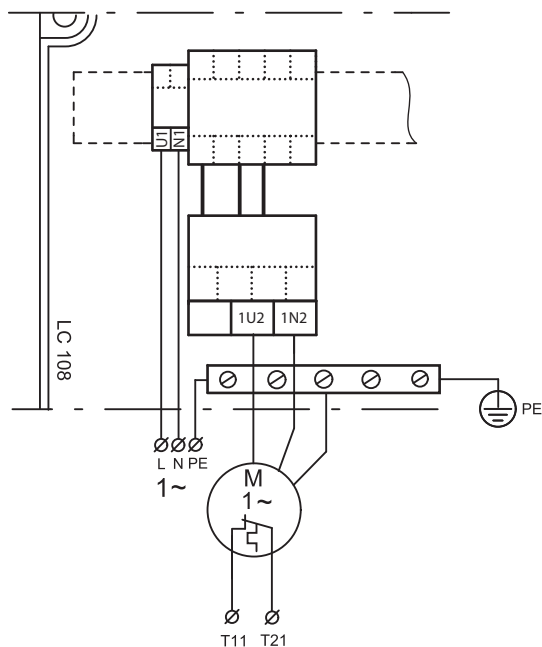


Fig. 4

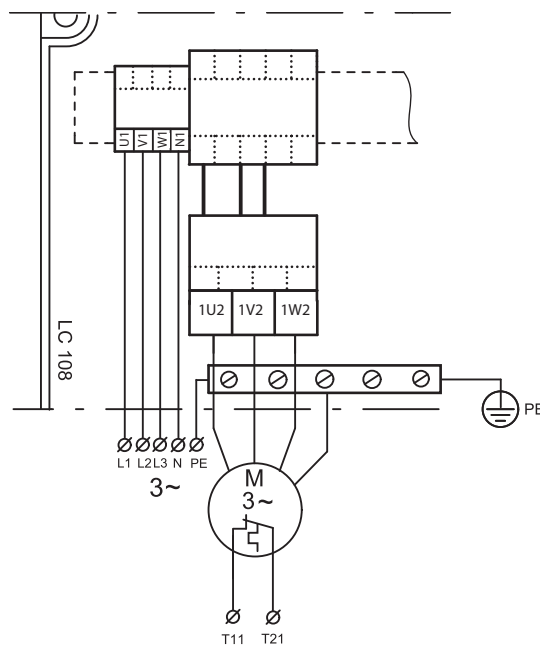
TM01 8128 1808



TM01 6620 1808



TM01 4864 1808



TM01 4862 1808

Fig. 5

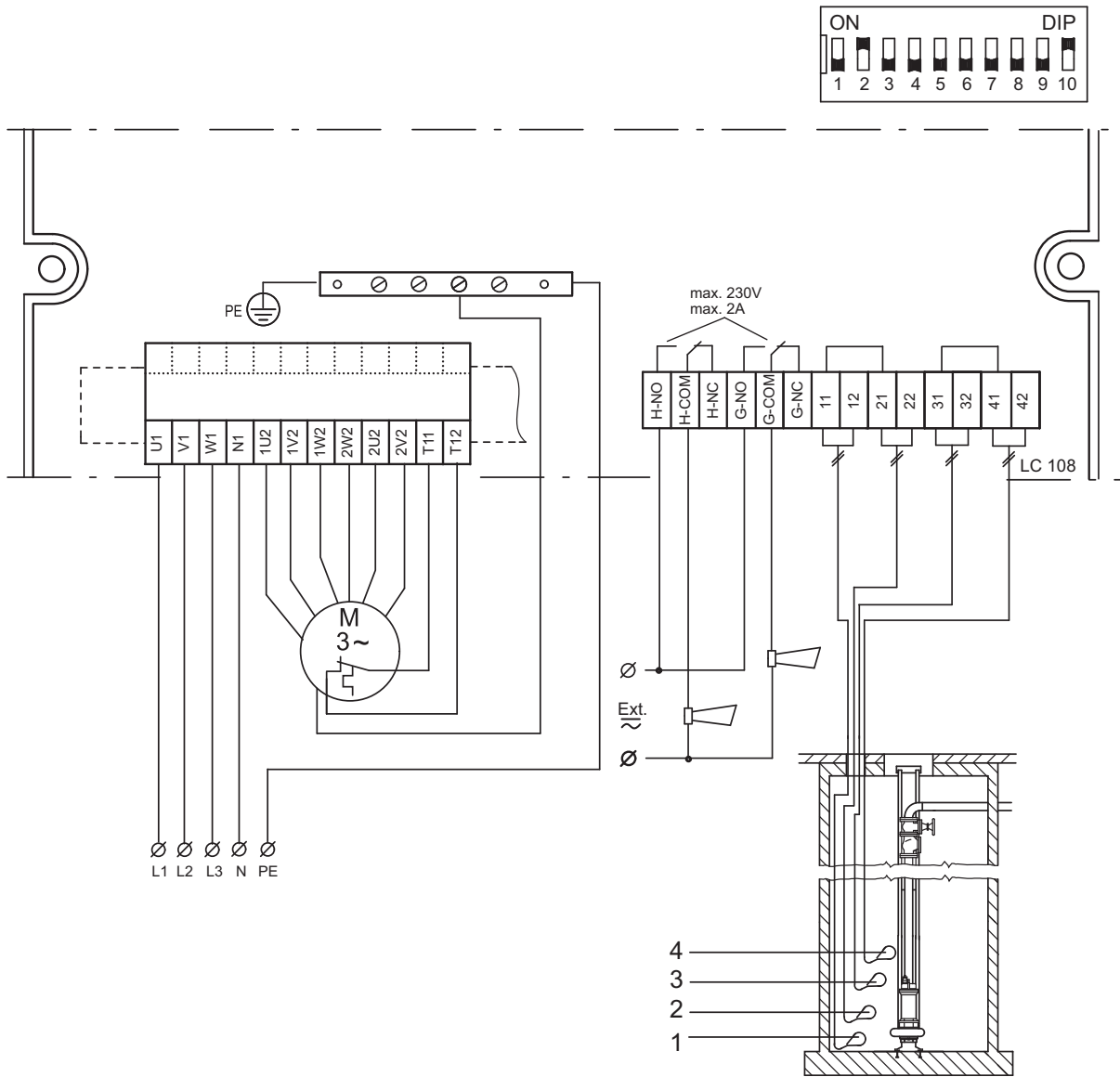
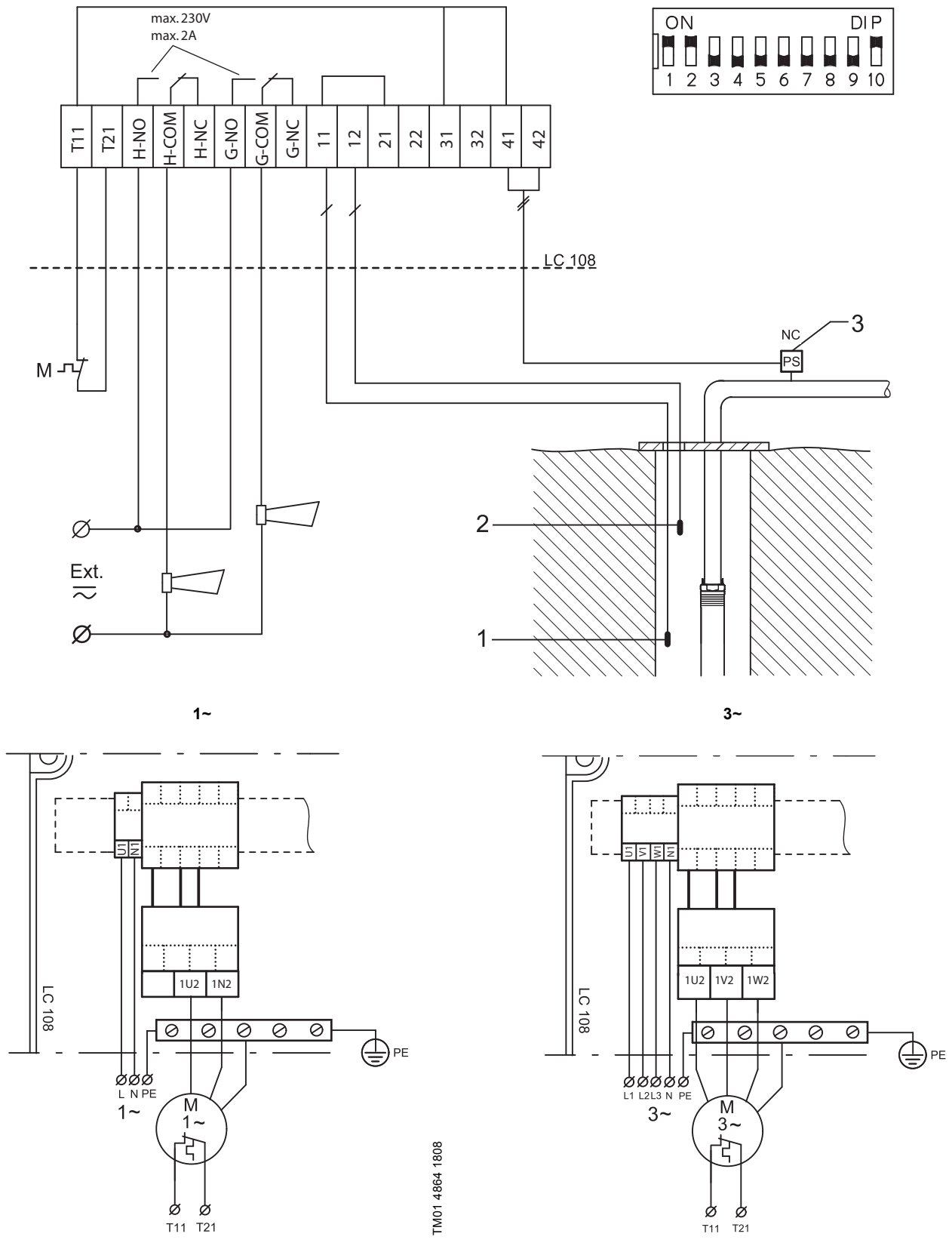


Fig. 6

TM01 8126 1808





TM01 6621 1808

Fig. 7

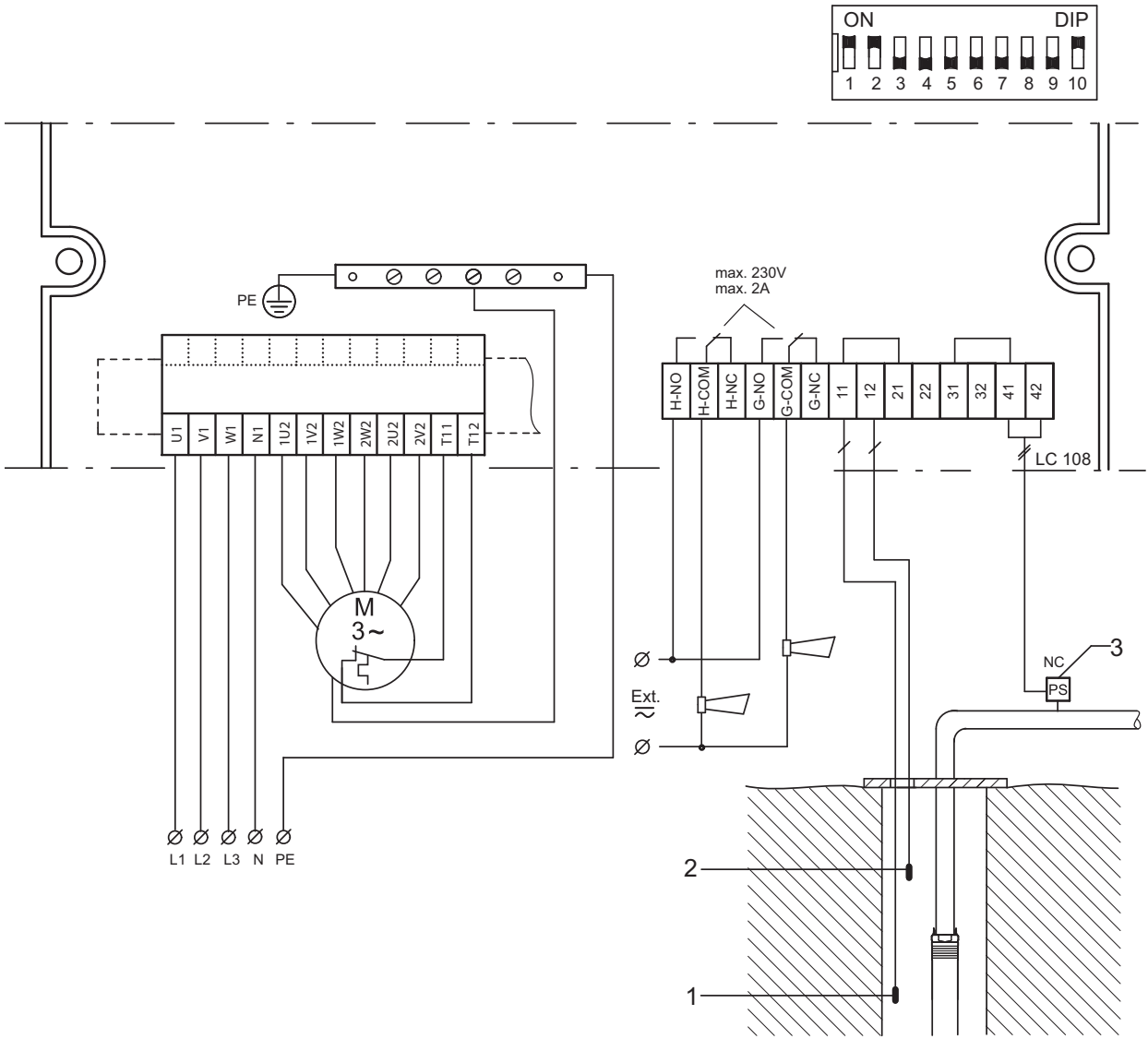
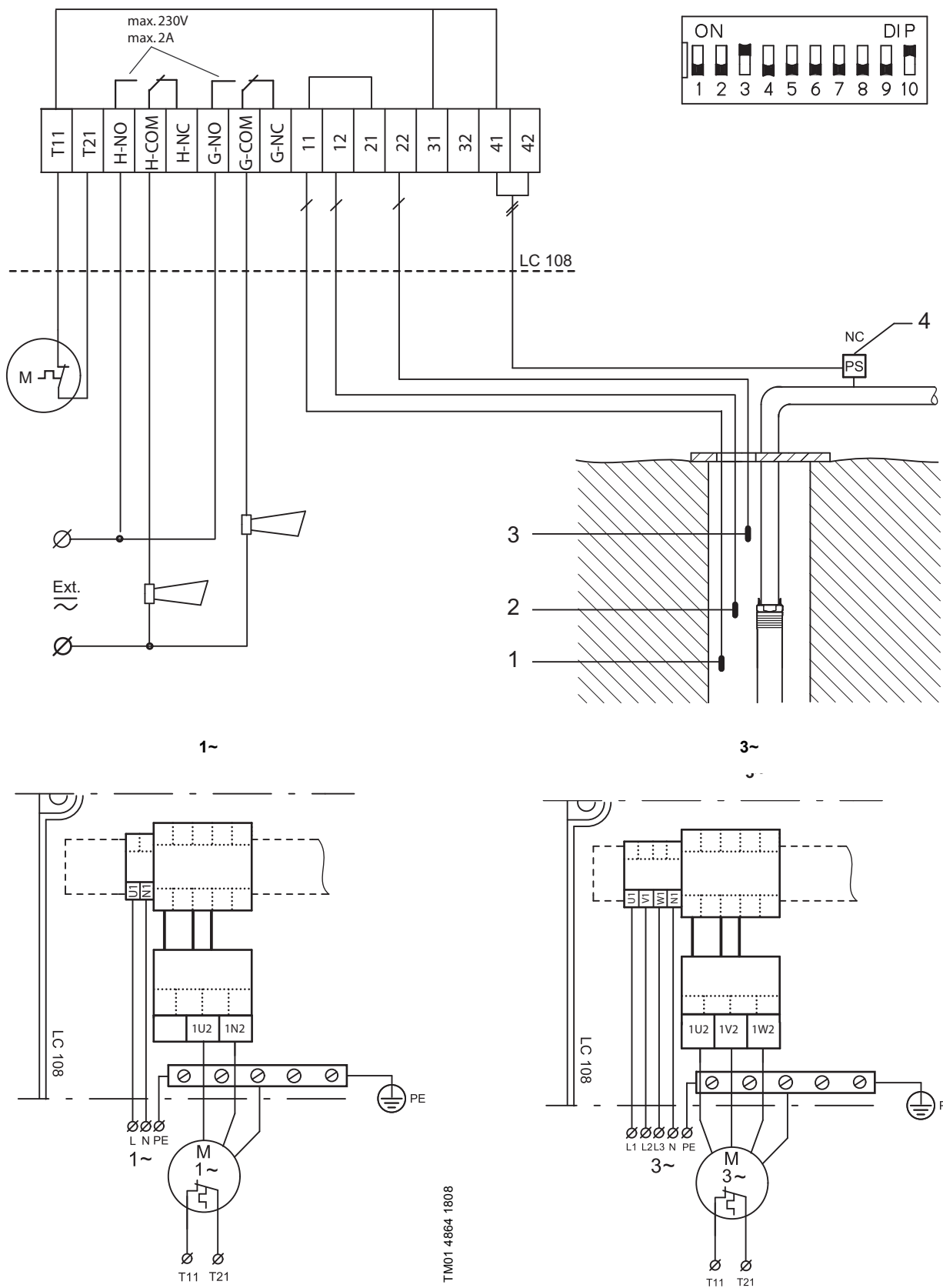


Fig. 8

TM01 8127 1808



TM01 6622 1808

TM01 4864 1808

TM01 4862 1808

Fig. 9

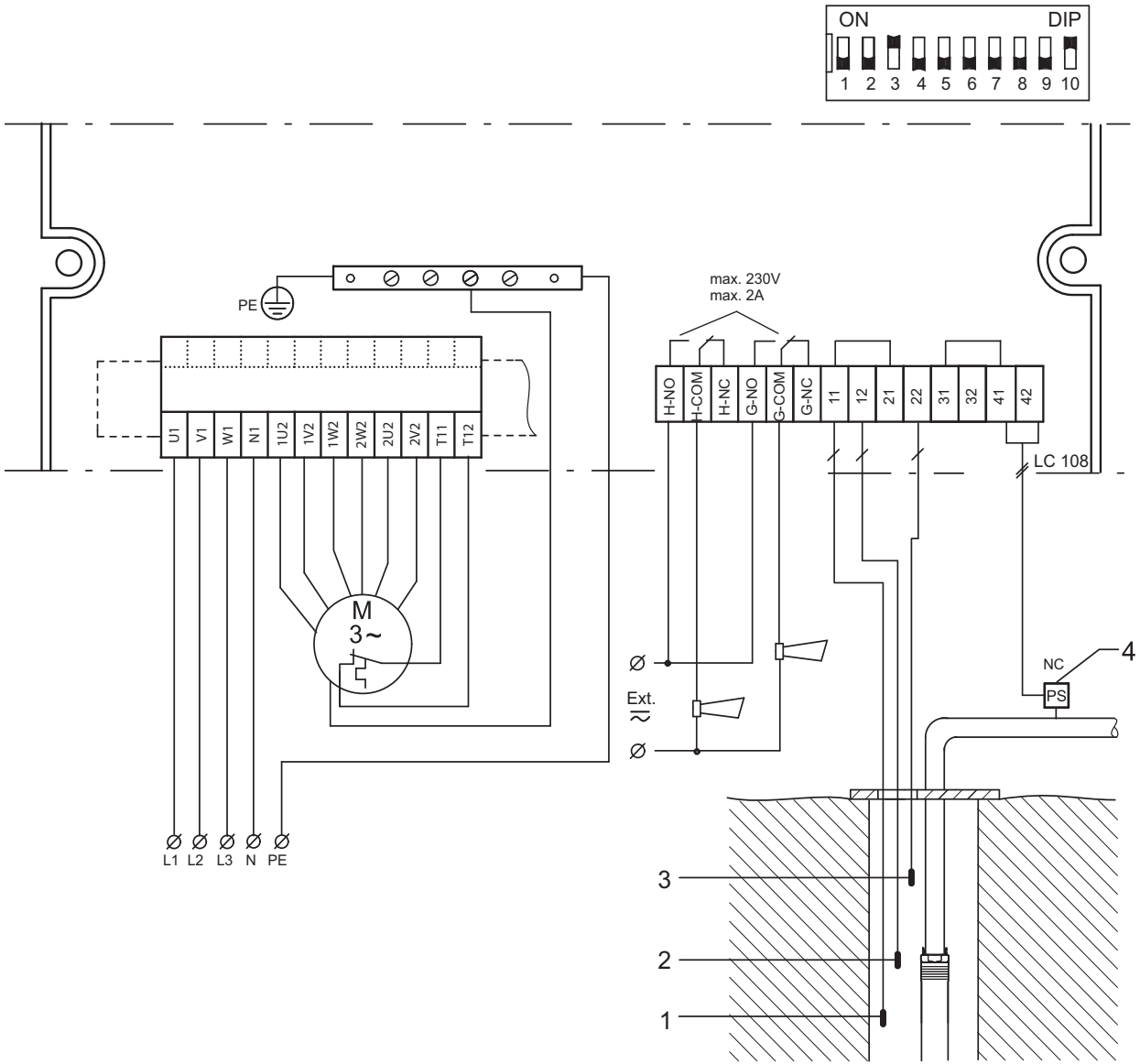
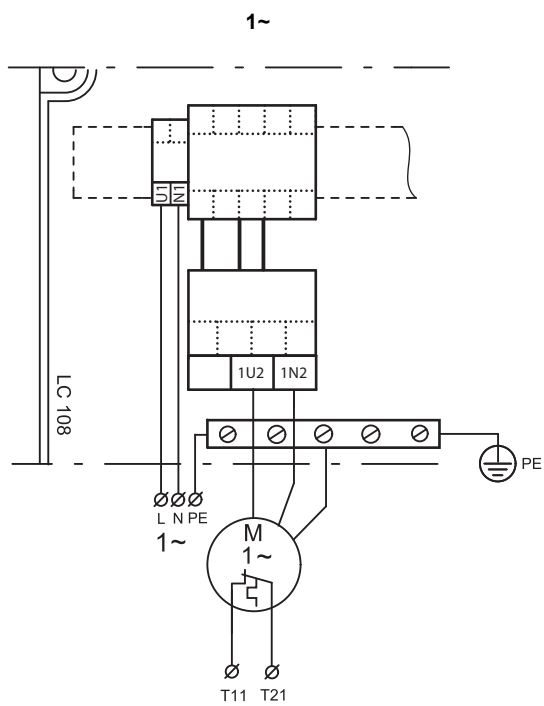
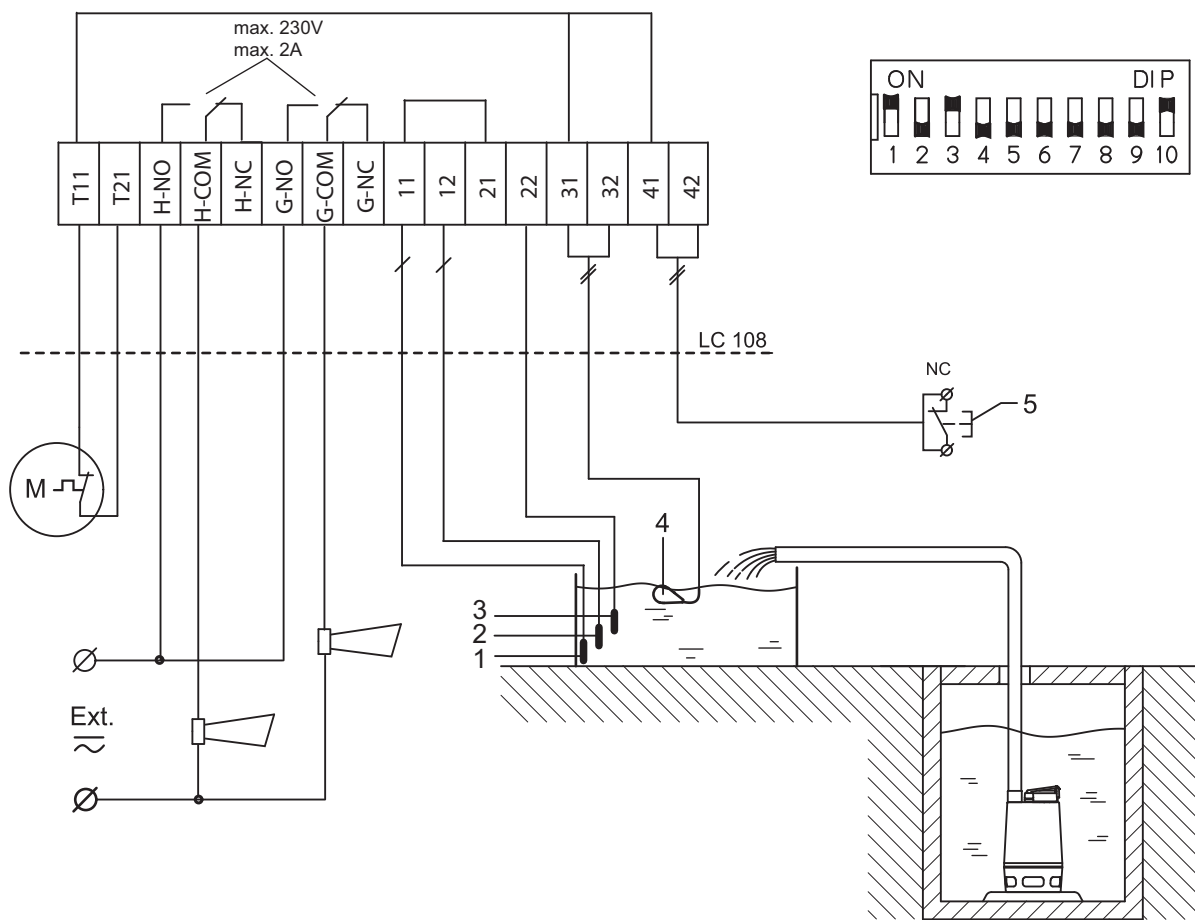
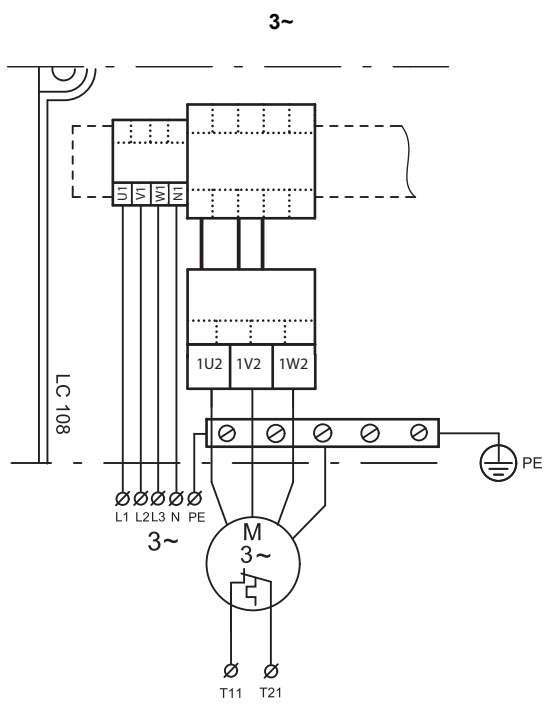


Fig. 10

TM01 8129 1808



TM01 4864 1808



TM01 4862 1808

Fig. 11

TM01 6623 1808

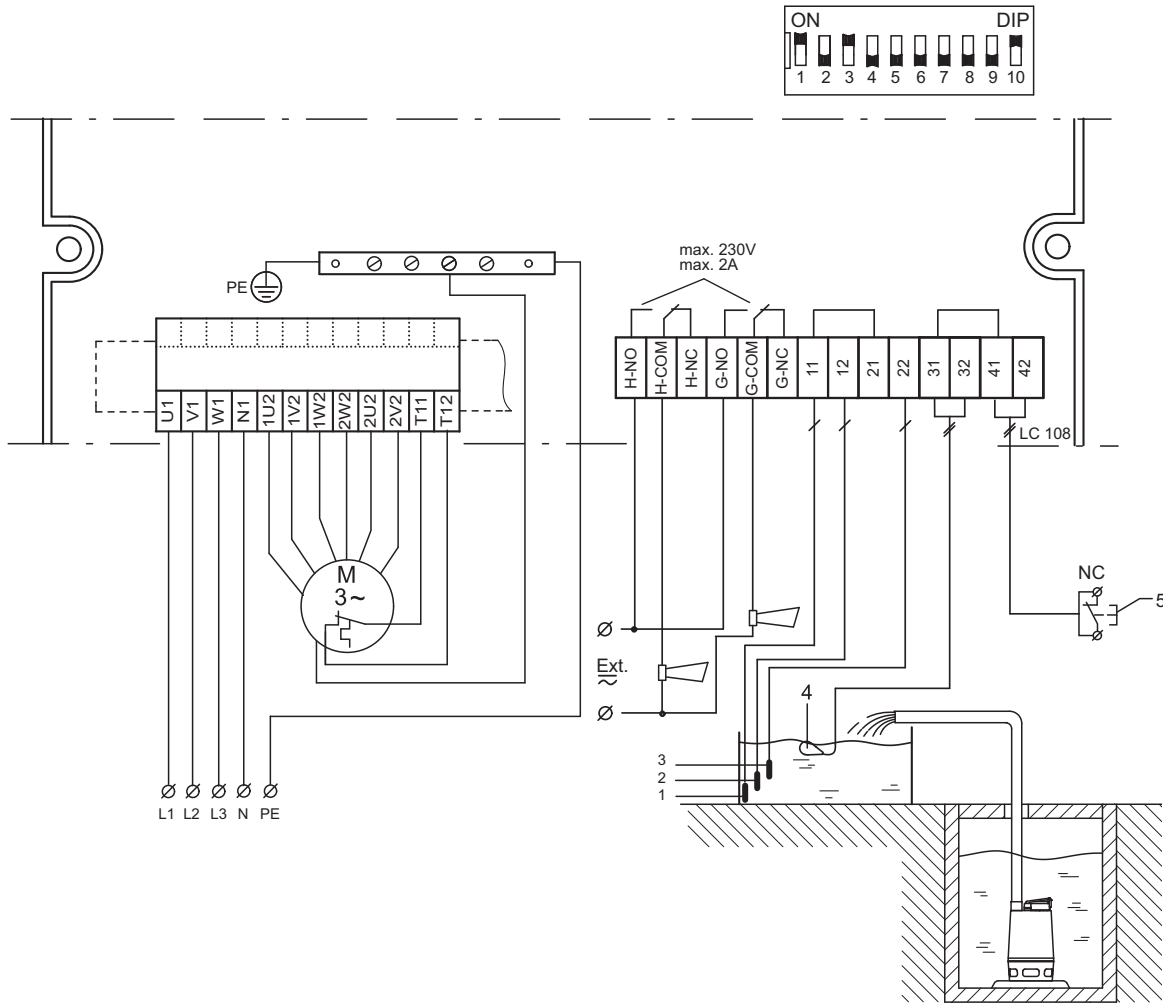
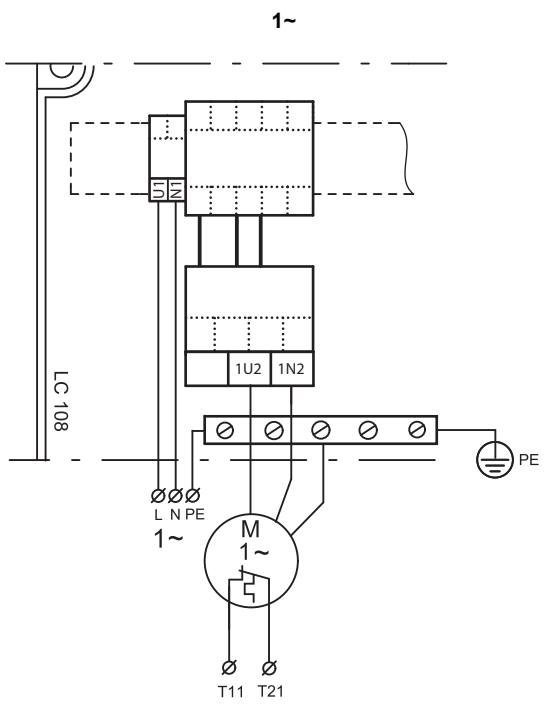
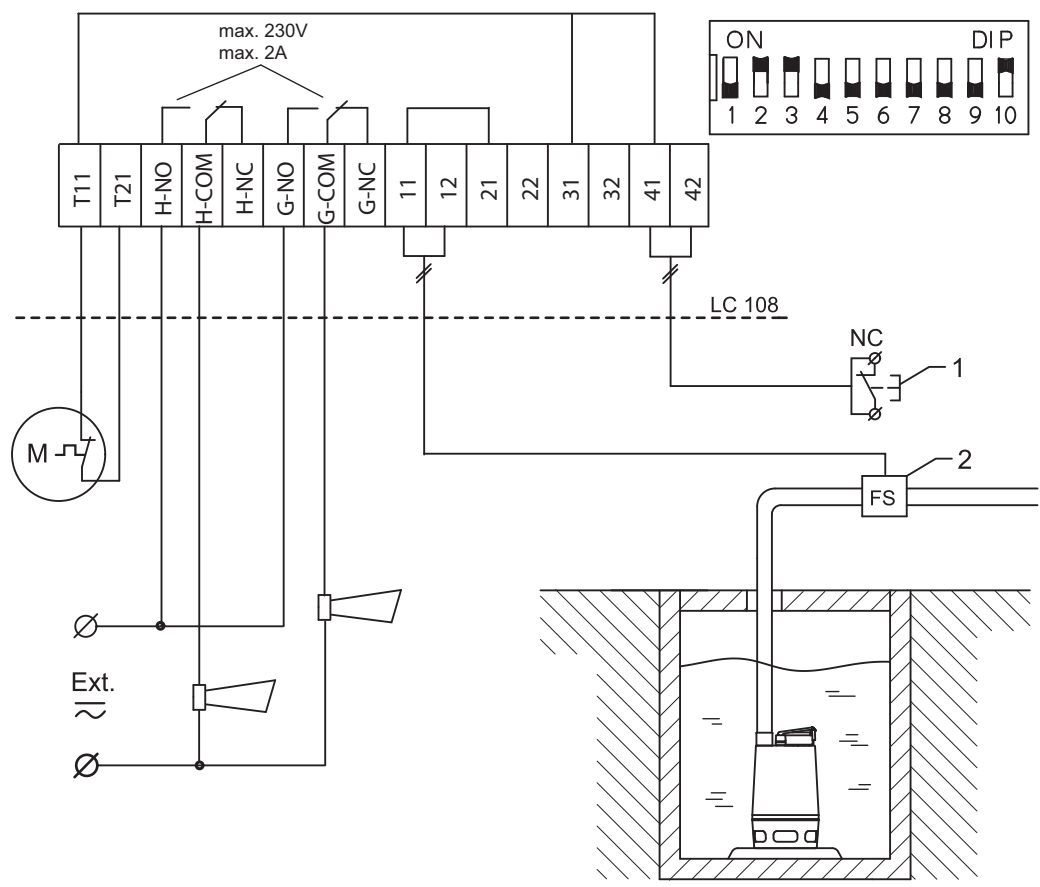
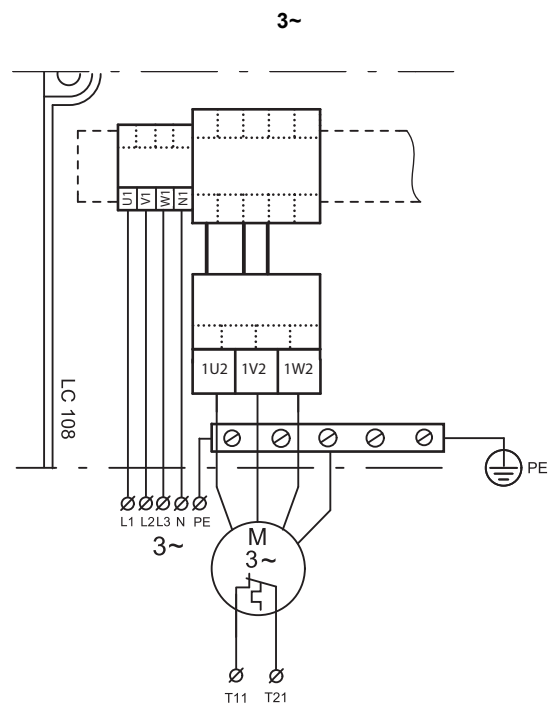


Fig. 12

TM01 8130 1808



TM01 4864 1808



TM01 4862 1808

Fig. 13

TM01 6624 1808



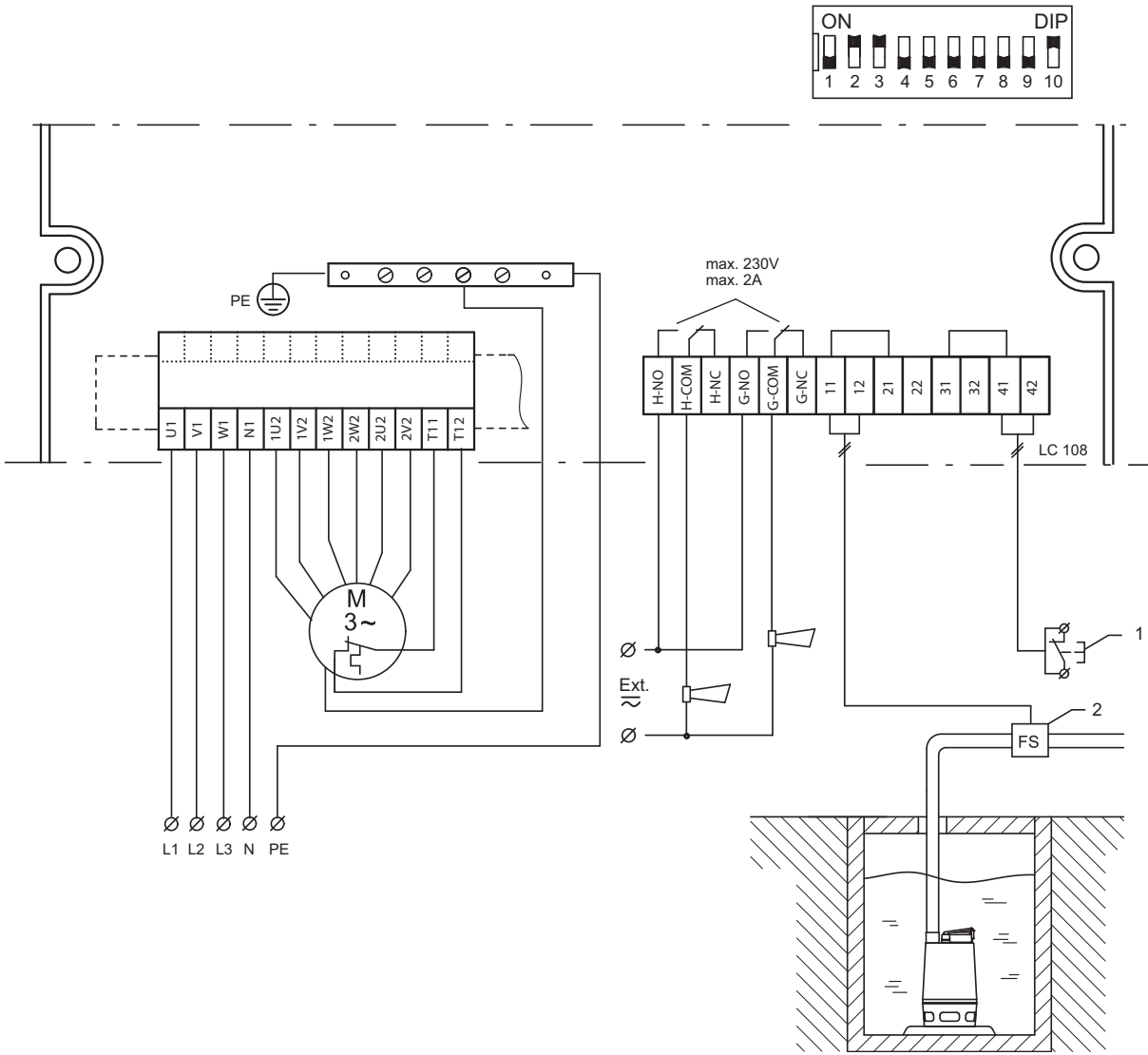


Fig. 14

TM01 8131 1808

## Declaration of conformity

**GB: EC declaration of conformity**

We, Grundfos, declare under our sole responsibility that the products LC/LCD 107, LC/LCD 108, LC/LCD 109 and LC/LCD 110, to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

**HU: EK megfelelési nyilatkozat**

Mi, a Grundfos, egyedüli felelősséggel kijelentjük, hogy a LC/LCD 107, LC/LCD 108, LC/LCD 109 és LC/LCD 110 termékek, amelyekre jelen nyilatkozik vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelveit összehangoló tanács alábbi előírásainak:

**PL: Deklaracja zgodności WE**

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze wyroby LC/LCD 107, LC/LCD 108, LC/LCD 109 oraz LC/LCD 110, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/s ujednoczenia przepisów prawnych krajów członkowskich WE:

**DE: EG-Konformitätserklärung**

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte LC/LCD 107, LC/LCD 108, LC/LCD 109 und LC/LCD 110, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmen:

**NL: EC overeenkomstigheidsverklaring**

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten LC/LCD 107, LC/LCD 108, LC/LCD 109 en LC/LCD 110 waarop deze verklaring betrekking heeft, in overeenstemming zijn met de Richtlijnen van de Raad in zake de onderlinge aanpassing van de wetgeving van de EG Lidstaten betreffende:

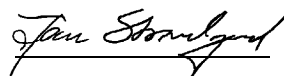
**RO: Declarație de conformitate CE**

Noi, Grundfos, declarăm pe propria răspundere că produsele LC/LCD 107, LC/LCD 108, LC/LCD 109 și LC/LCD 110, la care se referă această declarație, sunt în conformitate cu aceste Directive de Consiliu asupra armonizării legilor Statelor Membre CE:

- Machinery Directive (2006/42/EC).  
Standard used: EN 60204-1:2006.
- Low Voltage Directive (2006/95/EC).  
Standard used: EN 60439-1:2004.
- EMC Directive (2004/108/EC).  
Standards used: EN 61000-6-2:2005 and EN 61000-6-3:2007.

This EC declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 96843432 0115).

Bjerringbro, 15th June 2010



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Person authorised to compile technical file and empowered to sign the EC declaration of conformity.



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