

# Operating Manual

## Roof-mounted Cooling Unit DTT series 6201 Multi Controller (MC) – 400 V, 2~

Original instruction manual – Version 1.4, July 2022



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## 1 About this manual

### 1.1 Use and safekeeping

#### NOTE

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Read the manual before starting any work on the unit/plant.

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#### Observe the following points:

- The manual is part of the unit and must always be available on the product and accessible to the operator. The manual must be kept complete, close to the machine and accessible to the respective authorized persons.
- The unit can only be commissioned, operated and serviced properly with the help of this manual.
- This manual refers only to the product specified on the title page.
- This manual is subject to change in the course of technical progress.
- This manual is part of the scope of delivery.
- This manual is valid from transport until final disposal and must be observed.
- Always keep the manual in a legible condition.
- Leave the manual with the unit in the event of a resale.
- The unit can present unavoidable residual hazards for persons and property. Therefore, personnel must read, understand and observe the manual before beginning any work. In addition, every person who works on and with the unit in any way must be instructed and aware of the possible dangers.
- This manual is aimed only at instructed and authorized specialist personnel.
- The owner must ensure that all persons concerned have read and understood the manual before starting work.
- Illustrations in this manual serve for general understanding and can differ from the actual version.

### 1.2 Exclusion of liability

Pfannenberg is not liable for any errors in this documentation. Liability for indirect and direct damages that occur in connection with the delivery or use of this documentation is excluded insofar as this is legally permitted.

Pfannenberg reserves the right to change this document, including the exclusion of liability, at any time without notice and is not liable for any consequences of this change.

### 1.3 Explanation of the notes

The warnings are indicated by signal words which express the degree of danger.  
The warnings must be heeded to avoid accidents, injuries and property damages.

Explanation of the warnings in this manual:

#### **DANGER**

##### **Brief description of the danger**

The signal word **DANGER** indicates an imminent danger.  
Failure to heed this warning will lead to severe injury or death.

#### **WARNING**

##### **Brief description of the danger**

The signal word **WARNING** indicates a possible danger.  
Failure to heed this warning can lead to severe injury or death.

#### **CAUTION**

##### **Brief description of the danger**

The signal word **CAUTION** indicates a possible danger.  
Failure to heed this warning can lead to minor to moderate injuries.

#### **ATTENTION**

##### **Brief description**

The signal word **ATTENTION** indicates possible property damages.  
Failure to heed the warning can lead to damages to the unit or plant.

#### **NOTE**

The signal word **NOTE** indicates further information about the unit or its use.

## 1.4 Marking of contents

### 1.4.1 Handling instructions

Handling instructions are indicated in this manual as follows:

#### Requirements

Requirements and additional warnings

#### Required tools and materials

Tools and materials required for handling

#### Procedure

1. <Handling steps>
  2. ...
    - <Intermediate result / Further instructions>
  3. ...
- ⇒ <Final result>

### 1.4.2 Links and cross references

Links and cross references are indicated in this manual as follows:

- If this document is available in digital form, the links are interactive. A CLICK will bring you to the desired target.
  - The button combination <ALT> + <Cursor left> always returns you to the starting point.
- The table of contents is also interactive.

#### Cross references (example)

For further information, see section "Links and cross references", page 7.

## 2 Safety

### 2.1 Intended use

The Pfannenberg roof-mounted cooling units of the DTT-series are stationary cooling units for heat dissipation from switch cabinets. The DTT-cooling units are mounted on the switch cabinet roof.

The cooling units have different cooling capacities. See the chapter "Refrigeration circuit", Page 27 for exact capacity data.

The cooling units have a cut-out compatibility with air/air heat exchangers and air/water heat exchangers. The use of aluminum filters, felt filters or bellows filters is possible with an additional adapter.

The cooling units are available with different controllers. Cooling units with a Standard-Controller (SC) or a Multi-Controller (MC) are available. These controllers are control unit for setting refrigeration functions and operating data. They also enable readout of system messages and diagnostic data.

The Multi-Controller (MC) is additionally equipped with a Multimaster function and an energy-saving mode.

- For detailed data of the controller, see chapter "Technical data", Page 27, "Electrical connection", Page 42 and "Operation", Page 52.

All Pfannenberg cooling units are RoHS compliant and free from:

- Silicone compounds
- PCT, asbestos, formaldehyde, cadmium
- Substances that cause wetting defects

### 2.2 Permissible usage conditions

- The permissible ambient air temperature of the DTT-cooling units is at +15 °C to +55 °C (+59 °F to +131 °F).
- The permissible storage temperature of the DTT-cooling units may not exceed +70 °C (+158 °F).
- Operation of the DTT-cooling units is only permissible with stationary assembly and with the switch cabinets closed.

### 2.3 Foreseeable misuse

The following points describe a foreseeable misuse of the unit:

- Use of the unit as a storage place, work platform.
- Attachment of transport aids.
- Installation in unsuitable locations.
- Outdoor operation.
- Operation outside of the permissible technical data. See section "Technical data".
- Operation without or with damaged sub-assemblies which serve for the safety of persons and the unit/plant.
- Use of cooling media not listed and approved in the "technical data".
- Cooling of media and objects not intended for operation of the unit.
- Blocking of the ambient air inlets and outlets by set down objects for example.

### 2.4 Duty of the operator

- The operator must ensure that the cooling units are only used for their intended purpose and that all hazards pertaining to the life and health of users or third parties are avoided. The accident prevention guidelines and safety regulations must also be observed.
- Unit faults must be responded to immediately.
- The owner must ensure that all users have read and understood this operating manual.

Non-compliance with this operating manual will void the warranty. The same applies if improper work has been carried out on the unit by the customer and/or third parties without the consent of the manufacturer.

## 2.5 Terms of warranty

### ATTENTION

#### Loss of warranty!

Loss of warranty due to spare parts from other manufacturers.

- Only original parts are subject to quality control by the manufacturer.
- The use of spare parts from other manufacturers will lead to loss of warranty.
- Only use original manufacturer parts to ensure safe and reliable operation.

The warranty does not apply or shall expire in the following cases:

- Improper use of the unit.
- Non-compliance with the operating conditions or non-observance of the operating manual.
- Irregular maintenance of the cooling units.
- Damage due to failure to observe the maintenance recommendations.
- Damage to cooling units caused by dirty or blocked filters.
- Damage due to unauthorized opening of the refrigeration circuit.
- Modifications made to the unit or any change in the serial number.
- Transport damage or other accidents.
- Replacement of parts by unauthorized personnel.

#### 2.5.1 Returning units

The following must be observed to assert warranty claims and to return the unit:

- Attach a precise description of the defect and the SRO (RMA) number assigned by Pfannenberg to the cooling unit.
- Enclose proof of purchase (copy of delivery note or invoice).
- Send the cooling unit with all supplied accessories, in original box or equivalent packaging, free of transport charges and insured.
- Observe transport instructions, see section "Transport", Page 30.

### 3 Unit description

#### 3.1 Application description

##### **⚠ WARNING**

Risk of injury due to impermissible use of the units.

Improper use of units can lead to serious accidents.

- Only use cooling units in stationary operation.

The Pfannenberg roof-mounted cooling units of the DTT-series are designed for heat dissipation from switch cabinets. The innovative arrangement of the climate circuits prevents a cold bridge to the switch cabinet,; the risk of condensate forming in the switch cabinet is avoided.

The evaporator unit in the upper section of the cooling units guarantees trouble-free condensate separation without switch cabinet contact.

- The cooling units operate with refrigerant that is very difficult to ignite and is not harmful to the ozone layer.
- The DTT-cooling units are only approved for stationary operation.

As cooling units of protection class IP 54, the cooling units are largely dust-protected.

Limitation: Dust can penetrate despite this under permanent exposure. The cooling units withstand splash water but not a continuous water jet.

#### 3.2 Scope of delivery

The scope of delivery consists of:

- DTT-cooling unit
- Brief operating instructions of the cooling unit
- Accessory kit: According to unit type - e.g. seal, fixing material, electrical plug connectors
- Special accessories if required (e.g. TS2-temperature sensor for cooling units with Multi-Controller (MC))

#### 3.3 Ordering options

##### **ATTENTION**

##### **Damage to the unit!**

Damage to the unit due to non-genuine spare parts.

- Only original parts are subject to the manufacturer's quality control.
- For safe and reliable operation, use only original parts of the manufacturer.

See chapter "Spare parts and accessories", Page 77 for Pfannenberg part numbers for spare parts.

An optional extension by a filter adapter for different filter mats (felt filter, pleated filter and metal filter) is available.

DTT-cooling units offer the additional option of a quick-change frame. It allows easy, convenient replacement of the cooling units. The cooling units have different sizes.

- For the Pfannenberg part numbers for accessory orders, see chapter "Spare parts and accessories", Page 77.

3.4 Functional description

3.4.1 Air circuit

**CAUTION**

**Risk of burns**  
Risk of burns due to high temperatures at the ambient air outlet. The air outlet can get very hot depending on the ambient temperature.

- Do not hold any parts of the body directly in front of the ambient air outlet (A).

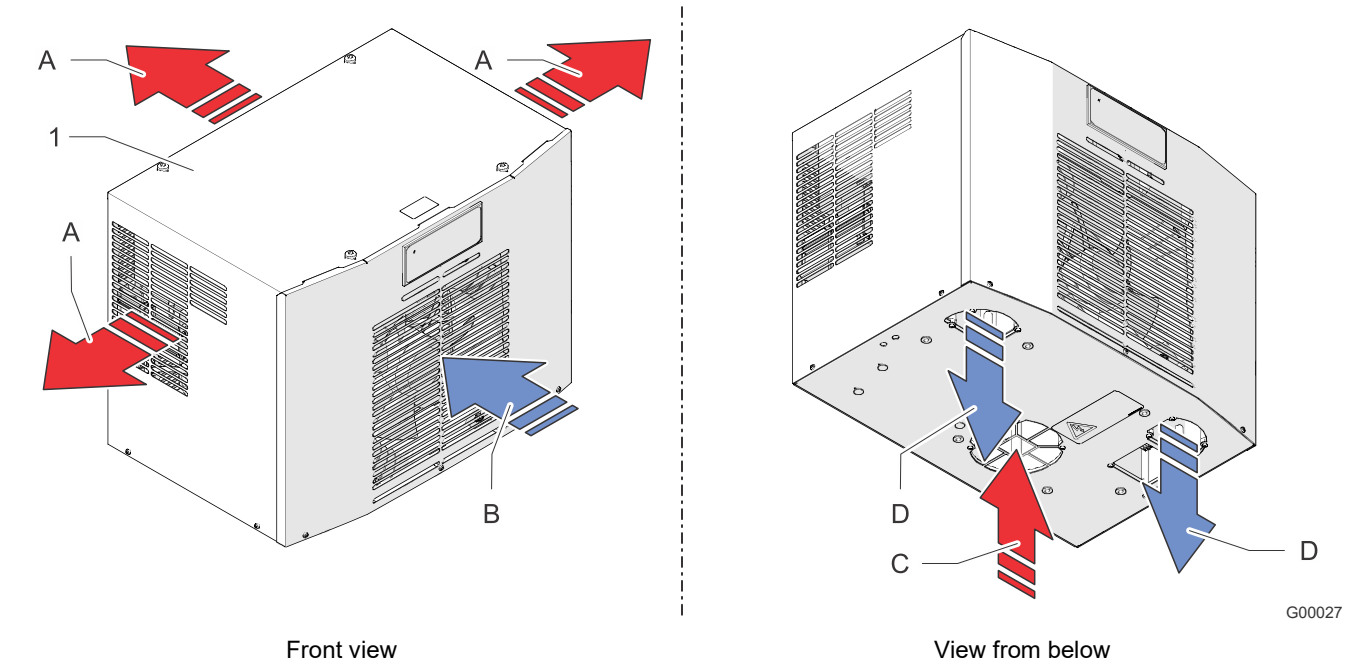
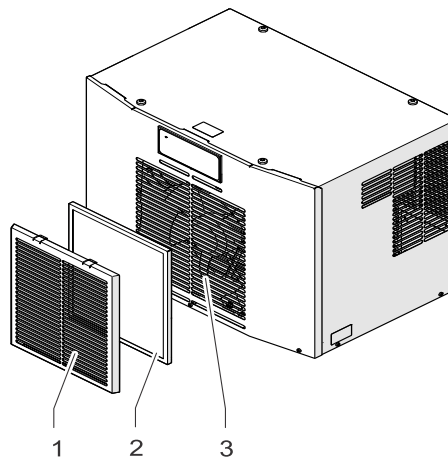


Fig. 1: Air circuit switch cabinet DTT

A	Ambient air outlet	1	DTT-cooling unit
B	Ambient air inlet		
C	Hot air inlet (switch cabinet)		
D	Cold air outlet (switch cabinet)		



### 3.4.2 Filter adapter (option)



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*Fig. 2: Filter adapter on the cooling unit*

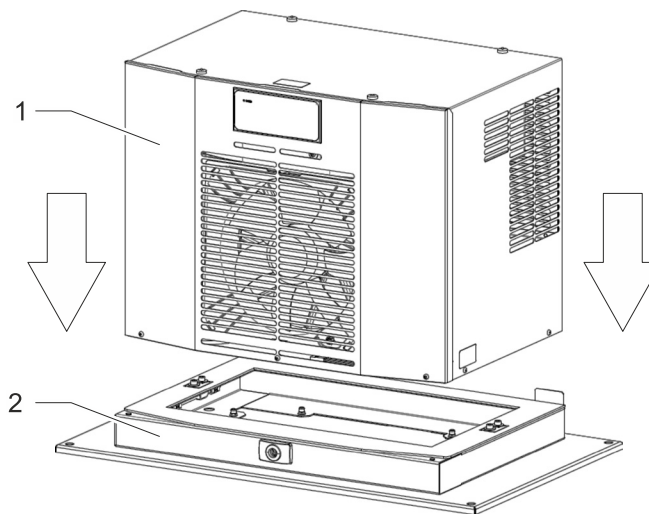
For permanent protection of the external air circuit from contamination, the optional filter adapter (1) can be fitted with a filter mat (2) at the air inlet (3) of the cooling unit.

The filter adapter (1) is simply clipped into the air inlet (3). Only one filter adapter per unit is needed. All filter types are suitable for the adapter.

Order number	Description
18310000151	Filter adapter, RAL 7035
18300000147	Felt filter (standard, dusty air without oil vapors)
18300000148	Pleated filter (longer life, dusty air without oil vapors)
18300000149	Aluminum filter (oily air)

*Tab. 1: Order information filter adapters and filter mats*

### 3.4.3 Quick-change frame (option)



G00028

*Fig. 3: Quick-change frame*

DTT-cooling units (1) with quick-change frames (2) are quick and easy to assemble. The flexibility allows easy, convenient replacement of the cooling units.

#### **NOTE**

Quick-change frames that are assembled with a "Performance-Cut" offer optimum cooling unit performance at minimum current consumption, see chapter "Dimensions of "Performance-Cut" unit cut-out", Page 34.

#### 3.4.4 Flat duct system (option)

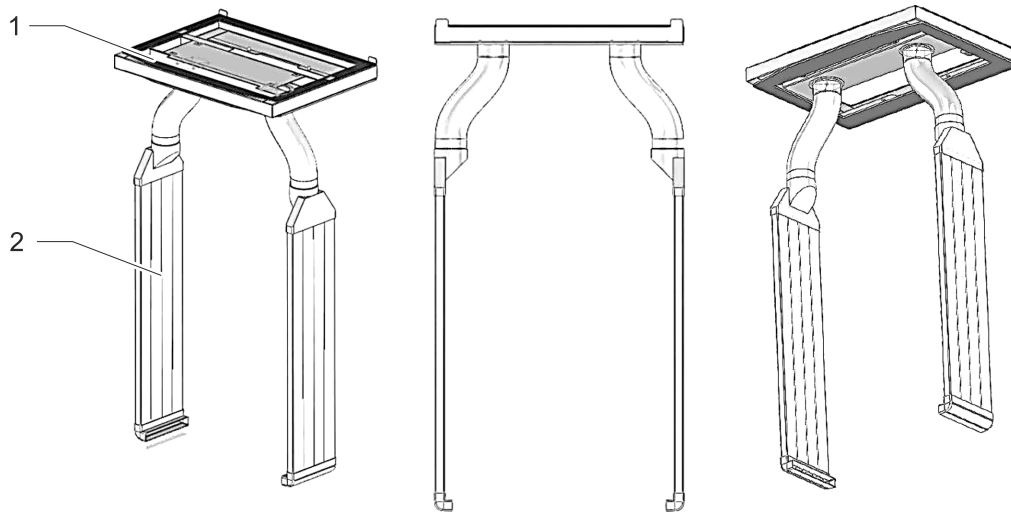
##### **⚠ WARNING**

##### **Danger of fire due to short-circuits**

Formation of condensate in the switch cabinet can lead to a fire risk due to short-circuits.

Condensate can form on the flat duct system.

- Check the flat duct system in the switch cabinet regularly for condensate formation.
- Shut down the unit immediately and inform your superiors if condensate forms.
- Find and remedy the cause of the condensate formation (e.g. switch cabinet not sealed tightly).



G00029

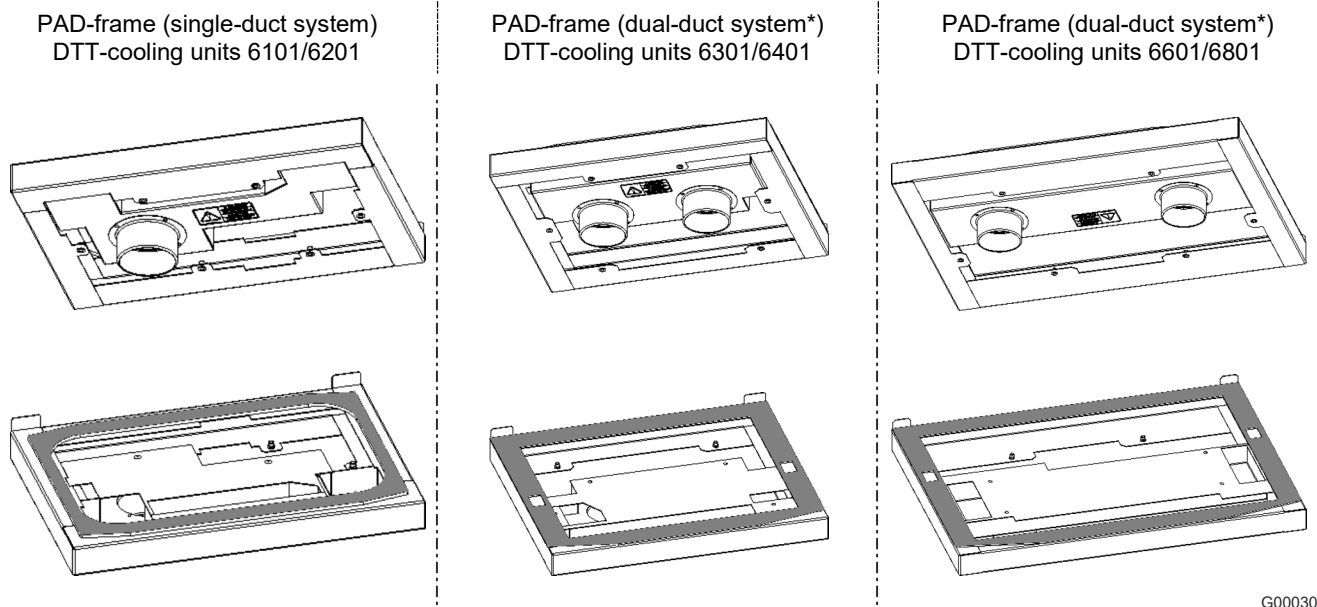
*Fig. 4: Flat duct system*

The flat duct system (2) supports the air distribution in confined switch cabinets. It ensures optimized cooling unit capacity with adapted current consumption. The flat duct system (2) is used with a PAD-frame (1).

### 3.4.4.1 PAD-frame

Three different PAD-frames are provided for the flat duct system (see Fig. 5):

- DTT-cooling units 6101/6201 size 1 (500 W/1000 W): PAD-single-duct system with PAD-single-duct frame.
- DTT-cooling units 6301/6401 size 2 (1500 W/4000 W): PAD-dual-duct system with PAD-dual-duct frame.
- DTT-cooling units 6601/6801 size 3 (1500 W/4000 W): PAD-dual-duct system with PAD-dual-duct frame.



G00030

Fig. 5: PAD-frame

- \* The PAD-dual-duct system requires the use of two PAD-air duct systems.

The DTT-cooling units need the following PAD-frames and the following PAD-air duct system:

Order number	Designation	Order number	Designation
1831500005	DTT 6101/6201 PAD-frame (single-duct system)	1831500002	PAD-air duct system*
1831500001	DTT 6601/6801 PAD-frame (dual-duct system*)	1831500004	PAD-extension package
1831500000	DTT 6301/6401 PAD-frame (dual-duct system*)		

Tab. 2: Ordering information for PAD-systems

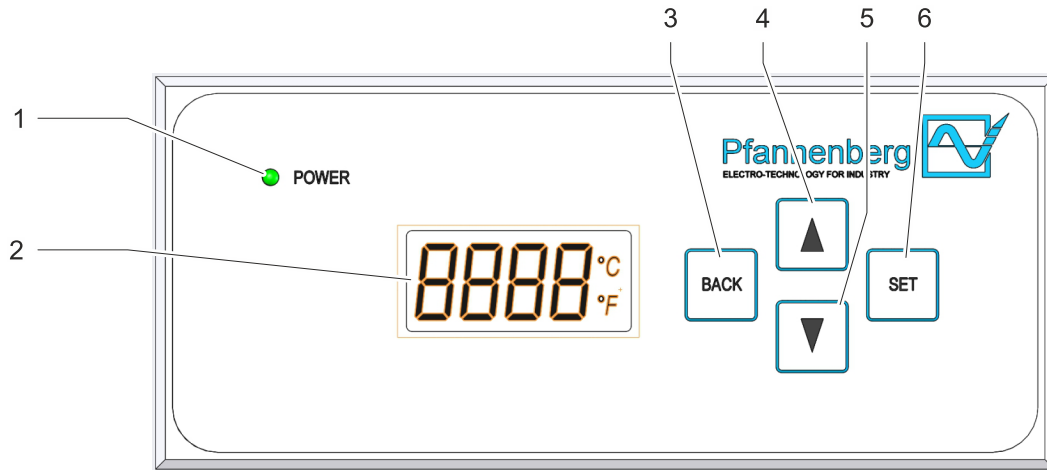
- \* The PAD-dual-duct system requires the use of two PAD-air duct systems.

### 3.4.5 Controller

The controllers are control units for setting refrigeration functions and operating data. They allow readouts of system messages and diagnostic data.

The controllers have a service interface at which different configurations are possible.





They also have a connection for collective fault signals.



G00018

Fig. 6: Control unit Multi-Controller (MC)

1	LED light	4	SCROLL UP button
2	Control panel	5	SCROLL DOWN button
3	BACK button	6	SET button





Operating/display element	Function
LED light	Indicates the operating mode: Continuous light = fault-free / flashing = operating fault
Control panel (4-digit)	Shows system information: Temperature measuring unit, energy function, operating mode, system data, error number and menu settings/menu items/menu level.
BACK button 	<ul style="list-style-type: none"> <li>Activation of the menu settings.</li> <li>Jump back to the next highest menu level.</li> </ul>
SCROLL UP / DOWN button  	SCROLL UP / DOWN of the menu items or the display elements, in the current menu level.
SET button 	<ul style="list-style-type: none"> <li>Selection of the current menu item.</li> <li>Jump to the next lowest menu level.</li> </ul>

Tab. 3: Operating and display elements on the Multi-Controller

Cooling units with a Multi-Controller (MC) have a control unit with a green LED light and a control panel. The control unit is on the unit cover.

Steady lighting of the green LED light when mains voltage is applied indicates fault-free operating mode. System information is displayed on the control panel.

The following system information displays are possible:

Control panel	System information
	Display – Temperature (°C/°F) of the control sensor in normal operating condition.
	Display – Execute stop mode. Door is open. Alternating display with temperature and stop mode, for fault Er00. Display: StoP → Er00 → Temperature.
	Display - Execution of the energy function, is activated in energy-saving mode Alternating display with temperature display (°C/°F).
	Display - Error number when a fault occurs. In case of a fault, error number (Er01-Er15) alternating with temperature display (°C/°F). Exception error Er00: StoP → Er00 → Temperature.

Tab. 4: System information on the Multi-Controller

For details of error messages, see "Error messages", Page 69.

### 3.4.6 Refrigeration circuit

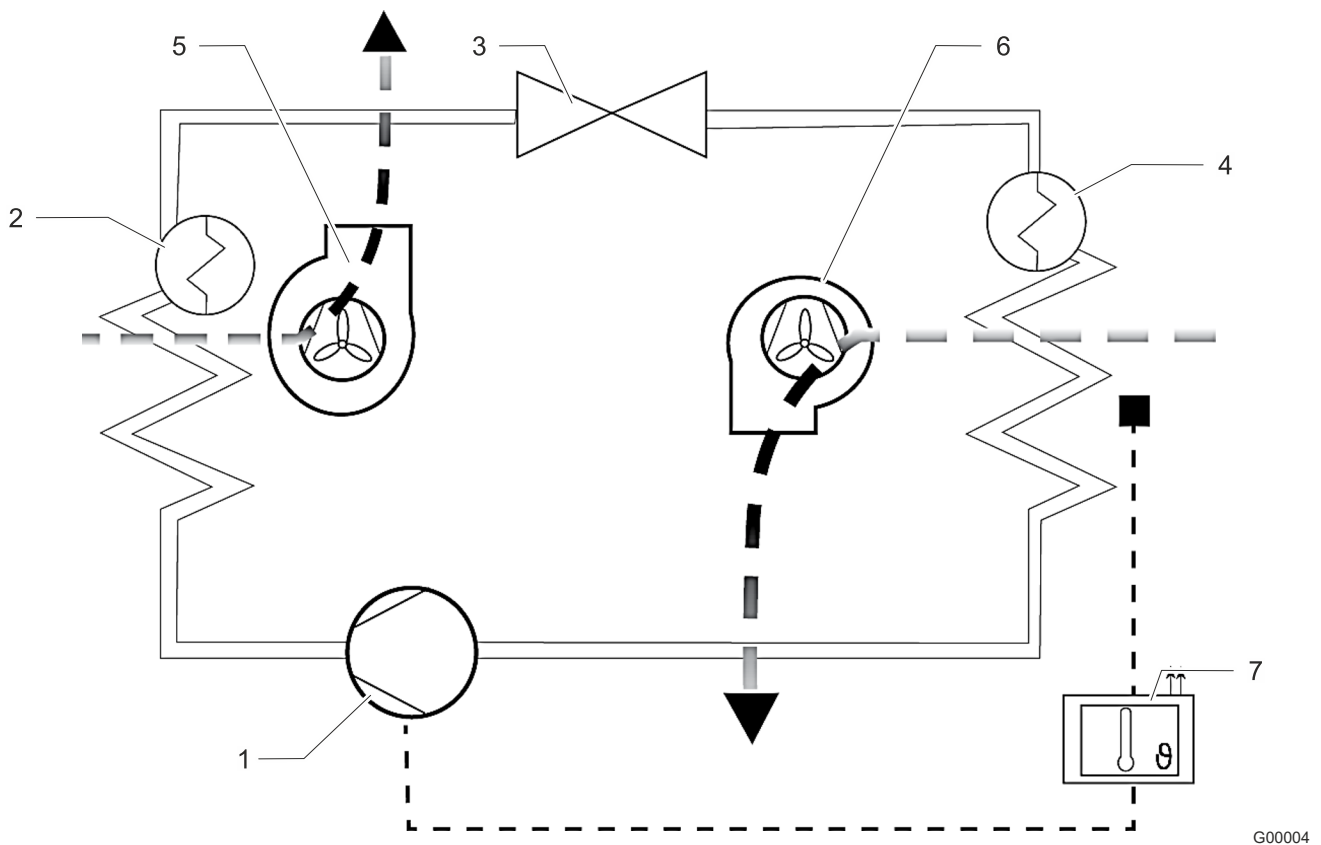


Fig. 7: Refrigeration circuit

1	Compressor	5	Condenser (external)
2	Condenser	6	Evaporator fan (internal)
3	Expansion valve	7	Electronic control with temperature sensor
4	Evaporator		

The cooling units consist of different components, see Fig. 7.

- The compressor (1) compresses the refrigerant with high pressure. The temperature rises.
- This heat is dissipated into the ambient air in the condenser (2). The refrigerant becomes liquid.
- The condenser fan (5) sucks in room air through the condenser (2) and discharges it into the ambient air.
- If the refrigerant passes through the expansion valve (3), there is a drop in pressure.
- In the evaporator (4), the refrigerant draws heat from the air inside the cabinet and evaporates it. The air inside the cabinet is cooled and dehumidified.
- The evaporator fan (internal) (6) sucks in the air from inside the cabinet through the evaporator (4) and feeds it back into the switch cabinet as cool air.

The cooling units are controlled by a temperature sensor (7). It measures the air inside the switch cabinet.

### 3.4.7 Safety concept

#### **WARNING**

##### **Risk of injury due to modified safety devices.**

Non-functional, modified or defective safety devices lead to serious accidents.

- All modifications to the unit and especially the safety devices are prohibited.
- In case of defective safety devices, shut down the unit immediately and take it out of operation.

#### 3.4.7.1 Safety devices

- The cooling units have a tested pressure switch in accordance with EN 12263. The pressure switch reacts to a pressure increase in the refrigeration circuit by switching off automatically.
- The fans and compressors are protected against overloading and overheating. For example, the compressor is protected against overspeeding.

#### 3.4.7.2 Additional protection function

Only cooling units with antifreeze option.

- The compressors and fans switch off if there is a danger of freezing.
- The unit must be restarted to exit this switch-off function.



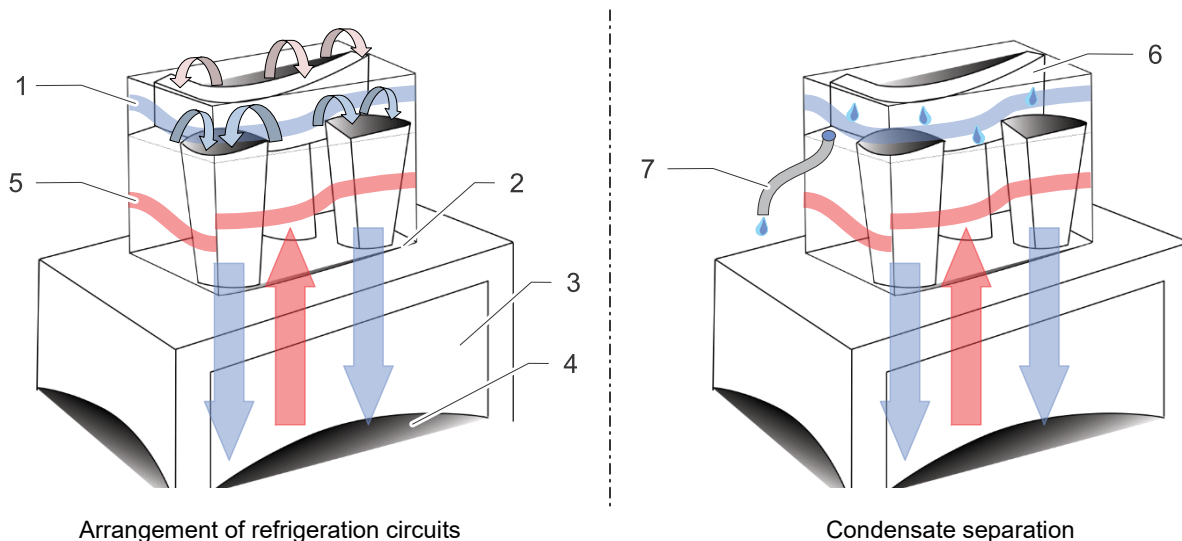
### 3.4.8 Condensate treatment

#### ATTENTION

##### Damage to the switch cabinet components by formation of condensate

Switch cabinet interior temperatures below the dew point of the ambient air or damaged switch cabinet seals can lead to excessive condensate formation.

- Check the switch cabinet seals regularly to avoid excessive formation of condensate due to penetrating ambient air.
- Install a door contact switch to reduce formation of condensate when the switch cabinet is open.



G00032

Fig. 8: Refrigeration circuits and condensate separation

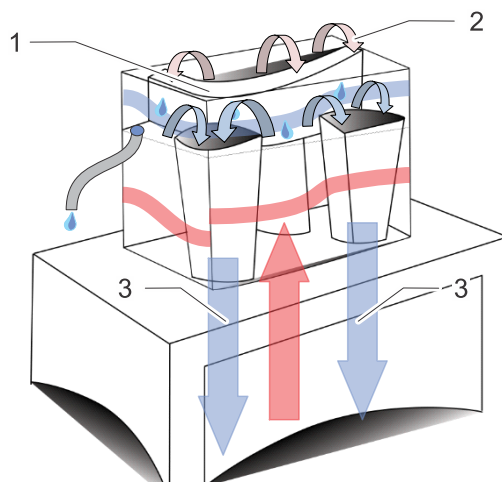
The main feature of the DTT-cooling units is the repositioning of the refrigeration circuits.

The cold circuit (1) is on top and the warm circuit (5) on the bottom. No cold bridge (2) to the switch cabinet (3) can occur and therefore no condensate forms in the switch cabinet interior (4), see figure Refrigeration circuits.

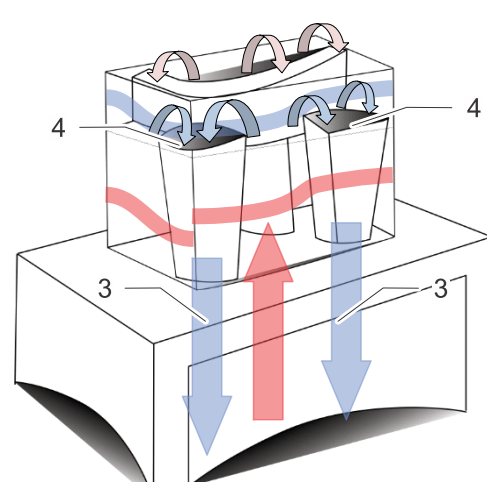
The evaporator unit (6) is located in the upper section of the DTT-cooling unit so that vertical separation of condensate is possible. The condensate has no contact with the switch cabinet.

For safety reasons, the condensate evaporator has a drain nozzle with drain hose (7) through which the excess condensate is discharged from the unit.

The condensate discharged by the drain hose (7) can be collected by the condensate collection bottle available as an accessory (see "Spare parts and accessories", Page 77).



Evaporator function



Air cooling

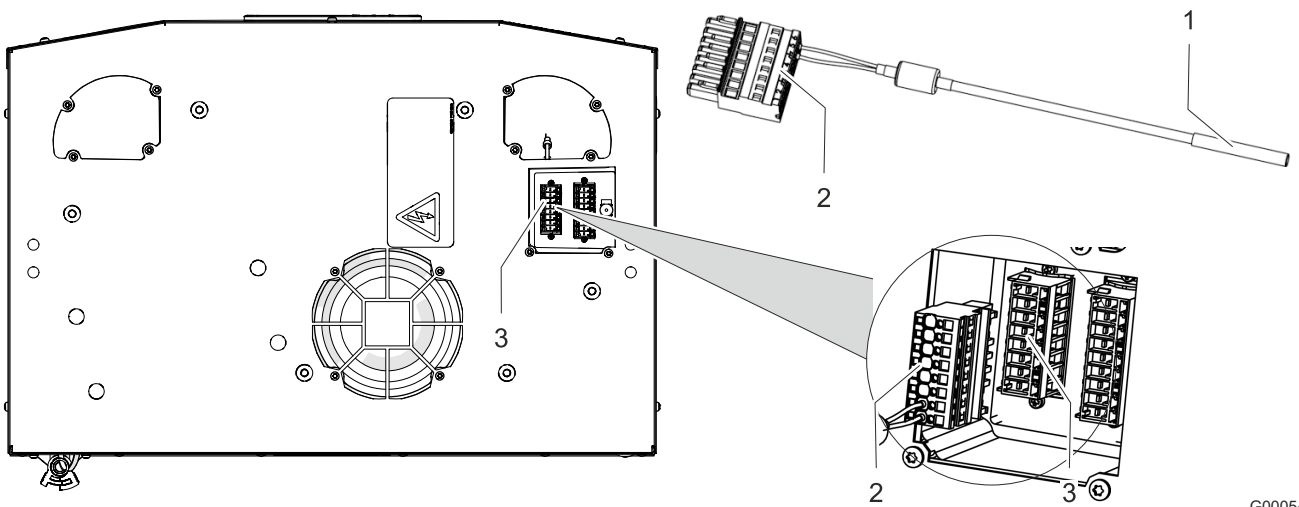
G00033

*Fig. 9: Cooling function*

Concentrated warm air forms condensate when it hits the evaporator. The warm air (2) is distributed over a large area on the evaporator (1) in the DTT-cooling unit. The resulting reduced air velocity prevents eddy currents so that the air stream (3) in the direction of the switch cabinet is condensate-free.

DTT-cooling units have air outlet nozzles (4) arranged on both sides instead of air hoses. These air output nozzles (4) accelerate the cold air (3) and dissipate it condensate-free to the floor of the switch cabinet.

### 3.4.9 Energy-saving mode



G00054

Fig. 10: Temperature sensor - TS2

Cooling units with Multi-Controllers (MC) are equipped with an energy-saving module.

The Multi-Controller (MC) therefore has a connection for a second TS2 temperature sensor (1).

The TS2 temperature sensor (1) is installed externally on the cooling unit and monitors the switch cabinet interior temperature.

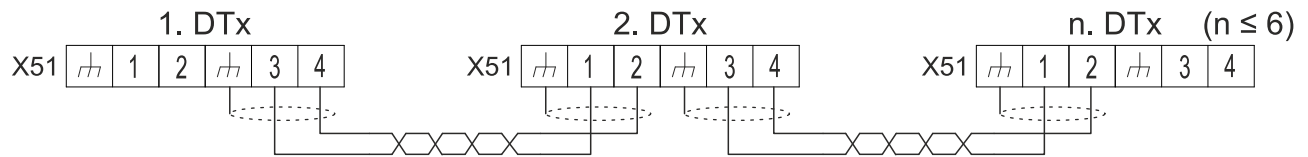
#### Functional description:

- In the delivery condition, the energy-saving mode is activated when cooling mode is not activated for 30 minutes. The control panel then shows "En", see section "Controller", Page 17.
- If the switch cabinet interior temperature exceeds the temperature setpoint during active operation, a cooling request is sent and the energy-saving mode is interrupted.
- The cooling mode always remains active until the temperature setpoint minus hysteresis is reached. The energy-saving mode is always activated 30 minutes after reaching the temperature setpoint.
- If the external TS2 temperature sensor (1) measures a drop below the temperature setpoint in the energy-saving mode, the evaporator fan (internal) switches off. The temperature setpoint is measured minus the hysteresis.
- If the external TS2 temperature sensor (1) measures exceeding of the temperature setpoint, the evaporator fan (internal) switches on. The value of the temperature setpoint is measured plus hysteresis.
- If no fault occurs, the fault indication output in energy-saving mode is closed.

#### NOTE

- For details about the electrical connection, see chapter "External temperature sensor TS2", Page 47.

### 3.4.10 Multimaster function



G00020

Fig. 11: Multimaster Control

The Multimaster function can control up to six cooling units in the system (bus function). Several cooling units are connected with each other by a 2-wire bus for this.

#### Functional description

- In the bus function, the cooling unit that reaches the switching threshold " $T_{nom} + 2K$ " first activates the cooling mode.
- It is ended by the cooling unit that drops below the switching threshold " $T_{nom} - 2K$ " last.
- The energy-saving mode is ended by the cooling request of one of the cooling units in the bus function.
- The energy-saving mode is reactivated 30 minutes (delivery condition) after the last cooling request of one of the cooling units in the bus function.
- If the minimum temperature alarm is triggered ( $Lit_{-}$ , falling below the lower temperature limit), check the affected unit. If the unit is part of a Multimaster system, the cooling requirement can be forced from another unit. If this is the case, the proper functioning of each unit involved in Multimaster operation must be checked.

#### NOTE

- All cooling units in the bus function can activate or end the cooling mode or the energy-saving mode. There is no "master and slave function".
- For details of the electrical connection, see section "Multimaster Control", Page 44.

### 3.5 Type plate

#### ⚠ WARNING

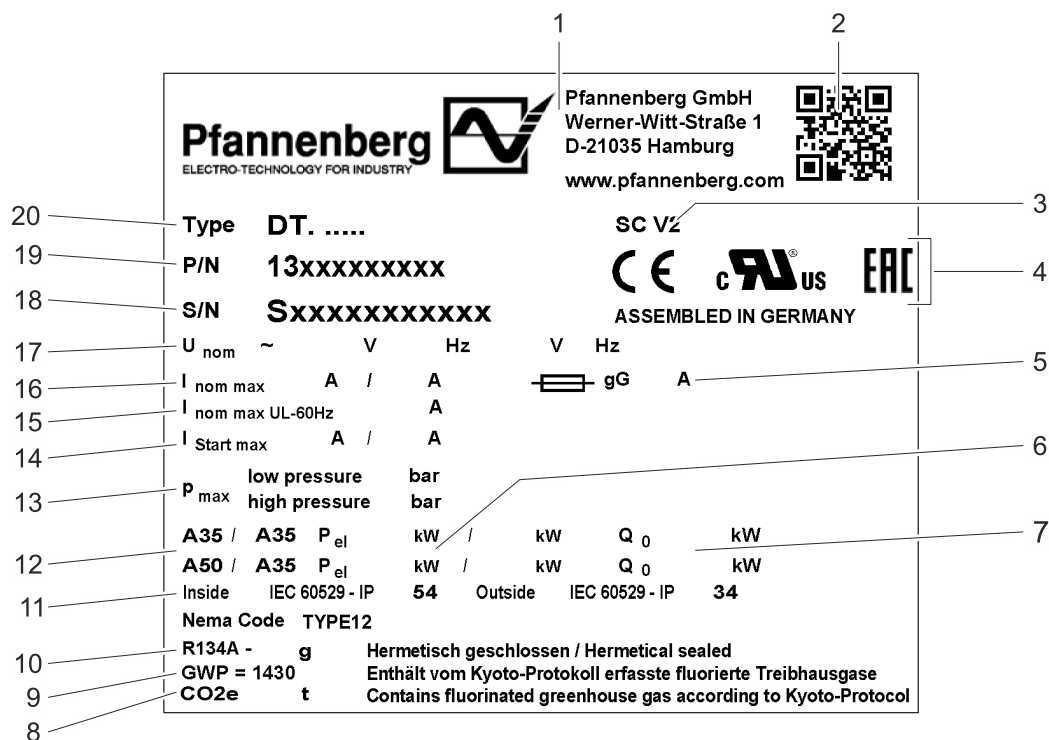
##### Risk of injury

Risk of injury due to failure to heed the type plate specifications.

- Always observe the information on the type plate when installing and maintaining the units.

#### NOTE

- The type plate is on the back of the cooling unit housing.
- The figure shows the standard design adopted by EU member states. The type plate design may differ in other countries.



G00005


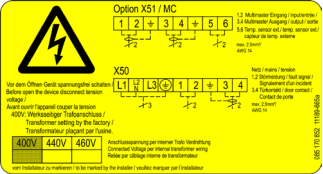
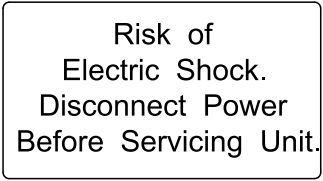
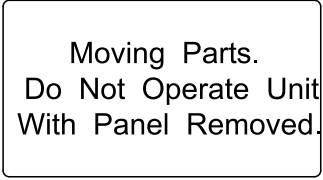
Fig. 12: Type plate for EU member states (example)

1	Manufacturer logo	11	Protection category
2	QR code	12	Exterior/interior ambient conditions
3	Options	13	Refrigerant pressures
4	Designations/approvals	14	Start-up current
5	Protection	15	Nominal current (UL 60 Hz)
6	Electrical power consumption	16	Nominal current
7	Cooling capacity	17	Rated voltage/frequency
8	CO2 equivalent value	18	Serial number
9	Global Warming Potential	19	Part number
10	Refrigerant	20	Unit type

### 3.6 Signs and symbols on the unit

The signs and symbols attached to the unit must be observed.

The signs and symbols attached to the unit must not be removed and must be kept in a fully legible condition. Damaged or illegible signs and symbols must be replaced.

Sign/Symbol	Position	Description
	Unit underside at the connection for the protective equipotential-bonding	Protective equipotential-bonding for the connection of metal components and dissipation of a possible touch voltage.
	Unit underside	<b>Connection diagram</b> <b>Warning</b> – Disconnect power before opening the unit <b>X51</b> – connection terminals Multimaster input/output <b>X50</b> – connection terminals mains supply, door contact and fault indication
	Unit cover, front right	<b>Warning</b> – Danger of electric shock. Switch off power to the unit before working on the unit.
	Unit cover, top center	<b>Warning</b> – Moving parts. Do not operate the unit without the unit cover.

Tab. 5: Signs and symbols on the unit

### 3.7 Technical data

#### 3.7.1 Refrigeration circuit

Designation		Model DTT 6201
Cooling capacity at A35 / A35 */*	Q <sub>0</sub> 50 Hz	1000 W
	Q <sub>0</sub> 60 Hz	1100 W
Cooling capacity at A50 / A35 */*	Q <sub>0</sub> 50 Hz	600 W
	Q <sub>0</sub> 60 Hz	640 W
Refrigerant type *		R134A
Refrigerant quantity *		400 g
Temperature setpoint (factory setting)		+35 °C (+95 °F)
Fault indication: Switch cabinet interior temperature (factory setting)		SC-Controller: > +50 °C (+122 °F)
		MC-Controller: > +52 °C (+125.6 °F)
Ambient air temperature		+15 °C (+59 °F) to +55 °C (+131 °F)
Switch cabinet interior temperature		+25 °C (+77 °F) to +45 °C (+113 °F)
Air volume flow, exterior circuit		1820 m³/h
Air volume flow, interior circuit		570 m³/h
Condensate separation		Condensate evaporator
Sound pressure level (1 m)		≤ 62 dB(A)

Tab. 6: Refrigeration data

\* Data on the type plate.

#### NOTE

The use of optional filter mats reduces the cooling capacity

#### 3.7.2 Electrical data

Designation		Model DTT 6201
Rated voltage * ***		400 V, 2~
Rated frequency *		50/60 Hz
Functional area		DIN IEC 60038
Power consumption * A35 / A35	P <sub>el</sub> 50 Hz	530 W
	P <sub>el</sub> 60 Hz	660 W
Condensate evaporator power consumption	P <sub>el</sub>	30 to 110 W (A35/A35 approx. 70 W)
Nominal current *	I <sub>nom max</sub> 50 Hz	1.6 A
	I <sub>nom max</sub> 60 Hz	1.7 A
Start-up current *	I <sub>Start max</sub> 50 Hz	5.2 A
	I <sub>Start max</sub> 60 Hz	6.2 A

\* Data on the type plate.

\*\*\* Adapt the upstream fuse if the rated voltage changes, see "Adapting the unit to the mains voltage", Page 51.

### 3.7.3 Dimensions

Designation	Model DTT 6201
Height	451 mm
Width	588 mm
Depth with cover (standard)	393 mm
Weight	40 kg
Installation attitude	Vertical
Unit construction	Standard: Steel sheet/plastic

### 3.7.4 Other unit data

Designation	
Anti-corrosion protection	Standard: Galvanized, electrostatically powder-coated (200°C) Variant: Stainless-steel hood
Protection category	When used as intended: <ul style="list-style-type: none"> <li>• IP 54 relative to the switch cabinet (EN 60529).</li> <li>• IP 34 relative to the environment (EN 60529).</li> </ul>



## 4 Assembly and initial commissioning

### 4.1 Safety information

#### **DANGER**

##### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.

#### **WARNING**

##### **Danger of falling during assembly of the unit on the switch cabinet roof**

There is a danger of falling during assembly work on the switch cabinet roof due to defective, missing or untested personal safety devices.

- Meticulously prepare and carefully perform assembly of the unit.
- Use a suitable safety ladder that is secured against tipping.
- Use personal protective equipment.

#### **CAUTION**

##### **Danger of crushing!**

Danger of crushing between the switch cabinet and the unit frame during assembly of the unit.

- Do not place any body parts between the frame and the unit cut-out.
- Work carefully and wear cut-proof gloves.

#### **ATTENTION**

##### **Damage to the switch cabinet equipment by metal chips**

Metal chips can get into the switch cabinet when fitting the assembly cut-outs.

- Protect the switch cabinet from contamination during assembly and use protective covers.

## 4.2 Transport

Observe the following to avoid personal injury and property damage:

- Work may only be performed by qualified specialists.
- Observe the safety information.

### **WARNING**

#### **Risk of injury for persons!**

Increased risk of injury due to improper transport.

- The unit may only be transported by persons who are familiar with the procedure and aware of the risks as well as having the necessary qualifications.

#### **Danger of crushing by components during transport.**

Components can crush limbs and cause severe injuries during transport.

- Use suitable means of transport.
- Use anti-slip materials for securing, e.g. anti-slip matting.
- Secure loads.
- Use personal protective equipment.

### **ATTENTION**

#### **Damage to the unit!**

Damage to the unit due to improper transport.

- Observe the information signs (if available) on the unit when transporting it.
- Only transport the unit with suitable lifting gear.
- Only transport the unit in its operating position.

### **NOTE**

The cooling units are always transported in the packaging provided at the factory.  
It consists of a covering carton, base plate, base and top padding.

### 4.2.1 Transporting the cooling unit

#### **Requirements**

The cooling unit is accommodated in the factory packaging.

#### **Required tools and materials**

Lashing straps, if necessary loading crane

#### **Procedure**

1. Secure the unit properly for transport using lashing straps. Always transport in the operating position.
  2. Only lift the unit by its housing.
  3. Always raise the cooling unit slowly and evenly and park it securely.
- ⇒ The cooling unit was properly transported and loaded.

### **NOTE**

The cooling unit can also be lifted by means of M8 jack rings.  
Observe the instructions in section "Crane transport", Page 31 for crane transport.

#### 4.2.2 Crane transport

##### **⚠ DANGER**

##### **Danger to life due to suspended loads**

Tipping or falling loads can cause severe or even fatal injuries.

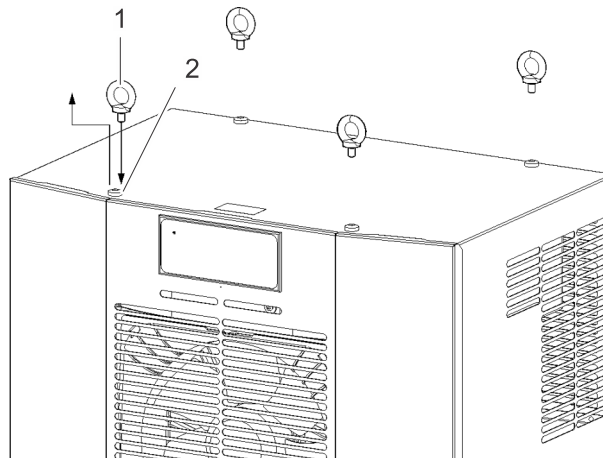
- Never stand beneath suspended loads.
- Only use approved lifting gear and slings which are designed for the total weight of the attached load.
- Only use slings/load handling devices in technically perfect condition.
- Observe the sling points and center of gravity of the load.
- Secure loads with suitable devices.

##### **⚠ WARNING**

##### **Risk of injury due to improper crane transport**

Moving switch cabinets with integrated cooling units can lead to accidents.

- Lifting by M8 jack rings is only permitted for the cooling unit.
- Make sure that jack rings and unit threads are not damaged and deformed.
- Use only jack rings with sufficient thread length in accordance with DIN 580 and check their fit.



G00038

Fig. 13: M8 jack rings DTT-cooling units

1	M8 jack rings	2	Unit cover fastening screws
---	---------------	---	-----------------------------

The cooling units have screw-in threads for M8 jack rings. Cooling units with screwed in M8 jack rings can be used for **crane transport**.

##### **Prerequisites**

- The unit has been unpacked completely.
- Observe the minimum screw-in depth of the M8 jack rings according to DIN 508.
- The M6 jack rings and cooling unit threads are free of damage (corrosion, deformation).
- The fastening screws (4×) were removed from the unit cover.

##### **Procedure**

1. Screw in the M8 jack rings (4×) completely.
  2. Check that the M6 jack rings are securely fitted in the cooling unit as prescribed.
- ⇒ The M8 jack rings are screwed in the cooling unit and the unit can be moved.

### 4.3 Storage

#### ATTENTION

##### Loss of warranty!

Failure to observe the storage conditions will lead to loss of warranty.

Note the following points for storage of the unit:

- Do not expose the cooling unit to temperatures above +70 °C during storage.
- Always store the unit in its operating position.

### 4.4 Unpacking

#### ⚠ WARNING

##### Risk of injury!

Risk of injury for persons due to the heavy weight of the units!

The total weight must be observed when transporting the unit.

- Observe the weight according to section "Dimensions", Page 28.
- Always transport the unit with several persons or suitable lifting gear.
- Use personal protective equipment.

#### ⚠ CAUTION

##### Risk of cutting and injury!

Risk of cutting and injury due to production-related, sharp sheet metal edges on the unit.

- Use personal protective equipment (cut-proof gloves).
- Handle with care.

#### Unpacking the unit

1. Check the packing for transport damages.
2. Remove all transport and packing material.
3. Check the unit for transport damages or other damages after unpacking.
4. If no damage is found, dispose of the packing material in an environmentally friendly way.

If damages occur during transport, observe the following points:

- Notify the transport company and the manufacturer in writing. Always state type designation and serial number in addition.
- Keep the packing material.
- Make a note of external and internal damages.
- Document damage (e.g. by photos).
- The "General Conditions for Deliveries and Services" of the ZVEI (Central Association for the German Electrotechnical Industry) shall apply in the latest version.

#### NOTE

The unit should only be sent back in the original packing to avoid transport damages during return transport.

## 4.5 Assembly

### 4.5.1 General

Fulfill the following general requirements to ensure safe and reliable operation of the cooling units:

- Select the switch cabinet installation site so that adequate ventilation of the cooling unit is ensured. The minimum distance of units from each other and from the wall is 200 mm.
- Installations in the switch cabinet must not obstruct air circulation.
- Secure the switch cabinet against tipping over.
- The cooling unit can be assembled with and without an outer unit cover.
- Protect the assembly site against heavy soiling by using covers.

### 4.5.2 Making the assembly cut-out for the DTT-cooling unit

#### Dimensions of "Easy-Cut" unit cut-out

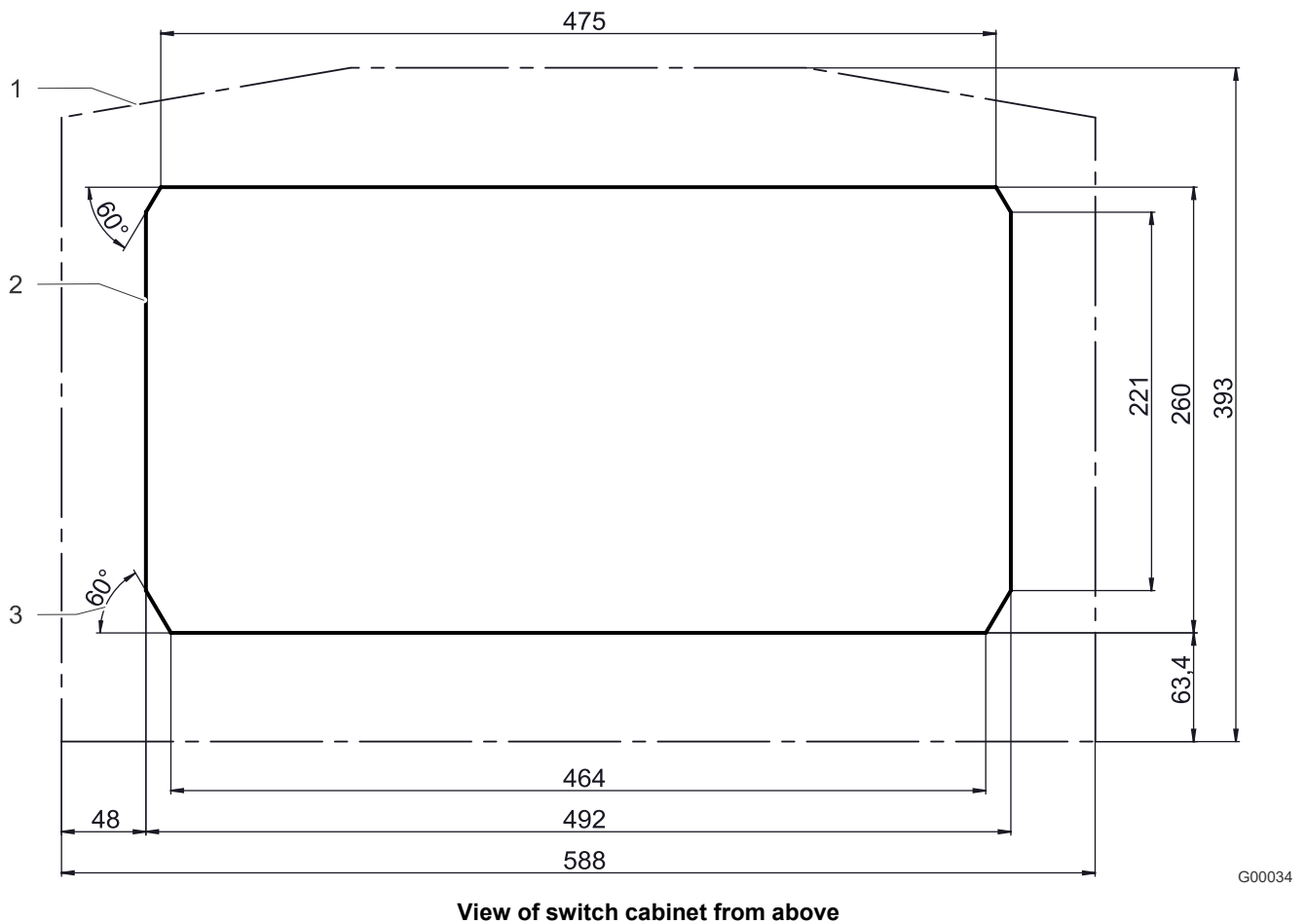
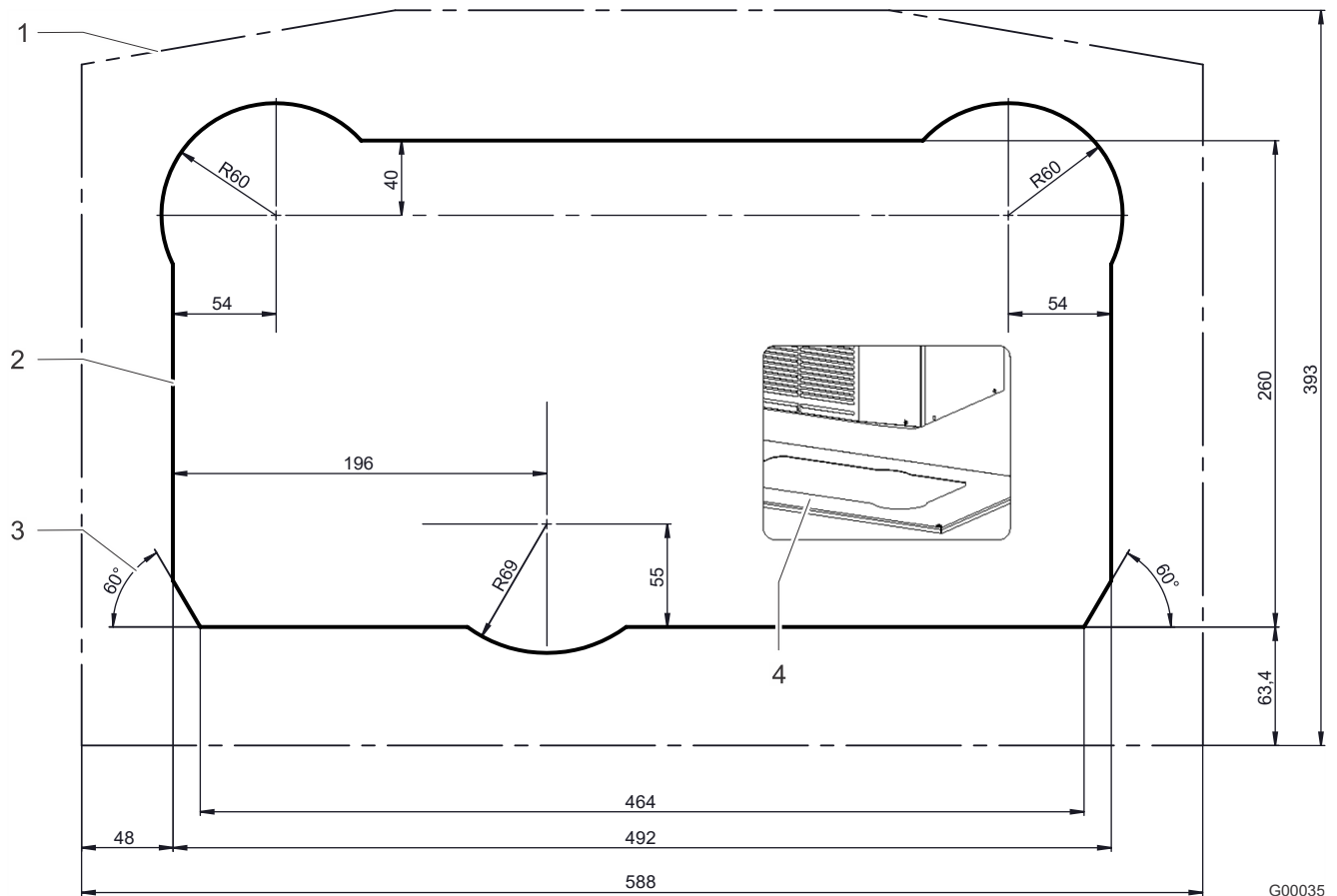


Fig. 14: Switch cabinet cut-out "Easy-Cut"

1	Device contour	3	Cut-out angle 60°
2	Switch cabinet cut-out		

**Dimensions of "Performance-Cut" unit cut-out**

**View of switch cabinet from above**
**Fig. 15: Switch cabinet cut-out "Performance-Cut"**

1	Device contour	3	Cut-out angle 60°
2	Switch cabinet cut-out	4	Total cut-out: DTT-cooling unit and cut-out

**NOTE**

The "Performance-Cut" switch cabinet cut-out ensures full cooling unit performance at minimum current consumption. It is also very suitable for cooling units with a flat duct system, see chapter "Flat duct system (option)", Page 15.

### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- All general requirements are fulfilled, see "General", Page 33>.

### Required tools and materials

- Saw
- Switch cabinet mill if necessary
- Protective covers

### Procedure

1. Ensure that the switch cabinet has a protective cover to protect against chips.
  2. Make cut outs and drill assembly holes as shown in Fig. 14 or Fig. 15.
  3. Remove burr from cutting edges.
  4. Remove chips and assembly waste from the switch cabinet.
- ⇒ The cut-outs are made and the surface seal can be stuck on.

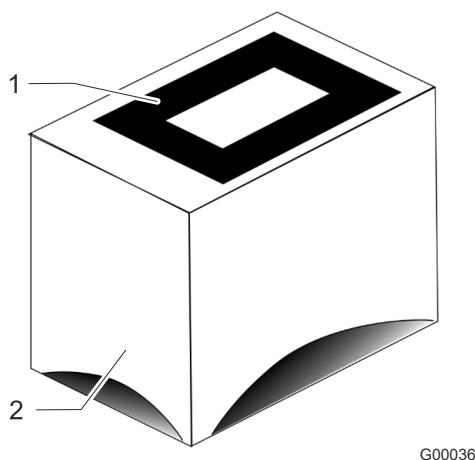
#### 4.5.3 Sticking on the surface seal

##### ATTENTION

##### Damage to the switch cabinet and the cooling unit!

Incorrectly attached seals can lead to excessive formation of condensate in the switch cabinet and therefore to short-circuits and damages due to the condensate.

- Fit the seal so that it provides sealing against the switch cabinet.
- Always check seals during cleaning and maintenance work.



G00036

Fig. 16: Stick on the surface seal

### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit and the switch cabinet are voltage-free.

- The suitable cut-out for the unit has been made, see "Dimensions of "Easy-Cut" unit cut-out", Page 33 or "Dimensions of "Performance-Cut" unit cut-out", Page 34.

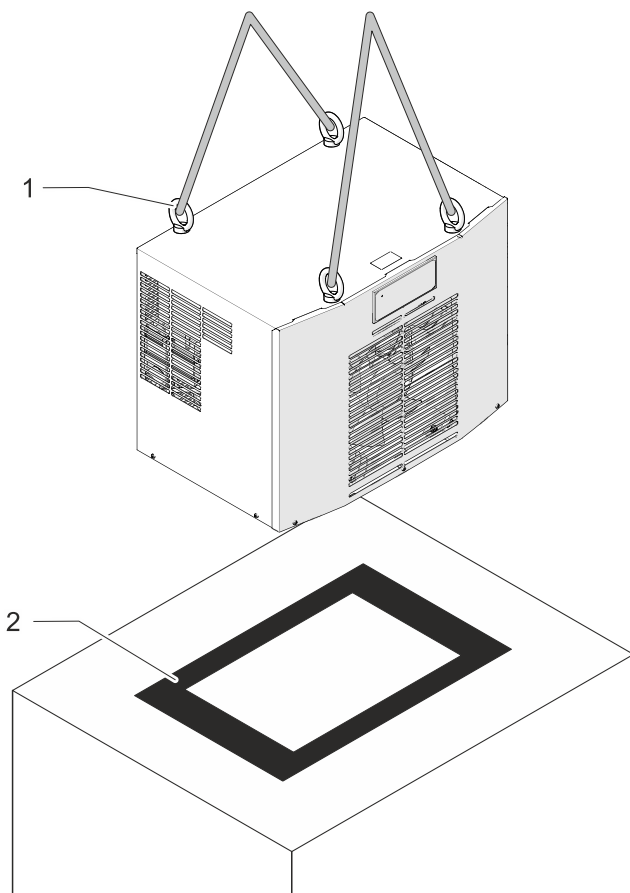
### Required tools and materials

- Surface seal

### Procedure

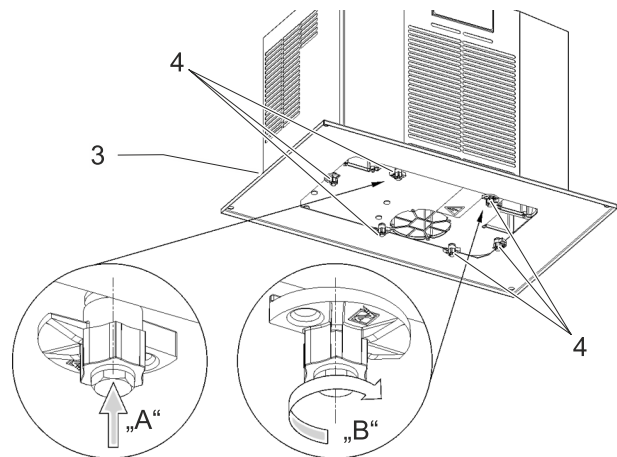
- Stick the self-adhesive surface seal (1) onto the switch cabinet (2).
- ⇒ The surface seal is attached and the cooling unit can be assembled.

#### 4.5.4 Mounting the cooling unit on the switch cabinet



Mounting the cooling unit

Fig. 17: Assembly of the cooling unit with locking levers



Locking the cooling unit with locking levers

G00037

#### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- All general requirements are fulfilled, see chapter "General", Page 33.
- The M8 jack rings (1) are screwed into the cooling unit, see chapter "Crane transport", Page 31.
- The cooling unit is properly secured with lashing straps.
- The switch cabinet is aligned exactly horizontally.

#### Required tools and materials

- Lashing straps, loading crane if necessary



**Procedure**

1. Lift the properly secured cooling unit slowly and evenly, see figure Fig. 17.
  2. Mount the cooling unit horizontally.
    - Permissible inclination up to 0.5° from the horizontal plane (switch cabinet + cooling unit).
  3. Set down the cooling unit on the surface seal (2) on the switch cabinet roof and align it with the cut-outs.
  4. Make sure that the condensate drain (3) is at the lowest point. Lay the condensate drain hose continuously with a gradient and without any kinks.
    - The condensate drain hose must not exceed 3 m in length.
    - Regularly check during operation as to whether the condensation drains off properly.
  5. Position the cooling unit precisely in the cut-out.
  6. Fasten all six locking levers (4) on the inside of the switch cabinet, see Fig. 17 - Detail cut-out "A".
  7. Turn all six locking levers (4) on the inside of the switch cabinet over the rail to fix the cooling unit, see Fig. 17 - Detail cut-out "B".
- ⇒ The cooling unit is mounted on the switch cabinet and ready for electrical connection, see "Electrical connection", Page 42.

#### 4.5.5 Assembly with quick-change frame (option)

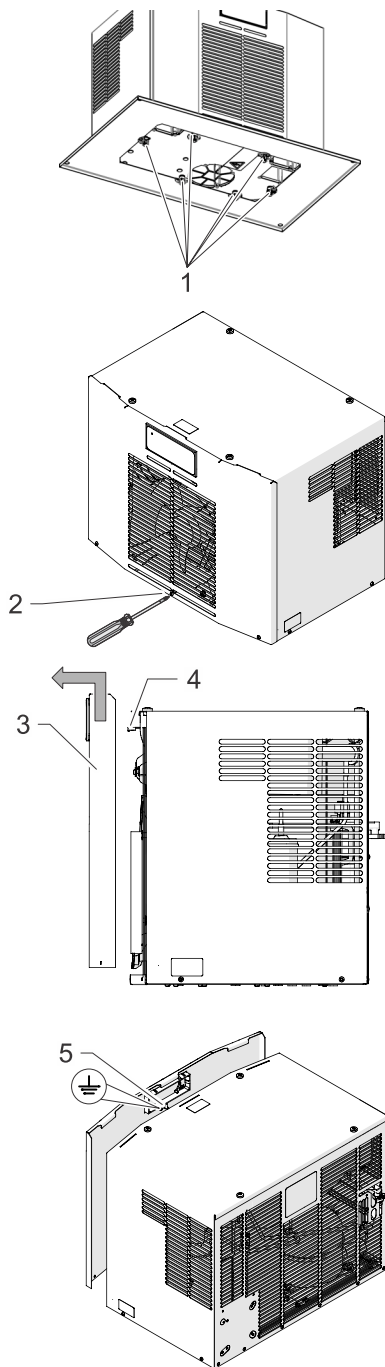
The quick-change frame offers maximum flexibility in dismantling and assembly of the cooling units.

The cooling units are therefore quick and easy to assemble. – The assembly cut-outs and fastening points are identical with those for the assembly of the cooling unit alone, see chapter "Dimensions of "Easy-Cut" unit cut-out", Page 33 or "Dimensions of "Performance-Cut" unit cut-out", Page 34.

– The quick-change frame is therefore easy to retrofit, see chapter "Spare parts and accessories", Page 77.

The quick-change frame has a central locking mechanism which guarantees an absolutely secure connection to the DTT-cooling unit.

##### 4.5.5.1 Unit preparation – removing the front flap



G00039

#### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free. Wait for the end of the 5-minute discharge phase of the electrical components. The unit should only be opened afterwards.

- All general requirements are fulfilled, see "General", Page 33.
- The cut-outs for the cooling unit are made, see chapter "Making the assembly cut-out for the DTT-cooling unit", Page 33.
- The surface seal to the switch cabinet is applied.

#### Required tools and materials

- Assembly tool, screwdriver
- Accessory kit: Bracket (2×), M6×10 mm screws (4×), washers (4×)

#### Procedure

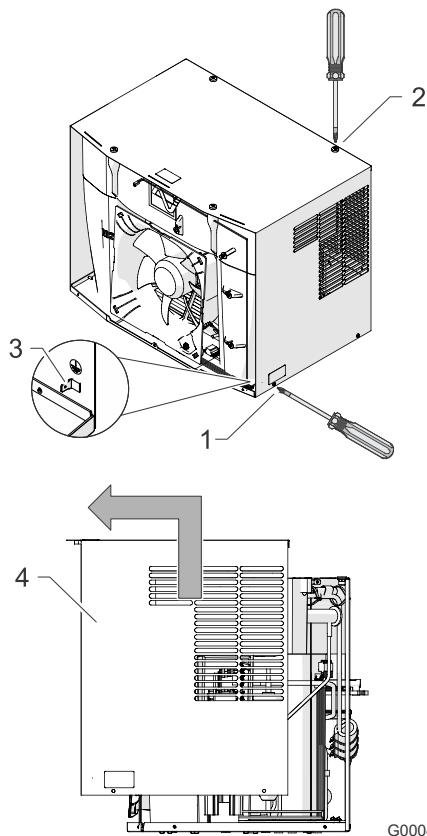
1. Loosen the six screws (switch cabinet/interior) with the locking levers (1).
  - The screws and locking levers are needed later for assembly of the quick-change frame.
2. Loosen the three screws (2) of the front flap. Turn the screwdriver counter-clockwise to loosen the screws.
3. Push up the front flap (3) carefully.
 

**ATTENTION** – Damage to the unit.  
Always disconnect the connecting cable of the display unit or control unit (4) as well as the earthing cable (5) before removing the front flap.
4. Pull off the front flap to the front.
 

⇒ The front flap is removed.

Fig. 18: Removing the front flap

#### 4.5.5.2 Unit preparation – removing the unit cover



G00048

Fig. 19: Removing the unit cover

##### Prerequisite

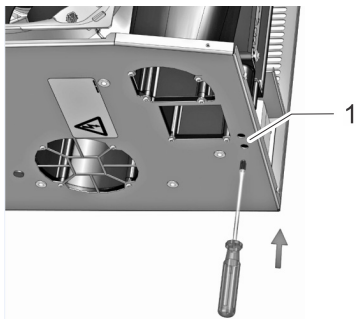
**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- Wait for the end of the 5-minute discharge phase of the electrical components. The unit should only be opened afterwards.

##### Procedure

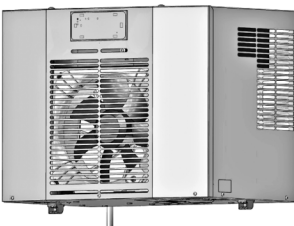
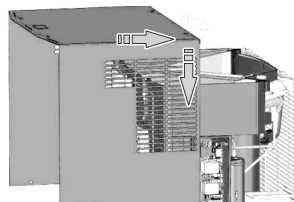
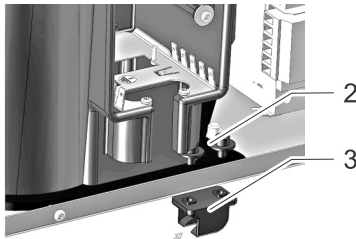
1. Loosen the four screws on the right and left-hand sides of the unit (1).
  2. Pull off the earthing cable (3).
  3. Remove the four screws on the top of the unit (2).
  4. Push up the unit cover (4) and pull off to the front.
- ⇒ The unit cover is removed.

#### 4.5.5.3 Unit preparation – fitting the bracket



##### Procedure

1. Puncture the insulation of the bracket opening (1) with a screwdriver. Turn 2× to the right and 2× to the left.
  2. Mount the two brackets (3) with the four screws (2) and the four washers (accessory kit).
    - The openings of the brackets face forwards.
  3. Remount the cover and the front flap in reverse order.
  4. Tighten the screws and plug in the earthing cables.
- ⇒ Preparation of the unit is completed. The cooling unit is ready for assembly with the quick-change frame.



G00041

Fig. 20: Mounting the bracket

#### 4.5.5.4 Mounting the cooling unit on the quick-change frame

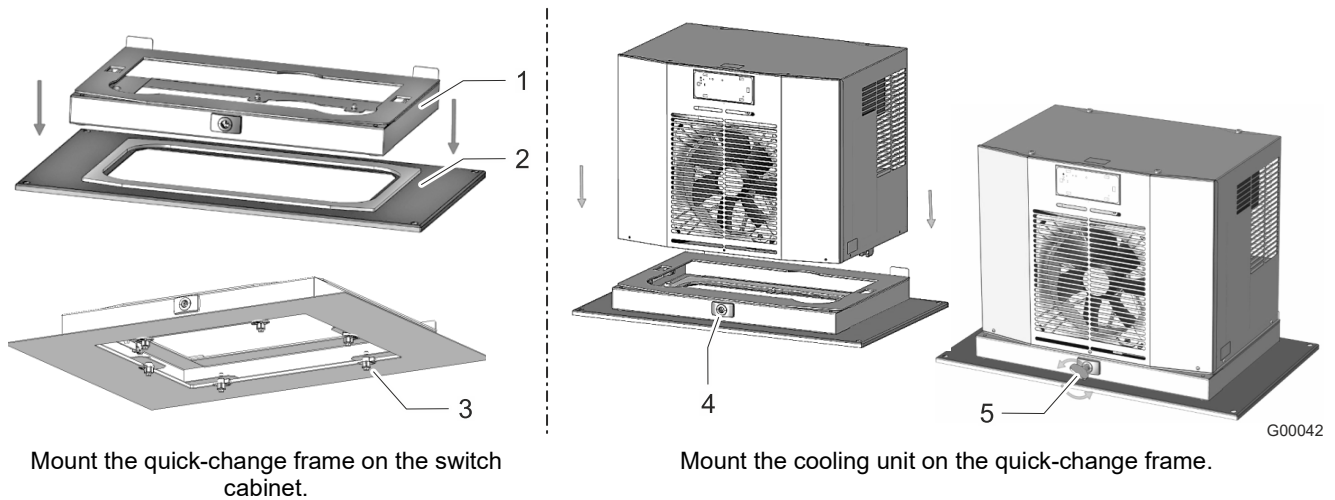


Fig. 21: Mounting the bracket

#### Procedure

1. Place the quick-change frame (1) into the assembly cut-out (2).
    - The assembly cut-outs and fastening points are identical with those for the assembly of the cooling unit alone, see chapter "Dimensions of "Easy-Cut" unit cut-out", Page 33 or "Dimensions of "Performance-Cut" unit cut-out", Page 34.
  2. Fasten the quick-change frame with screws and locking levers (3) to the switch cabinet from the inside.
    - For a retrofit, use the screws and locking levers with which the cooling unit was previously fixed, see chapter "Unit preparation – removing the unit cover", Page 39.
  3. Insert the cooling unit into the quick-change frame (4).
  4. Lock the cooling unit in the quick-change frame. Use the enclosed socket wrench (5) for this.
- ⇒ The cooling unit is assembled and ready for electrical connection.

## 4.6 Electrical connection

### DANGER

#### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.

### ATTENTION

#### **Unit malfunction**

Unit malfunction due to wrong field of rotation in the mains connection and due to high-frequency interferences (EMC interferences).

- Make sure that the unit is connected to a three-phase network with right-hand field of rotation.
- Always check the field of rotation before commissioning the unit!
- Interfering electrical installations (high-frequency) must be avoided.
- Signal cables must be laid separately from power cables.

### ATTENTION

#### **Wrong connection voltage!**

Wrong connection voltages can damage component parts.

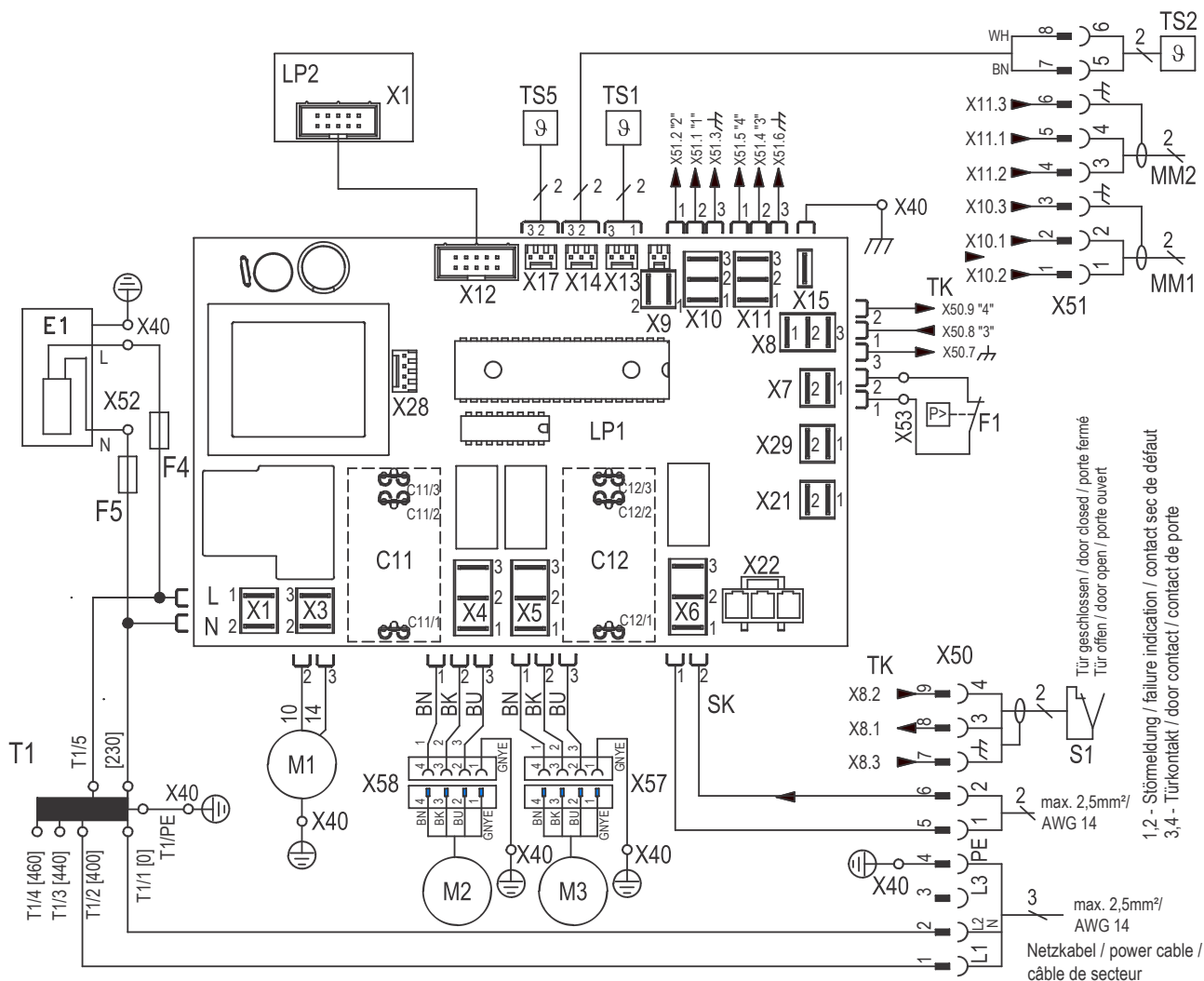
- Compare the connection voltage with the unit type plate. Necessary protection according to section "Electrical data", Page 27.

### 4.6.1 Notes for connecting cables to the unit

Note the following points when connecting the lines to the unit:

- All cables must be supported by a suitable strain relief.
- Maximum cable cross-section 2.5 mm<sup>2</sup> (AWG 14).
- Stripped length of the cable wires: 8 ... 9 mm.
- Observe the connection assignment according to the circuit diagram.

#### 4.6.2 Electrical circuit diagram – Multi-Controller (MC)



085 000 439 11189-828b

Fig. 22: Circuit diagram

C11	Capacitor condenser fan (external)	MM1	Multimaster input	X40	Ground terminal contact
C12	Capacitor evaporator fan (internal)	MM2	Multimaster output	X50	Mains terminal contact + door contact + fault indication
E1	Condensate evaporation	S1	Door contact	X51	Multimaster terminal contact
F1	High-pressure pressostat	SK	Fault signal contact (1,2)	X52	Heater condensate contact
F4-F5	Fuse	TK	Door contact/signal (3,4)	X53	High-pressure pressostat contact
LP1	Controller	TS1	Temperature sensor (internal)		
LP2	Display control unit (MC)	TS2	Temperature sensor (external)		
M1	Compressor	TS5	Temperature sensor (internal)		
M2	Condenser fan (external)				
M3	Evaporator fan (internal)				

### 4.6.3 Multimaster Control

#### ATTENTION

##### Damage to the unit!

Damage to the unit and the controller by applying external voltage to the Multimaster inputs/outputs.

- Do not apply external voltage to the Multimaster inputs/outputs (MM1 / MM2).
- The Multimaster inputs/outputs are supplied from the cooling unit with a low voltage (< 20 V, 20 mA).

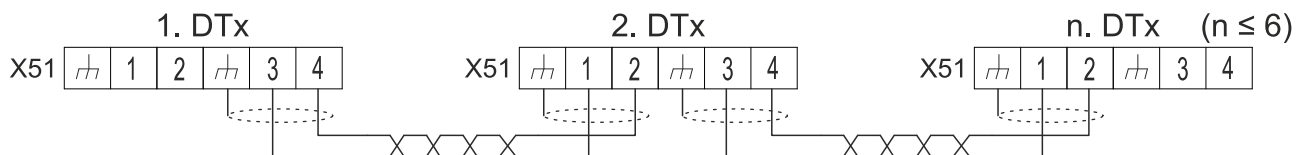
The Multimaster function can control up to six cooling units in the system (bus function). The connection is made on the input and output side by the terminals MM1 and MM2.

#### 4.6.3.1 Connecting the Multimaster control

##### Requirements

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

##### Procedure



G00020

Fig. 23: Multimaster Control

1. Connect the controllers of the cooling units according to the connection diagram and Fig. 23 to the appropriate terminal strip MM1 / MM2, see "Electrical circuit diagram – Multi-Controller (MC)", Page 43.
    - Use a shielded cable with twisted pairs to avoid interferences. Connect the shield to the terminal for function ground on one side.
    - If no shielded cables are used, make sure that there are no sources of interference in the immediate vicinity. Sources of interference are: Power cables and components with increased electromagnetic radiation, these include, for example, frequency converters or motor drives.
- ⇒ The Multimaster control is connected.



#### 4.6.4 Door contact switch

##### ATTENTION

##### Damage to the unit!

Damage to the unit and the controller by applying external voltage to the door contact input.

- Do not apply external voltage to the door contact input.
- The door contact input provides a low voltage (< 20 V, 20 mA) for the door contact switch.

Fitting a door contact switch increases safety and prevents increased condensate formation. The door contact switch switches off the cooling unit motors (fan, compressor) when the switch cabinet is opened.

The door contact switch must interrupt the connection between the terminals **X50:3** and **X50:4** when the switch cabinet door is open.

Connector strip/terminals	Voltage	Current load capacity	Version
X50:3 Door contact	< 20 V	20 mA	Potential-free door contact (normally closed)
X50:4 Door contact			

Tab. 7: Collective fault signal

#### 4.6.4.1 Connecting a door contact switch

##### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

##### Procedure

1. Connect the door contact switch (S1) according to the connection diagram to the connector strip **X50** on the underside of the unit, see "Electrical circuit diagram – Multi-Controller (MC)", Page 43.
    - Use a shielded cable with twisted pairs to avoid interferences. Connect the shield to the terminal for function ground on one side.
    - If no shielded cables are used, make sure that no sources of interference are laid in the immediate vicinity. Sources of interference are: Power cables and components with increased electromagnetic radiation, these include, for example, frequency converters or motor drives.
  2. Close the switch cabinet, restart the unit and check the function of the door contact switch:
    - Open the switch cabinet door when the unit is running, the motors (fan, compressor) must switch off.
- ⇒ The door contact switch is connected.

#### 4.6.5 Collective fault signal

The unit is equipped with a potential-free relay contact for the collective fault signal.

Connector strip/terminals	Voltage	Current load capacity	Version
X50:1 root contact	Maximum 230 V	Maximum 1 A	Potential-free relay contact (normally closed)
X50:2 normally closed (NC)			

Tab. 8: Collective fault signal

##### 4.6.5.1 Connecting the collective fault signal

###### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

###### Procedure

1. Connect the collective fault signal (SK) according to the connection diagram to the connector strip **X50** on the underside of the unit, see "Electrical circuit diagram – Multi-Controller (MC)", Page 43.
- ⇒ The collective fault signal is connected.

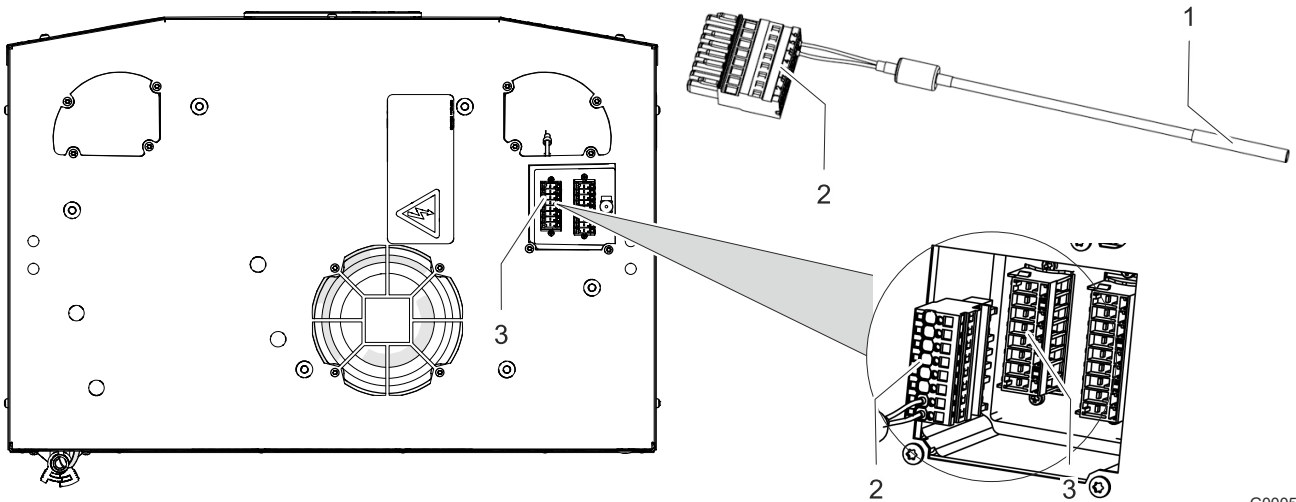
#### 4.6.6 External temperature sensor TS2

##### ATTENTION

##### Damage to the unit!

Damage to the unit and the controller by applying external voltage to the temperature sensor input.

- Do not apply external voltage to the temperature sensor input.



G00054

Fig. 24: Temperature sensor - TS2

Cooling units with Multi-Controllers (MC) are equipped with an energy-saving module.

The Multi-Controller (MC) therefore has a connection for a second TS2 temperature sensor (1).

The TS2 temperature sensor (1) is installed externally on the cooling unit and monitors the switch cabinet interior temperature.

##### 4.6.6.1 Connecting the external temperature sensor TS2

##### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

##### Procedure

1. Plug the connecting plug (2) into the mating plug (3) on the cooling unit. The mating plug (3) is labeled with X51 in the electrical circuit diagram, see "Electrical circuit diagram – Multi-Controller (MC)", Page 43.
  2. Position the TS2 temperature sensor (1) in the switch cabinet and fix with a cable tie.
    - It is recommended to position the TS2 temperature sensor in an area in which the greatest heat development takes place.
- ⇒ The external temperature sensor TS2 is connected.

#### 4.6.7 Mains connection

##### **DANGER**

###### **Danger of fatal injury due to electric shock!**

Unconnected or incorrectly installed protective conductor systems can generate hazardous voltages and cause electrical shocks resulting in serious accidents.

- Work may only be carried out by qualified specialists.
- Implement protective conductor systems in accordance with DIN EN 60204-1, Section 8.2.
- Every single part of the electrical equipment must be connected to the protective conductor system.
- Never interrupt the protective conductor system if electrical equipment is attached to covers, doors or covering plates.
- If parts are removed, e.g. during maintenance work, make sure that the protective conductor system is not interrupted for the remaining parts.

##### **DANGER**

###### **Risk of injury and fire due to electric arcs!**

Electric arcs, dangerous voltages and electric shocks may occur when disconnecting and plugging in the connectors of the mains connection under load or voltage.

- Never plug or unplug mains connectors under voltage.
- Switch off the power supply and secure against switching back on before working on the mains connection.
- Work on the connectors must only be carried out under sufficient lighting.

##### **WARNING**

###### **Risk of fire!**

Risk of fire due to too small cable cross-sections. A too small cable cross-section will result in overheating of the cable.

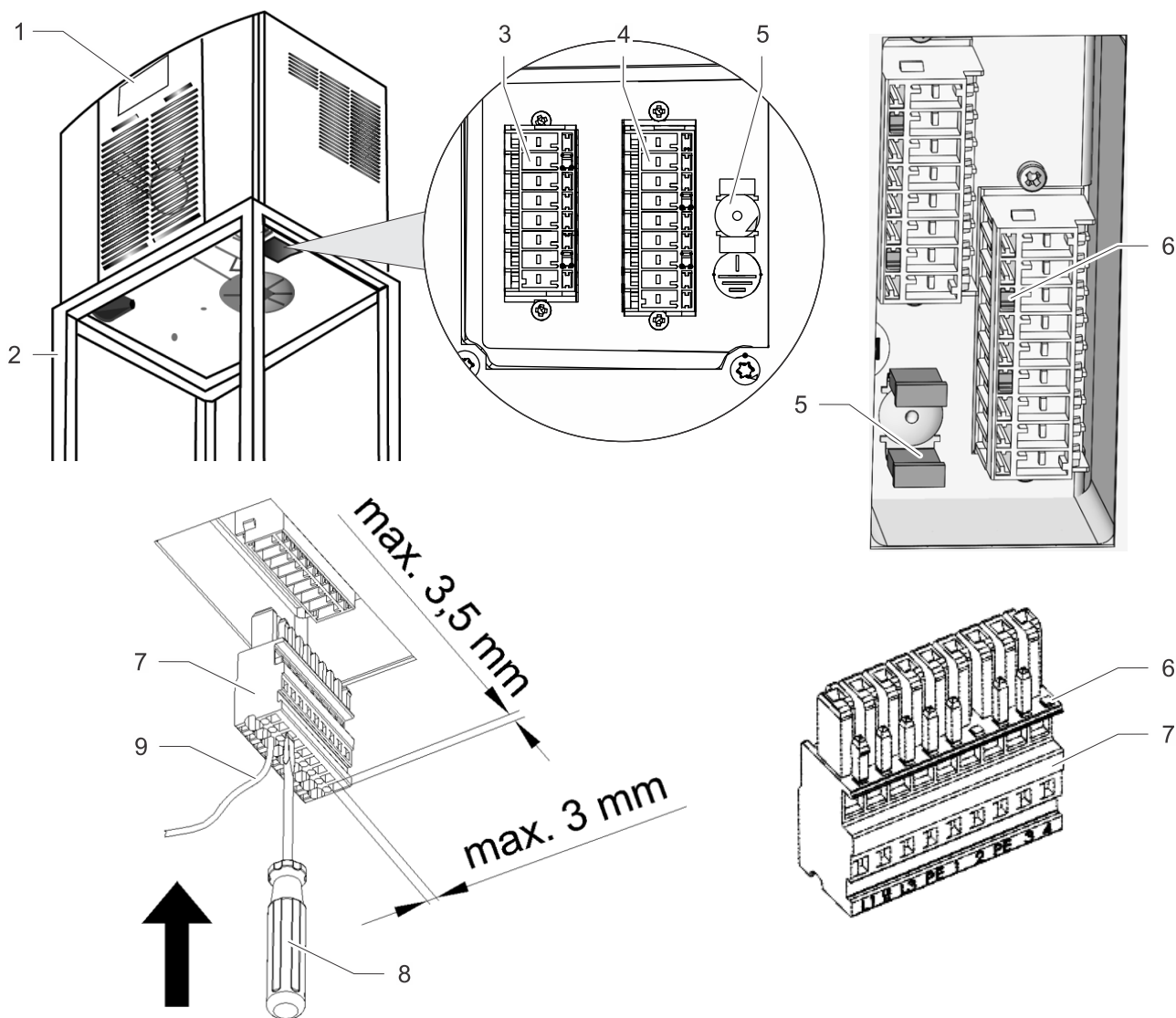
- Lay cable cross-sections according to the current consumption of the unit and the length of the cable.
- Protect the power cable with the upstream fuse specified on the type plate and in the technical data.

#### 4.6.7.1 Electrical connection of the cooling unit

The device corresponds to overvoltage category II.

Fulfill the following general requirements to ensure safe and reliable operation of the cooling unit:

- Connection of an upstream temperature control on the feed side is prohibited.
- Connect the upstream fuse specified on the type plate as line protection, see chapter "Type plate", Page 25 and "Adapting the unit to the mains voltage", Page 51.
- Always connecting the cooling unit to the mains via a disconnecting device (switch/contactor).
  - The disconnecting device must have a 3 mm contact opening. The disconnecting device is provided and fitted by the customer.
- Install an all-pole sine filter (phase-phase and phase-earth) when using a frequency converter.



G00044

Fig. 25: Cooling unit mains plug

1	Cooling unit	5	Ground connection
2	Switch cabinet	6	Coding pins
3	Socket X51 (only on units with MC-Controller)	7	Plug
4	Socket X50	8	Screwdriver (flat, max. 3.5 mm)
		9	Cable 0.5 to 2.5 mm²

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**NOTE**

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Protective conductors in the mains connection cable are not regarded as potential equalization conductors.

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**Prerequisite**

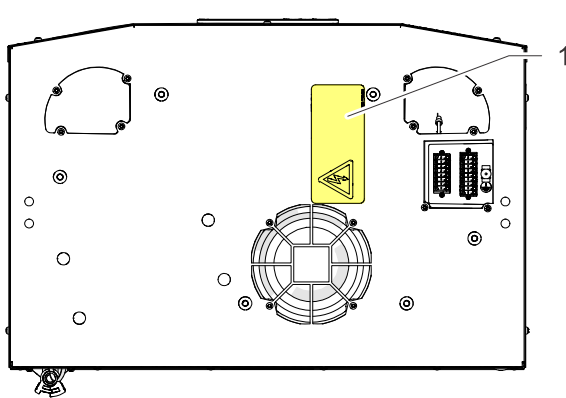
**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- All general requirements for safe and reliable operation are fulfilled.

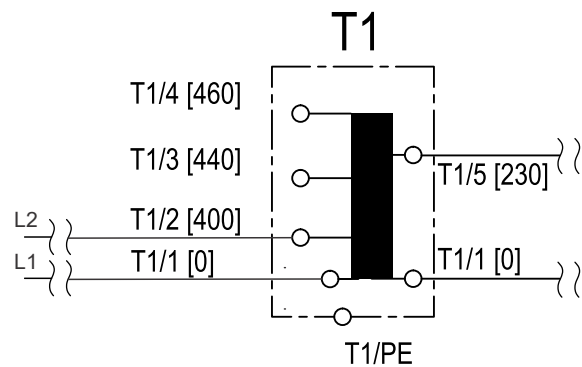
**Procedure**

1. Make the mains connection according to the circuit diagram, see chapter "Electrical circuit diagram – Multi-Controller (MC)", Page 43.
  2. Open the cage clamp terminal of the connecting plug with the flat screwdriver and connect the cables on the plug.
    - Firmly insert the screwdriver into the cage clamp terminal. Never turn, this will damage the cage clamp terminal.
  3. Before switching on, make sure that the mains voltage matches the data on the type plate and that there is a right-hand field of rotation.
- ⇒ The cooling unit is connected electrically.

#### 4.6.8 Adapting the unit to the mains voltage



Factory settings upstream transformer



Input winding upstream transformer

G00056

Fig. 26: Adapting the mains voltage on the upstream transformer

Units with a mains voltage of 400/460 V can be connected optionally to another mains voltage.

The mains voltage on the upstream transformer must be adapted for this.

- The adaption is made by replugging the supply cable on the primary side of the transformer.
- The upstream fuse must match the changed mains voltage, see the "Upstream fuse" column in **Fehler! Verweisquelle konnte nicht gefunden werden.**
- The data for the transformer factory settings can be found on the yellow connection diagram (1) on the rear of the unit.
- UL-conform with following fuses: Category "Class CC", slow-blow, suitable for transformer protection.

Mains voltage	Transformer input winding	Upstream fuse (min. 480 V)
		DTT 6201
400 V	T1/ 1 [0] – T 1/ 2 [400]	Max. 5 A
440 V	T1/ 1 [0] – T 1/ 3 [440]	Max. 5 A
460 V	T1/ 1 [0] – T 1/ 4 [460]	Max. 5 A

Tab. 9: Transformer options and upstream fuse

#### NOTE

The changed mains voltage on the transformer must be marked on the yellow connection diagram (1) on the back of the unit.

## 5 Operation

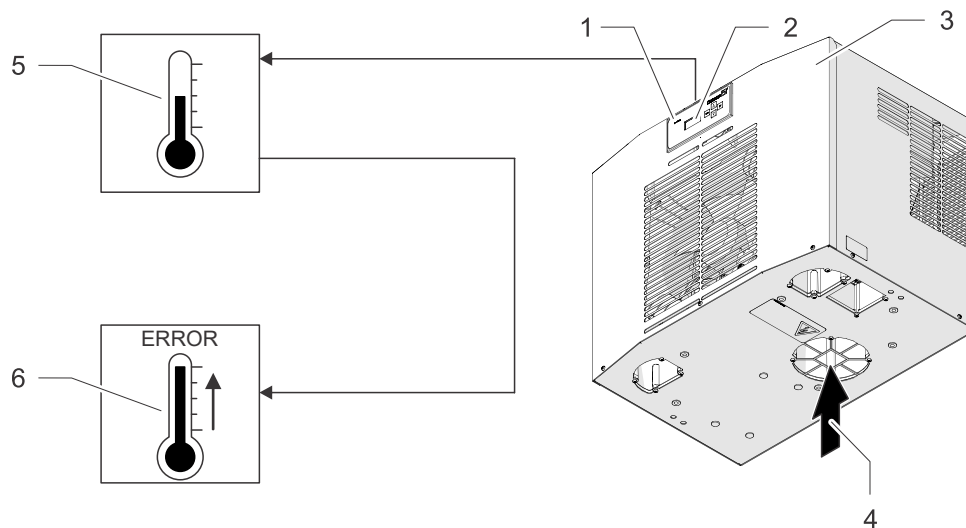
### 5.1 General functions

#### ATTENTION

##### Damage to the unit

Operation without the unit cover prevents sufficient air supply to the condenser and restricts the intended cooling function.

- Only operate the cooling unit with the unit cover in place.



G00055

Fig. 27: Function of the electronic controller

The Multi-Controller (MC) has an indicator unit with a green LED light (1).

If an error occurs, the green LED light (1) flashes and different items of system information are shown in the control panel (2), see "Controller", Page 17.

- Switch on the power supply to the cooling unit after completing the assembly and installation work.
- The cooling unit (3) starts operation and the LED light (1) of the indicator unit switches to green continuous light. The units run continuously after applying the supply voltage and closing the door.
  - Exception: Energy-saving mode and cooling units with antifreeze option.
  - The external temperature sensor controls the energy-saving mode, see section "Energy-saving mode", Page 23.
- The Multimaster function can connect up to six cooling units in the bus function.
- The control panel (5) shows the current operating states.
- The cooling unit (3) is equipped with an electronic controller. A temperature sensor (5) measures the temperature of the sucked in interior switch cabinet air (4).
- Exceeding or dropping below the lower and upper temperature limit leads to tripping of the fault indication (6).
- The green LED light flashes in the case of a fault indication the control panel (2) shows the error number alternately with the temperature.

#### NOTE

- The ambient conditions and switch cabinet interior temperatures must match the specified technical data, see chapter "Technical data", Page 27.



## 5.2 Multi-Controller (MC) operation

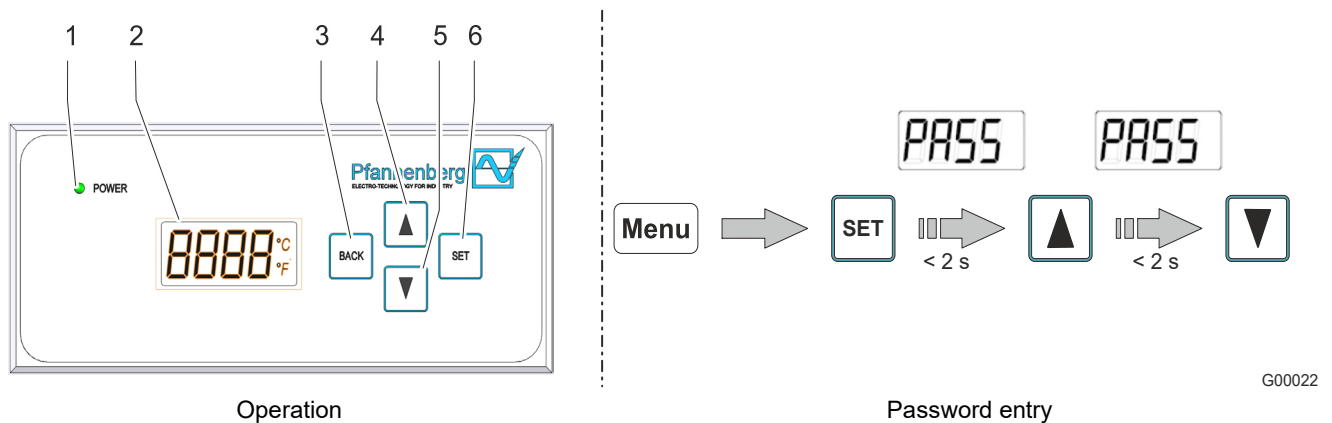


Fig. 28: Multi-Controller (MC) operation

1	LED light	4	SCROLL UP button
2	Control panel	5	SCROLL DOWN button
3	BACK button	6	SET button

The control unit offers four menus which are displayed on the control panel (1).

Control panel	System information	Value range
SEtP	SetP: Setpoint of the switch cabinet temperature.	0 ... 90 °C
Lit <sup>+</sup>	Lit <sup>+</sup> : Maximum value (limit value high) of the switch cabinet temperature	-55 ... 95 °C
Lit <sub>-</sub>	Lit <sub>-</sub> : Minimum value (limit value low) of the switch cabinet temperature	-55 ... 95 °C
Unit	Unit: Unit of the switch cabinet temperature.	°C / °F

Tab. 10: Menus on the Multi-Controller

### 5.2.1 Carrying out menu settings

See also section "Menu overview", Page 54.

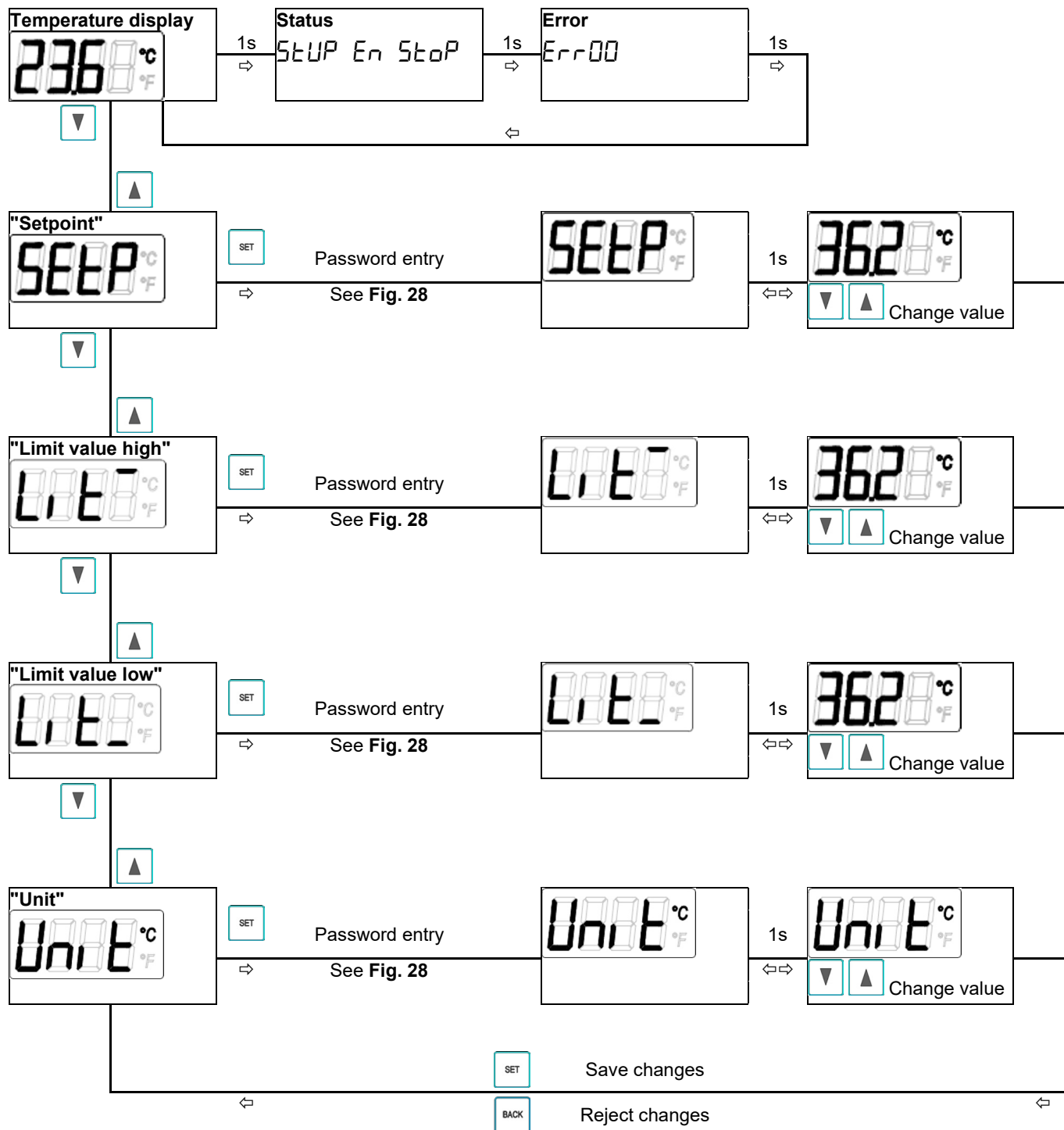
#### Requirements

- The cooling unit has started operation.
- The LED light (6) of the control unit lights green.

#### Procedure

1. Scroll through the menus (SetP, Lit<sup>+</sup>, Lit<sub>-</sub>, Unit) from the temperature display (1) with the SCROLL UP (3) and SCROLL DOWN (4) buttons.
  2. Select a menu with the SET button (5).
  3. Enter the password. After pressing the SET button (5), first press the SCROLL UP button (3) and then the SCROLL DOWN button (4) within two seconds, see Fig. 28 – Password entry.
  4. Set the desired value with the SCROLL UP (3) and SCROLL DOWN (4) buttons.
  5. Confirm the value with the SET button (5).
    - Back with the BACK button (2); the value will not be saved in this case.
  6. Select another menu by scrolling with the SCROLL UP (3) and SCROLL DOWN (4) buttons.
- Note** – If no entry is made for 30 seconds, a TIMEOUT occurs and the control panel jumps to the temperature display.
- ⇒ Menu is set in the cooling unit.

### 5.2.2 Menu overview



#### NOTE

If no entry is made for 30 seconds, a TIMEOUT occurs and the control panel jumps to the temperature display.

### 5.3 Operation of the cooling unit

#### ATTENTION

##### Damage to the switch cabinet components by formation of condensate

Switch cabinet interior temperatures below the dew point of the ambient air or damaged switch cabinet seals can lead to excessive formation of condensate.

- Check the switch cabinet seals regularly to avoid excessive condensate from penetrating ambient air.
- Install a door contact switch to reduce formation of condensate when the switch cabinet is open.

- The unit goes directly into operating mode after the mains voltage is applied. Which mode it adopts depends on the controller equipment.
- In the operating mode, the cooling unit switches to cooling mode if necessary. This happens depending on whether the temperature switching threshold ( $T_{nom}$ ) is reached or exceeded.
  - The cooling mode switches off if the temperature drops below the temperature switching threshold ( $T_{nom}$ ).
  - The evaporator fan (internal), the condenser fan (external) and the compressor switch off when the door is opened (only with connected door contact switch).

#### 5.3.1.1 Operating conditions

- The mains voltage must be within the specified values, see section "Electrical data", Page 27.
  - A deviation of  $\pm 10\%$  is permitted.
  - The rated frequency must be within  $\pm 3$  Hz of the specified value.
- The ambient air temperature must be below  $55^\circ\text{C}$ . Other options, see section "Refrigeration circuit", Page 27.
  - Only use cooling units in such a way that the specified cooling capacity can cover the actual demand.
  - Only the specified refrigerant may be used.

#### NOTE

For the Pfannenberger part numbers for spare parts, see section "Spare parts and accessories", Page 77.

# 5.4 Service interface

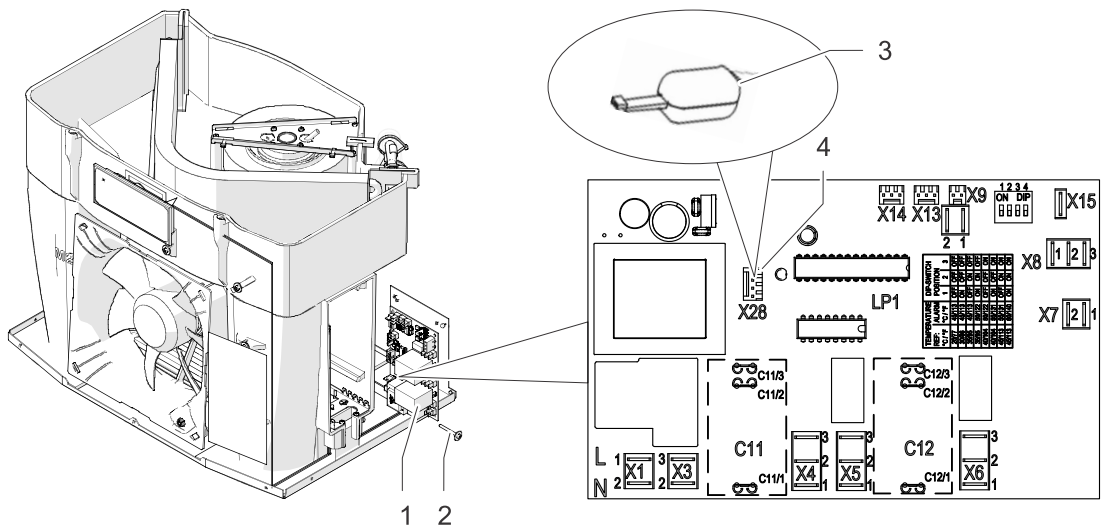
## **DANGER**

### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.



G00046

Fig. 29: Service interface

1	Controller board	3	USB adapter
2	Plastic screw	4	Service interface on the controller (X28)

The service interface enables operating parameters to be changed.

- A USB adapter and the configuration software ECoolPLANT 2.X, including the USB driver software are required for this.
- The connection for the USB adapter (Fig. 29, item 3) to the interface is marked on the circuit diagram with the device tag X28 (Fig. 29, item 4).
- The USB adapter enables connection to a computer that operates with the configuration software ECoolPLANT 2.X.
  - The USB adapter is available as an accessory, see section "Spare parts and accessories", Page 77.
  - Remove the USB adapter from the unit after use. The service interface is only intended for temporary data exchange, e.g. to read out system messages. Continuous operation is forbidden.

### NOTE



- The ECoolPLANT software is available as a free download on the website [www.pfannenberg.com/](http://www.pfannenberg.com/). Alternatively, simply scan the QR code opposite.
- The appropriate operating manual for the ECoolPLANT software is available for downloading under [My Pfannenberg](#)

#### 5.4.1.1 Connecting/removing the USB adapter

##### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- Wait for the end of the 5-minute discharge phase of the electrical components. The unit should only be opened afterwards.

##### Procedure

1. Remove the front flap and unit cover, see chapter "Unit preparation – removing the unit cover", Page 39 and "Unit preparation – fitting the bracket", Page 40.
  2. Remove the plastic screw (Fig. 29, item 2).
  3. Pull out the controller board (Fig. 29, item 1).
  4. Connect the USB adapter (Fig. 29, item 3) to the service interface X28 (Fig. 29, item 4).
  5. Push the controller board back into the cooling unit.
  6. Switch the cooling unit back on.
    - Make the desired settings with the configuration software ECoolPLANT 2.X.
  7. Switch the cooling unit off again after making the settings.
  8. – Remove the USB adapter from the unit after use.
  9. Screw the controller board tight again with the plastic screw; remount the front flap and unit cover.
- ⇒ The cooling unit can be restarted.

##### NOTE

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For a detailed description of the error messages and troubleshooting notes, see section "Error messages", Page 69.

---

## 5.5 Test mode

### DANGER

#### **Danger of fatal injury due to electric shock!**

Condensate may form increasingly on the cooling unit when the switch cabinet door is open and during extended test operation.

This may lead to an electrical hazard in the vicinity of live parts.

- The test mode may only be activated by authorized specialists with electrical training.
- The unit may only be operated in test mode under supervision.

The test mode triggers the cooling unit to commence unconditional cooling for 90 s.

This means that the internal and external fans as well as the compressor are switched on. Errors and alarms have priority, but the "door contact open" error is ignored.

Normal operation is automatically resumed after 90 s.

#### **Requirements**

- The cooling unit is ready for operation.
- The LED light of the control unit lights green.

#### **Procedure**

1. Press the **Back + Set** buttons simultaneously for at least 5 s.
  - Fans and compressors start up.
2. The countdown timer is shown in the display (alternating with the ACTUAL temperature):



- ⇒ The test mode is active. The cooling unit resumes normal operation after 90 s. If the **Back + Set** button combination is pressed again during the countdown, the test mode starts again with the countdown of 90 seconds.

The test mode may be started as often as necessary.

## 6 Service and maintenance

### 6.1 Safety information

#### DANGER

##### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.

#### WARNING

##### **Danger due to faulty maintenance/repair!**

A higher risk of injury exists for persons who carry out work for which they are neither qualified nor have been instructed.

- The unit may only be maintained/repared by persons who are familiar with the procedure and aware of the risks as well as having the necessary qualifications.
- Always switch off the disconnecter/contactator prior to starting maintenance work.
- Wait for the discharge phase of 5 minutes for the electrical components. The unit should only be opened afterwards.
- Ensure that the fans are in the idle position and do not rotate.
- Check the unit for proper and safe operation after replacing defective parts or components.
- Check the full performance of the condensate drain following each maintenance operation or replacement of spare parts.

#### ATTENTION

##### **Damage to the unit!**

Damage to the unit due to irregular maintenance. Non-compliance with the recommended maintenance work reduces the cooling capacity of the cooling unit and may lead to reduced machine availability.

- Regularly carry out maintenance work in accordance with the maintenance checklist.
- Only units serviced in accordance with specifications are covered by the warranty.

#### ATTENTION

##### **Damage to the unit!**

Damage to the unit due to spare parts from other manufacturers.

- Only original parts are subject to quality control by the manufacturer.
- Only use original manufacturer parts to ensure safe and reliable operation.

## 6.2 General

The refrigeration circuit is a maintenance-free, hermetically sealed system.

The units are 100%-tested at the factory.

### **Manufacturer recommendation to the owner for maintenance work:**

- Perform maintenance work regularly every 12 months according to the maintenance checklist, see section "Maintenance schedule", Page 61.
  - Shorter maintenance intervals are required for air/water heat exchangers that cool in ambient air containing oil and dust. A shorter guide value of two to six months applies between the maintenance intervals.
- The functions of the Pfannenberg filters are optimally adapted to the cooling units. Therefore, the use of Pfannenberg filters has positive effects on the scope of the maintenance work.



### 6.3 Maintenance schedule

<b>Maintenance interval:</b>	Perform every twelve months. Every two to six months, in ambient air containing oil and dust.			
<b>Type:</b>				
<b>Serial number:</b>				
<b>Date of maintenance:</b>				
<b>Executing specialist (name):</b>				

	Unit area designation / necessary maintenance work	Visual inspection	To do	Result
<b>1</b>	<b>Aggregate prior to maintenance</b>			
1.1	General visual inspection of the aggregate			
1.2	Inspection for corrosion damage			
<b>2</b>	<b>Refrigeration circuit</b>			
2.1	Check refrigerant carrying parts for oil traces			
2.2	Check refrigerant carrying parts for leaks			
2.3	Check electrical connections for damage			
<b>3</b>	<b>Condenser/heat exchanger</b>			
3.1	Check pipe assembly for deposits			
3.2	Inspection for general corrosion damage			
3.3	Check, clean and align blades*			
<b>4</b>	<b>Evaporator/heat exchanger</b>			
4.1	Check pipe assembly for deposits			
4.2	Inspection for general corrosion damage			
4.3	Check, clean and align blades*			
<b>5</b>	<b>Condenser fan (external)</b>			
5.1	Check holder for loose parts			
5.2	Check electrical connections for damages			
5.3	Check motor bearing for noise			
5.4	Check drive for signs of overheating			
5.5	Clean fan*			
<b>6</b>	<b>Evaporator fan (internal)</b>			
6.1	Check holder for loose parts			
6.2	Check electrical connections for damages			
6.3	Check motor bearing for noise			
6.4	Check drive for signs of overheating			
6.5	Clean fan*			
<b>7</b>	<b>Pre-filter</b>			
7.1	Change filter mat*			
7.2	Clean filter mat*			

Tab. 11: Cooling unit maintenance schedule

\* Maintenance intervals more frequent, depending on the level of contamination.

## 6.4 Maintenance work

### 6.4.1 Cleaning

#### **⚠ WARNING**

##### **Danger of accident and component damage**

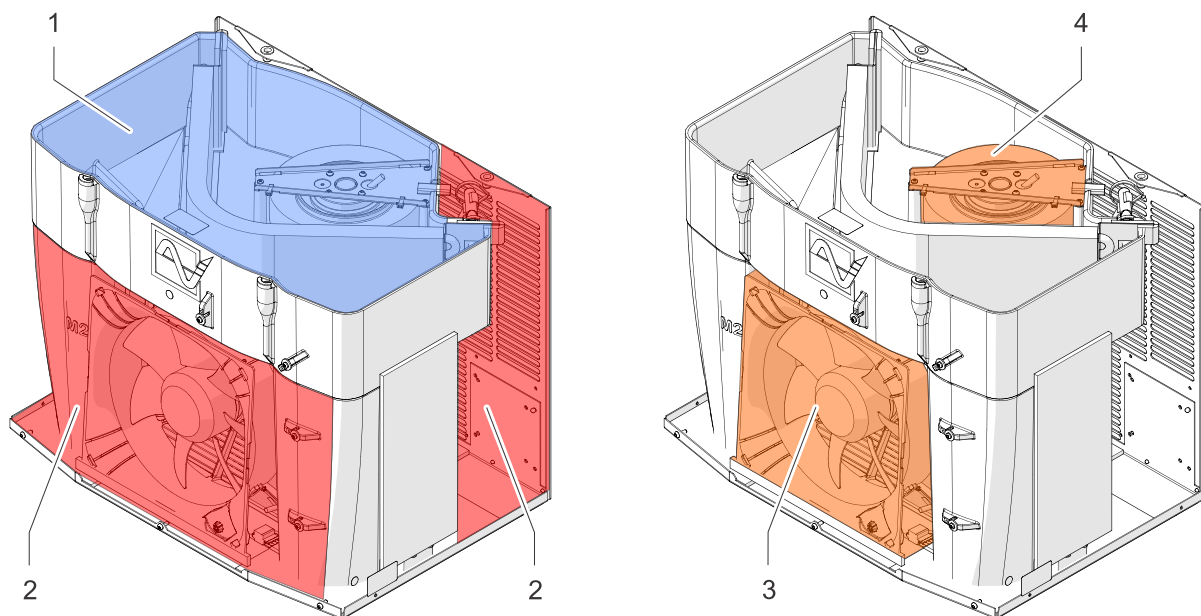
Danger of accident and component damage due to improper cleaning.

Cleaning the cooling units using water jets, steam jet cleaners or high-pressure cleaners or sharp objects may damage the electrical and electronic components. Malfunctions may cause accidents.

- Do not clean with a water jet, high-pressure cleaner or flammable cleaning agents.
- Protect electrical components against moisture penetration.
- Do not use pointed or sharp-edged objects when cleaning the blades. They must not be compressed or damaged.

The frequency of cleaning intervals depends on the respective operating conditions. Perform the following cleaning operations regularly to ensure safe and reliable operation of the cooling units:

- Clean the heat exchangers of dust or ambient residues.
- Regularly check the condensate drain.



G00050

Fig. 30:

1	Internal air circuit (blue, cold area)	3	Condenser fan (external)
2	External air circuit (red, hot area)	4	Evaporator fan (internal)

#### **Internal air circuit**

The internal air circuit of the cooling unit (cold area) is protected against being soiled by the environment when installed correctly on the switch cabinet. No cleaning is necessary here under normal circumstances.

#### **External air circuit**

The external air circuit of the cooling unit (hot area) can be soiled by contaminated air. The external air circuit must therefore be cleaned regularly.

#### **Fans**

The fans can be dismantled easily for maintenance and cleaning.

#### 6.4.1.1 Removing the front flap and unit cover

##### **⚠ CAUTION**

##### **Risk of crushing when removing the front flap and unit cover**

Hands and other parts of the body could be crushed when removing and remounting the front flap and unit cover.

- Work carefully and wear cut-proof gloves.

##### **Prerequisite**

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- Wait for the end of the 5-minute discharge phase of the electrical components. The unit should only be opened afterwards.

##### **Procedure**

1. Loosen the three screws (1) of the front flap. Turn the screwdriver counter-clockwise to loosen the screws.

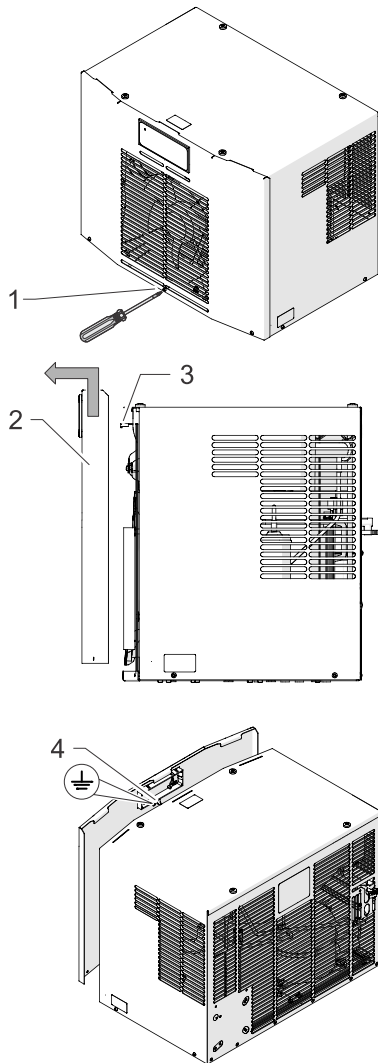
2. Push up the front flap (2) carefully.

**ATTENTION** – Damage to the unit.

Always disconnect the connecting cable of the display unit or control unit (3) as well as the earthing cable (4) before removing the front flap.

3. Pull off the front flap to the front.

⇒ The front flap is removed.



G00047

Fig. 31: Removing the front flap

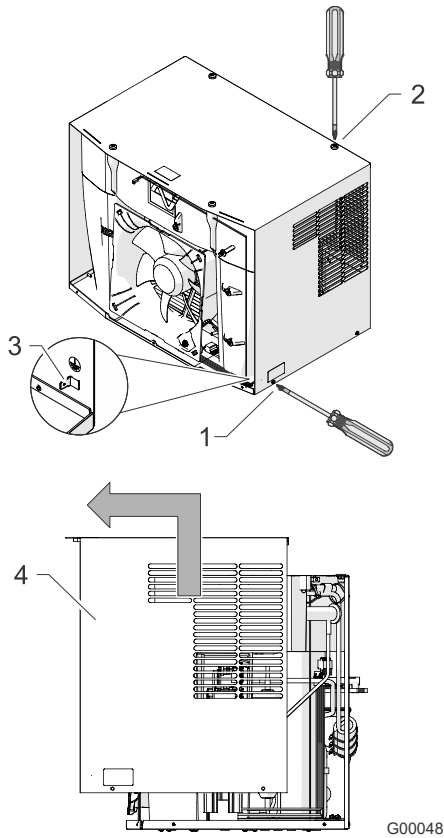


Fig. 32: Removing the front flap

#### Prerequisite

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- Wait for the end of the 5-minute discharge phase of the electrical components. The unit should only be opened afterwards.

#### Procedure

1. Loosen the four screws on the right and left-hand sides of the unit (1).
  2. Pull off the earthing cable (3).
  3. Remove the four screws on the top of the unit (2).
  4. Push up the unit cover (4) and pull off to the front.
- ⇒ The unit cover is removed.

#### 6.4.1.2 Cleaning the external heat exchanger (condenser)

##### ATTENTION

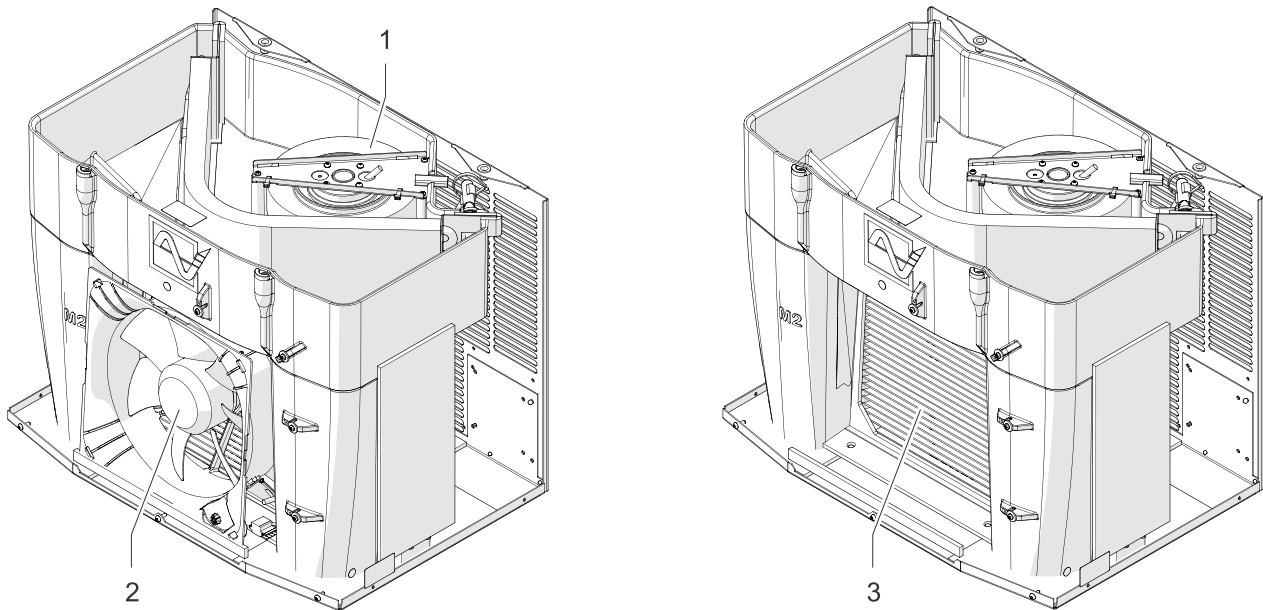
##### Damage to components

Damage to the heat exchanger fins due to incorrect cleaning.

- Clean the heat exchanger fins with a soft brush, compressed air or a vacuum cleaner with a brush attachment.

##### NOTE

The time intervals for cleaning depend strongly on the contamination of the ambient air.



G00049

Fig. 33: Cleaning the heat exchangers and fans

##### Prerequisites

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

- The unit cover and front flap are removed, see chapter "Removing the front flap and unit cover", Page 63.

##### Required tools and materials

- Soft brush
- Vacuum cleaner with brush attachment or compressed air cleaner
- Fin comb

**Procedure**

1. Clean the evaporator fan (1) and condenser fan (2) with a soft brush, compressed air or a vacuum cleaner with a brush attachment.  
**⚠ CAUTION** – risk of injury. Do not touch the sharp heat exchanger fins.  
**⚠ CAUTION** – dust development when cleaning with compressed air. Wear eye, mouth and nose protection when cleaning with compressed air.
  2. Remove the condenser fan (2).
  3. Clean the heat exchanger (3) with a soft brush, compressed air or a vacuum cleaner with a brush attachment.  
**⚠ CAUTION** – risk of injury. Do not touch the sharp heat exchanger fins.  
**⚠ CAUTION** – dust development when cleaning with compressed air. Wear eye, mouth and nose protection when cleaning with compressed air.
  4. Check the heat exchanger (3) for bent fins; align fins with a fin comb.
  5. Re-install the condenser fan (2).
  6. Remount the unit cover and front flap.
  7. Check that the cooling unit works properly and safely after cleaning.
- ⇒ The heat exchanger is cleaned.

#### 6.4.1.3 Cleaning filter mats

##### ATTENTION

###### Damage to components

Damage to the filter mats due to improper cleaning.

- Avoid high-pressure water jets.
- Do not wring out filter mats.
- Replace oily or greasy filter mats immediately.

##### NOTE

The time intervals for cleaning or replacing the filter mats depend strongly on the contamination of the ambient air.

##### Requirements

- Unit is switched off.

##### Required tools and materials

- Brush
- Water below 40 °C
- Fine detergent
- Vacuum cleaner or compressed air cleaner

##### Procedure

In cooling units with pre-filters, clean the filter mat at regular intervals.

1. Unhook the filter adapter from the cooling unit.
  2. Remove the filter mat and clean it or, if it can no longer be cleaned, replace it.
    - Wash out the filter mat with water up to 40 °C and commercially available fine detergent.
    - Knock off, suck off or blow off dry contamination from the filter mat.
  3. Insert the cleaned filter mat into the filter adapter.
  4. Hang the cooling unit back onto the cooling unit.
  5. Check that the cooling unit works properly and safely after cleaning.
- ⇒ The cooling unit is cleaned.

## 7 Rectification of operating faults

### 7.1 General

#### NOTE

Flashing of the red LED light on the controller card is **not** a fault indication or error message.

The red LED light indicates that the cooling unit is carrying voltage.

Fault	Possible causes	Remedial measures
Unit does not cool, evaporator fan (internal) running	Temperature setting too high.	Check temperature setting.
Unit does not cool sufficiently	Application limits exceeded.	Check ambient air temperature and internal load.
	Low refrigerant level.	Call authorized specialist personnel, check the unit for leaks.
	Heat exchanger contaminated.	Cleaning the heat exchanger.
	Evaporator fan (internal) defective. Condenser fan (external) defective.	Call authorized specialist personnel; change fan.
	Air circulation in switch cabinet disrupted.	Check installations and circulation channels in the switch cabinet. Check the air inflow and outflow from the cooling unit into the inlet and outlet openings of the switch cabinet. Check DIP-switch and cable connections.
Unit only cools sometimes.	DIP-switch set incorrectly or defective.	Set higher temperature on the DIP-switch.
Condensate formation in the switch cabinet	Blow-out temperature too low.	Close switch cabinet door.
	Switch cabinet is not sufficiently sealed.	Rectify any leaky areas or seals on the switch cabinet. Check temperature setting.
Condensate does not drain	Condensate drain is blocked.	Clean the condensate drain. Check whether the condensate drain hose is free of kinks and installed on a gradient.
Condensate drips from the unit.	Condensate evaporator defective or there is too much condensate.	Change fuses for condensate evaporator.
	Switch cabinet is not sufficiently sealed.	Rectify any leaky areas or seals on the switch cabinet.

Tab. 12: General operating faults



### 7.1.1 Error messages

The error numbers are not displayed in units with Standard Controllers. Using the ECoolPLANT software, it is possible to read out the error numbers on the computer.

#### NOTE

Flashing of the red LED light on the controller card is **not** a fault indication or error message.

The red LED light indicates that the cooling unit is carrying voltage.

Error no.	Fault/unit behavior		Possible causes	Remedial measures
<b>Er00</b>	LED:	flashes	<b>Door contact:</b> The door contact circuit is interrupted.	Close the door. Connect the door contact switch. Bridge the door contact. Check wiring.
	Compressor:	OFF		
	Evaporator fan (internal):	OFF		
	Condenser fan (external):	OFF		
	Heating (external):	OFF		
	Fault signal contact::	closed		
<b>Er01</b>	LED:	flashes	<b>Pressostat tripped:</b> Too high pressure in the refrigeration circuit. The cooling unit cannot dissipate the heat from the refrigeration circuit.	Let the unit cool down. Clean the fins of the heat exchanger (internal/external). Check the function of the condenser fan (external).
	Compressor:	OFF		
	Evaporator fan (internal):	ON		
	Condenser fan (external):	OFF		
	Heating (external):	OFF		
	Fault signal contact::	Open		
<b>Er04</b>	LED:	flashes	<b>Phase sequence/phase failure:</b> Failure of at least one phase or phase sequence is wrong (only in three-phase units with cam compressors).	Check field of rotation - (right-hand field of rotation is mandatory). All phases must carry rated voltage.
	Compressor:	OFF		
	Evaporator fan (internal):	OFF		
	Condenser fan (external):	OFF		
	Heating (external):	OFF		
	Fault signal contact::	Open		
<b>Er05</b>	LED:	flashes	<b>Sensor 1 (TS1) defective.</b>	According to the unit type, replace sensor 1 (permanently soldered on the controller card) or the complete controller card.
	Compressor:	ON		
	Evaporator fan (internal):	ON		
	Condenser fan (external):	ON		
	Heating (external):	OFF		
	Fault signal contact::	Open		

Tab. 13: Possible error messages

Error no.	Fault/unit behavior		Possible causes	Remedial measures
<b>Er06</b>	LED:	flashes	<b>Sensor 1 Minimum:</b> Minimum value of the switch cabinet temperature "Lit" (display) is reached or exceeded.	Select a higher switch cabinet temperature setpoint. Check switch cabinet for leakages. Move components located in the vicinity of the air inlet and air outlet further away to prevent an air short-circuit. (The cold air is deflected directly to the air inlet by components.)
	Compressor:	OFF		
	Evaporator fan (internal):	ON		
	Condenser fan (external):	ON		
	Heating (external):	OFF		
	Fault signal contact::	Open		
<b>Er07</b>	LED:	flashes	<b>Sensor 1 Maximum:</b> Maximum value of the switch cabinet temperature "Lit" (display) is reached or exceeded. The cooling unit cannot cool the air in the switch cabinet sufficiently.	Check settings of the cooling unit. Clean the fins of the heat exchanger (internal/external). Check the function of the evaporator fan (external). Check the refrigeration circuit for spilled refrigerant or leakage. Install a cooling unit with a higher cooling capacity if necessary.
	Compressor:	ON		
	Evaporator fan (internal):	ON		
	Condenser fan (external):	ON		
	Heating (external):	OFF		
	Fault signal contact::	Open		
<b>Er08</b>	LED:	flashes	<b>Sensor 2 (TS2) defective.</b>	Replace sensor 2 according to the unit type. Sensor 2 is plugged to the card, not permanently soldered.
	Compressor:	ON		
	Evaporator fan (internal):	ON		
	Condenser fan (external):	ON		
	Heating (external):	OFF		
	Fault signal contact::	Open		

Tab. 13: Possible error messages (continued)

Error no.	Fault/unit behavior		Possible causes	Remedial measures
<b>Er 15</b>	LED:	flashes	<b>Antifreeze (option):</b> Antifreeze-Sensor $\leq 1^{\circ}\text{C}$ . Safety cut-out because the evaporator is threatening to ice up.	Restart operation after condensate has evaporated. A restart is only possible by disconnecting and reconnecting the mains voltage. No other reset is provided for safety reasons. Clean the fins of the heat exchanger (internal/external). Check switch cabinet for leakages. Select a higher switch cabinet temperature setpoint. Check the evaporator fan (internal) function.
	Compressor:	OFF		
	Evaporator fan (internal):	OFF		
	Condenser fan (external):	OFF		
	Heating (external):	OFF		
	Fault signal contact::	Open		
<b>Er 19</b>	LED:	flashes	Sensor 5 (TS5) defective.	Replace sensor 5 or the controller card according to the unit type.
	Compressor:	OFF		
	Evaporator fan (internal):	OFF		
	Condenser fan (external):	OFF		
	Heating (external):	OFF		
	Fault signal contact::	Open		

Tab. 13: Possible error messages (continued)

### 7.1.2 System messages

Signal	Unit behavior		System information
<b>En</b>	LED:	lights	<b>Energy-saving mode active</b> <ul style="list-style-type: none"> <li>Execution of the energy function, is activated in energy-saving mode.</li> <li>For details of the energy-saving mode, see section "Energy-saving mode", Page 23.</li> </ul>
	Compressor:	OFF	
	Evaporator fan (internal):	OFF	
	Condenser fan (external):	OFF	
	Heating (external):	OFF	
	Fault signal contact::	closed	
<b>StUP</b>	LED:	lights	<b>Start-up mode</b> The cooling unit starts its operation
	Compressor:	OFF	
	Evaporator fan (internal):	OFF	
	Condenser fan (external):	OFF	
	Heating (external):	OFF	
	Fault signal contact::	closed	
<b>StopP</b>	LED:	lights	<b>Stop mode</b> Unit was stopped by: <ul style="list-style-type: none"> <li>Opening the switch cabinet door.</li> <li>The cooling unit received a stop command, e.g. via the software application.</li> </ul>
	Compressor:	OFF	
	Evaporator fan (internal):	OFF	
	Condenser fan (external):	OFF	
	Heating (external):	OFF	
	Fault signal contact::	closed	

Tab. 14: Possible system messages

## 8 Decommissioning

### DANGER

#### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.

### 8.1 Temporary decommissioning

#### WARNING

#### **Danger of injury from materials and substances**

Improper work on the unit or opening of the refrigeration circuit can be harmful to the health.

- Always ensure that the power supply is disconnected prior to working on the unit.
- Only properly qualified personnel should dispose of the unit in accordance with applicable environmental regulations.

The power supply must be interrupted if the cooling unit is not required for an extended period of time.

- Ensure that improper commissioning by third parties is ruled out

### 8.2 Final decommissioning

#### CAUTION

#### **Danger of crushing when decommissioning the unit**

Hands and other body parts may be crushed when removing units.

- Do not place any body parts between the frame, springs and the unit cut-out.

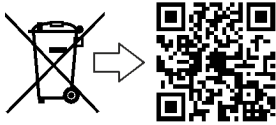
When cooling units are ultimately decommissioned or disposed of, observe the notes in section "Dismantling and disposal", Page 74!

#### **NOTE**

Old units are also professionally disposed of by Pfannenberg. Delivery to one of our manufacturing facilities shall be free of charge.

## 9 Dismantling and disposal

The unit must be dismantled and disposed of in an environmentally friendly way at the end of its useful life.



Units marked by the symbol opposite may not be disposed of with unsorted domestic waste. They must be taken to a separate electrical and electronic waste collection depot. For further information about disposal, scan the QR code or call [www.pfannenberg.com/disposal](http://www.pfannenberg.com/disposal).

### 9.1 Safety information

All work may only be performed by persons with certified qualifications under consideration of:

- the minimum qualification
- this manual
- the valid local regulations and laws
- company-internal work, operation and safety regulations

Use the necessary personal protective equipment for the respective activity for all work.

#### **⚠ DANGER**

##### **Danger of fatal injury due to electric shock!**

Parts may be under voltage when the unit is opened and can cause an electric shock if touched.

Observe the following points when working on the open unit:

- Work on the electrical system may only be carried out by authorized electricians.
- Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied and secure against being switched back on.
- Cordon off the working area and post a warning sign.
- The electrical connection must be made according to nationally valid regulations.

#### **⚠ CAUTION**

##### **Risk of cutting and injury!**

Risk of cutting and injury due to production-related, sharp sheet metal edges on the unit.

- Use personal protective equipment (cut-proof gloves).
- Handle with care.

#### **⚠ CAUTION**

##### **Risk of injury due to improper working!**

Risk of injury due to improper working on the refrigeration unit.

- The refrigeration unit may only be dismantled by specialized refrigeration companies.

**ATTENTION****Hazards for the environment**

Refrigerants are harmful to the environment as soon as they escape into the atmosphere.

- Only have work on the refrigeration unit carried out by experts in accordance with the chemicals climate protection directive.
- Do not damage refrigerant lines.
- Pass on refrigerants for professional treatment.

**NOTE**

Dismantling and disposal are to be carried out by the owner or persons authorized by him.

Contact the local authorities or special disposal companies for information on issues of environmentally friendly disposal.

## 9.2 Dismantling

**Requirements**

**⚠ DANGER** – Danger to life due to electric shock. Make sure that the unit is voltage-free.

**Procedure**

1. Switch off the unit, secure against switching back on and wait until all parts have a temperature below 40 °C.
2. Physically disconnect all energy and media supplies from the unit, discharge stored residual energy.
3. Clean dirt and contamination from the unit.
4. Remove operating and auxiliary materials and dispose of them in an environmentally friendly way.
5. Dismantle the unit into the different separable materials.
  - Observe the valid work safety and environmental protection regulations.

### 9.3 Disposal

#### NOTE

Old units are also professionally disposed of by Pfannenberg. Delivery to one of our manufacturing facilities shall be free of charge.

Dismantled components should be recycled unless return or disposal agreements have been made:

- Scrap metals
- Hand over plastic elements for recycling
- Dispose of other parts sorted according to their material properties

#### ATTENTION

##### Hazards for the environment

Improper disposal of chemicals (e.g. additives) can cause environmental pollution.

- Chemicals must not be thrown in with the domestic trash and must not be allowed to get into the sewer system or ground.
- Wear appropriate protective clothing (gloves, eye protection, etc.) for disposal.
- Dispose of the used chemicals (as special waste if necessary) and pass on for recycling separately.
- Refrigerants may not escape into the atmosphere. Pass on refrigerants for professional treatment.
- Work on the refrigeration circuit may only be carried out by experts in accordance with the chemicals climate protection directive.
- Observe safety data sheets as well as valid national and local regulations.

The components of the plant or the unit basically consist of the following materials:

- plastic
- non-ferrous metals
- stainless steel
- steel and aluminum parts
- electronic sub-assemblies
- refrigerants in the refrigeration circuit (type and amount, see section "Refrigeration circuit", Page 27)



## 10 Spare parts and accessories

### NOTE

- Always state the Pfannenberg part number when ordering spare parts and accessories.
- The Pfannenberg part number for the controller is on the controller transformer.

No.	Designation	No.	Designation
18811100077	Evaporator fan (internal)	18315000005	DTT 6101/6201 PAD-frame
18811000081	Condenser fan (external)	18315000000	DTT 6301/6401 PAD-frame
18810200138	Unit cover	18315000001	DTT 6601/6801 PAD-frame
18810200141	Stainless-steel cover	18310000007	Quick-change frame DTT-cooling unit 6101/6201
18810000058	Display control unit (MC)	18300000145	Quick-change frame DTT-cooling unit 6301/6401
18810000001	Display unit (SC)	18300000146	Quick-change frame DTT-cooling unit 6601/6801
18310000004	USB adapter	18315000002	PAD-air duct system *
18314000100	Condensate collection bottle	18315000004	PAD-extension package
18816300003	Mechanics set DTT 61-6801 SC/MC		

Tab. 15: Spare parts and accessories list

- \* The PAD-dual-duct system requires the use of two PAD-air duct systems.

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**Exclusion of liability:**

All the contained information has been carefully checked.

However, we shall assume no liability with regard to the completeness and accuracy of the information.

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