Operating Manual

Add-on and Built-in Cooling Units
Series DTFS 6021, 6031, 6041

Original instruction manual – Version 2.0, November 2025

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

1 About this manual

1.1 Use and safekeeping

NOTE

Please read the manual before starting any work on the unit/system.

Note 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 people.
- The unit can only be put into operation, operated, and maintained properly and safely with the help of this manual.
- This manual applies only to the product specified on the title page.
- We reserve the right to make changes to this manual due to technical developments.
- This manual is available online.
- This manual applies from transport to final disposal and must be followed.
- Keep the manual in a legible condition.
- Leave the quick start guide with the unit in the case of resale.
- The device may pose unavoidable residual risks to people and property. Therefore, personnel must read, understand, and follow the manual before starting any work. Every person working on or with the unit in any way must be trained and aware of possible dangers.
- This manual is intended only for trained and authorized personnel.
- The operator / owner must ensure that all relevant personnel have read and understood the manual before starting work.
- Illustrations in this manual are for general understanding only and may 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 Target group

The different activities for handling the unit must be allocated to the target groups.

The necessary personnel qualifications are subject to different legal requirements according to the application site. The owner must ensure that the applicable laws are observed. The admissible personnel and their minimum qualification are defined below insofar as this is not regulated by law.

Observe the following points:

- Work on or with the unit/system may only be performed by suitable specialists.
- The personnel must be familiar with the pertinent standards, regulations, rules for the prevention of accidents and operating conditions.
- The personnel must be instructed and trained for the work to be performed.
- The personnel must be capable of recognizing and avoiding hazards.

Person	Activity	Qualification	Life phase
Load transport specialists	Lifting/setting down and transporting the system	Proven experience in the handling of suspended loads and load securing	Transport, disposal
Specialized personnel (mechanics)	Mechanical work for: Commissioning, troubleshooting, maintenance and decommissioning	Training as industrial mechanics or an equivalent professional qualification	Commissioning, maintenance, troubleshooting, decommissioning, disassembly
Specialized personnel (electrician)	Electrical work	Professional training in electrical engineering or an equivalent professional qualification	Commissioning, maintenance, troubleshooting, decommissioning, disassembly
Operators and users	Operation of the system	By the owner based on the instruction of an instructed person	Commissioning, operation, maintenance, troubleshooting
Specialized personnel (disposal agent)	Proper disposal of the system	Knowledge of the disposal regulations applicable at the application site	Decommissioning, disassembly, disposal

Tab. 1: Target groups and required personnel qualification

1.4 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.

1.5 Marking of contents

1.5.1 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>

1.5.2 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 8.

2 Safety

2.1 Intended use

The Pfannenberg DTFS series of add-on and built-in cooling units are stationary cooling units designed to dissipate heat from switch cabinets. They are suitable for two types of assembly:

- Fully recessed in the side or installed in the door
- Mounted on the side or on the door as an alternative.

⚠ WARNING

Risk of injury due to unauthorized use of the units.

Improper use of the units can lead to serious accidents.

- Only use cooling units for stationary operation.

The DTFS cooling units are only approved for stationary operation.

The cooling units are available with different cooling capacities. For exact performance data, see chapter "Technical data", Page 25.

The use of aluminum filters or fleece filters is possible with an additional adapter.

The cooling units are available with different cooling capacities:

LED version:	LED display unit without condensate evaporation
DIS version:	LCD control panel with condensate evaporation

The controllers are used to configure refrigeration functions and operating data. They also enable the readout of system messages and diagnostic data.

All Pfannenberg cooling units are ROHS-compliant and free of:

- Silicone compounds
- PCT, asbestos, formaldehyde, cadmium
- Wetting-impairing substances

2.1.1 Permissible conditions for use

- The permissible ambient air temperature of the DTFS cooling units is +15 °C … +55 °C (+59 °F … +131 °F).
- The permissible ambient air temperature of the DTFS-cooling units is -20 °C … +70 °C (-4 °F … +158 °F).
- Operation of DTFS cooling units is only permitted as a stationary assembly and in closed switch cabinets.

2.2 Foreseeable misuse

The following points describe foreseeable misuse of the unit:

- Use of the unit as a storage space, work platform
- Installation at unsuitable locations
- Transport of the cooling unit installed on the switch cabinet without transport protection device
- Operation outdoors
- Exceeding the limits of the technical specifications. See chapter "Technical data", Page 25.
- Operation with damaged components or removing components that ensure the safety of persons and the unit/system.
- Use of refrigerants that are neither listed nor approved in the "Technical Data"
- Cooling of media and objects that are not intended for the operation of the unit
- Blocking the ambient air inlets and outlets, e.g. by placing objects in the way

2.3 Obligations of the owner

- The owner must ensure that the units are only used as intended and all kinds of danger for 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.

2.4 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.
- Failure to perform regular maintenance of the units.
- Damage due to failure to observe the maintenance recommendations.
- Damage to 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.

2.4.1 Returning units

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

- Enclose a detailed description of the defect and the SRO (RMA) number assigned by Pfannenberg.
- Enclose proof of purchase (copy of delivery note or invoice).
- Send the unit with all supplied accessories, in original box or equivalent packaging, free of transport charges and insured.
- Observe transport instructions, see chapter "Transport", Page 33.

NOTE

The SRO (RMA) number (for material return authorization) can be requested from the Pfannenberg Service Department.

3 Unit description

3.1 Unit layout

The Pfannenberg add-on and built-in cooling units of the DTFS series are designed to dissipate heat from switch cabinets. Sensitive components in the switch cabinet are protected. Condensate produced during cooling is discharged by an integrated system.

- The cooling units work with a refrigerant that is non-flammable and harmless to the ozone layer.

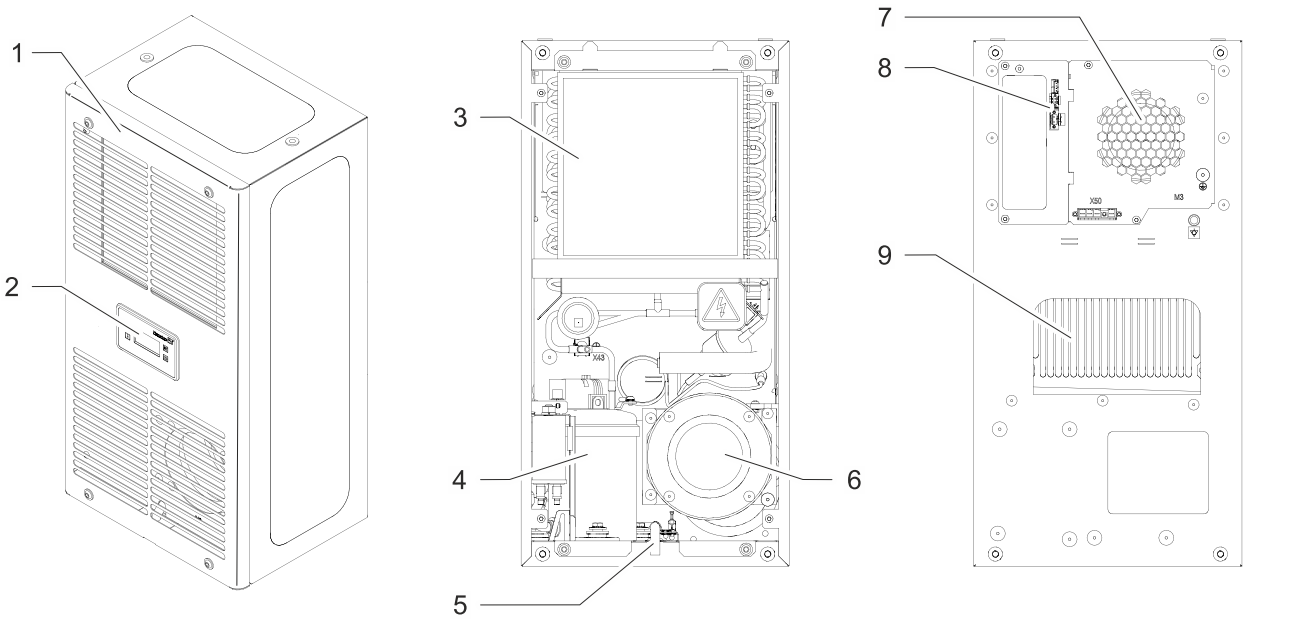


Fig. 1: Layout (DTFS cooling unit)

1	Unit cover	6	Condenser fan (external)
2	LED display unit / LCD control panel	7	Evaporator fan (internal)
3	Condenser	8	Connection area
4	Compressor	9	Evaporator (internal)
5	Condensate drain		

3.2 Scope of delivery

The scope of delivery includes:

- DTFS cooling unit
- Abbreviated operating manual for cooling unit
- Accessory pack: seal, fastening material, electrical connectors, condensate drain hose
- Special accessories when required

3.3 Order options

CAUTION

Damage to the unit!

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

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

For Pfannenberg spare part numbers, see chapter "Spare parts and accessories", Page 80.
There is an optional filter adapter for various filter mats (fleece filter and aluminum filter).

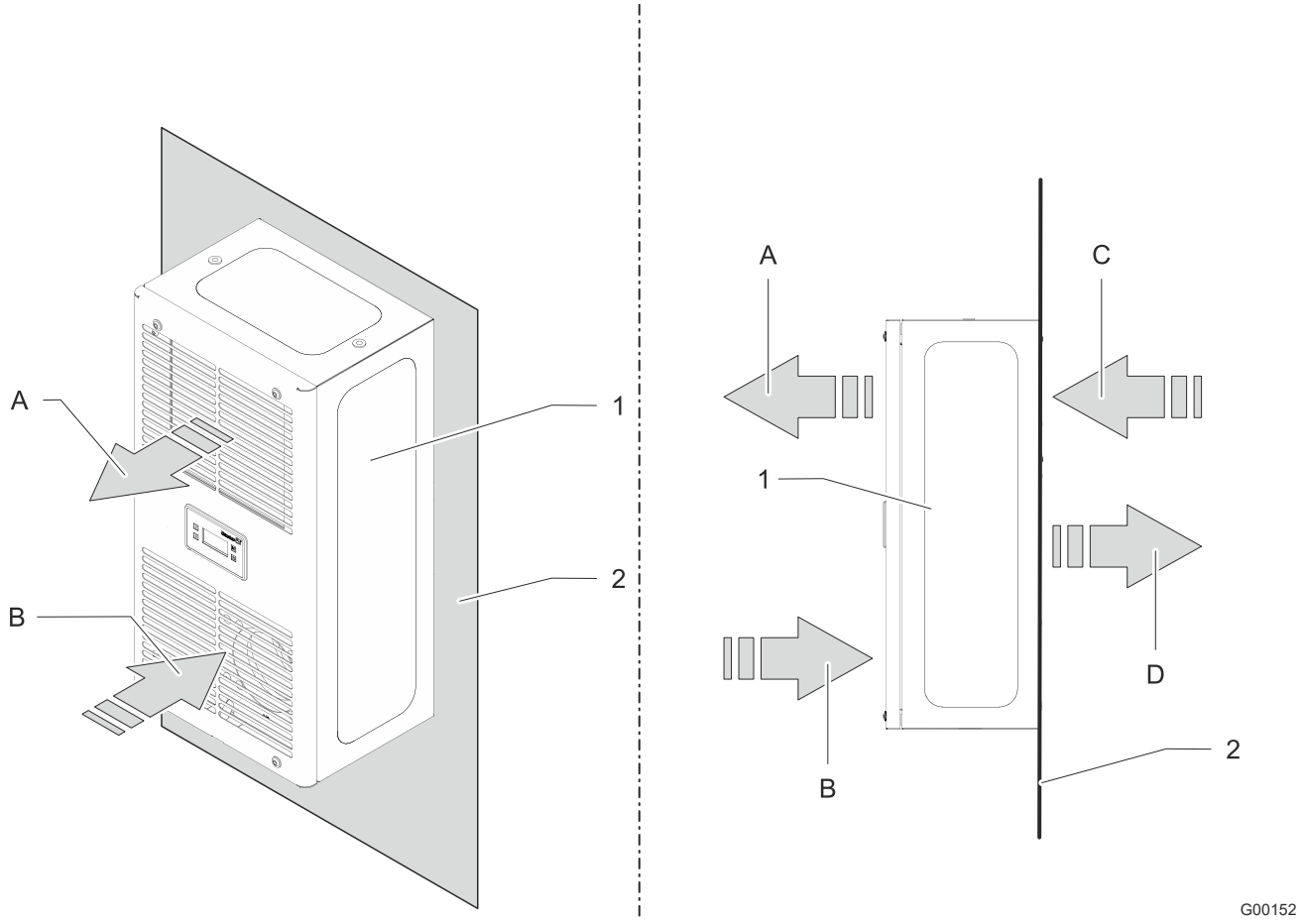
3.4 Air circuit

⚠ CAUTION

Risk of burns

Risk of burns due to high temperatures at the ambient air outlet. Depending on the ambient temperature, the air outlet can become extremely warm.

Do not place any part of your body directly in front of the ambient air outlet (A).



Front view

Side view

Fig. 2: DTFS switch cabinet air circuit

A	Ambient air outlet	1	DTFS cooling unit
B	Ambient air inlet	2	Switch cabinet wall
C	Warm air inlet (switch cabinet)		
D	Cold air outlet (switch cabinet)		

3.5 Controller

The controllers are used to configure refrigeration functions and operating data. They enable the readout of system messages and diagnostic data.

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

There is also a connection for collective fault signals.

3.5.1 LED display

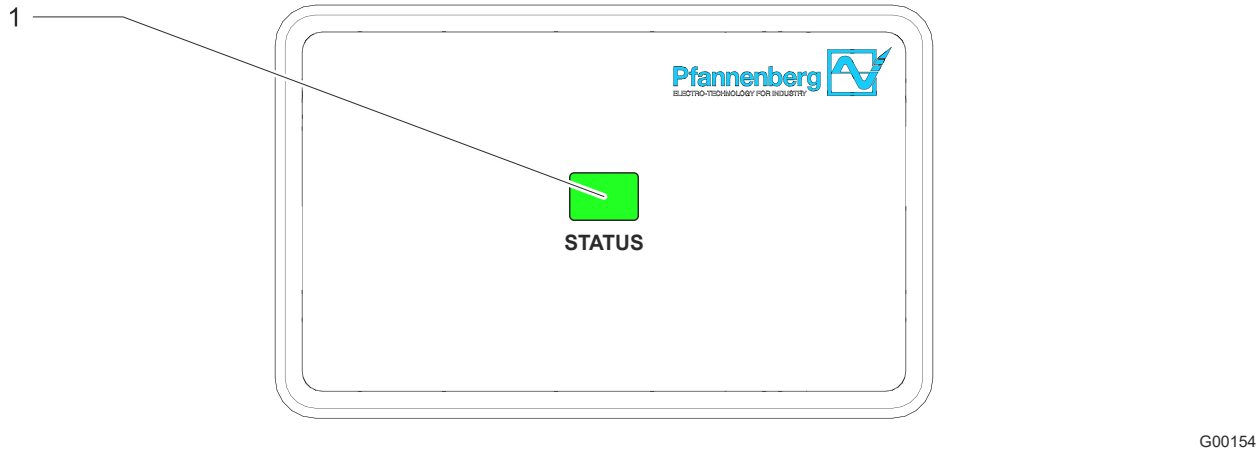


Fig. 3: Display with LED

The **LED** version of the cooling units has a display with an LED light (1).

The LED display shows operating information via a two-color LED. More detailed information can be obtained from the Pfannenberg Control Center if a PC is connected to the service interface of the cooling unit.

For an explanation of the status displays, see "Control LED", Page 57.

NOTE

The "Pfannenberg Control Center" operating and configuration software is available for download at www.pfannenberg.com.

3.5.2 LCD control panel

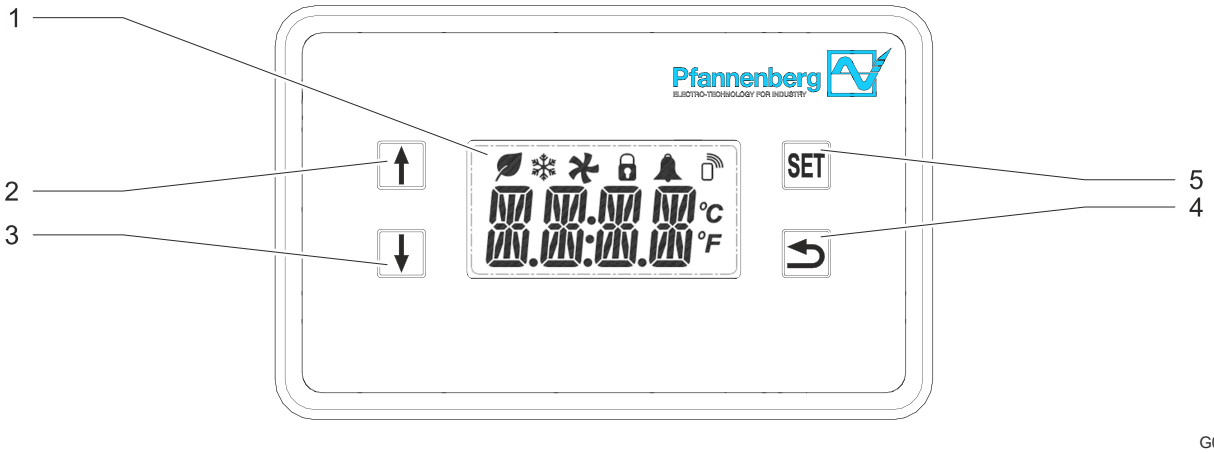


Fig. 4: LCD control panel

1	LCD display	4	BACK button
2	SCROLL UP button	5	SET button
3	SCROLL DOWN button		

DIS version cooling units has a control panel with an LCD display (1). The control panel is located on the unit cover. Various system information is displayed on the LCD display.

For an explanation of the individual status displays, see "LCD control", Page 58.

3.6 Refrigeration circuit

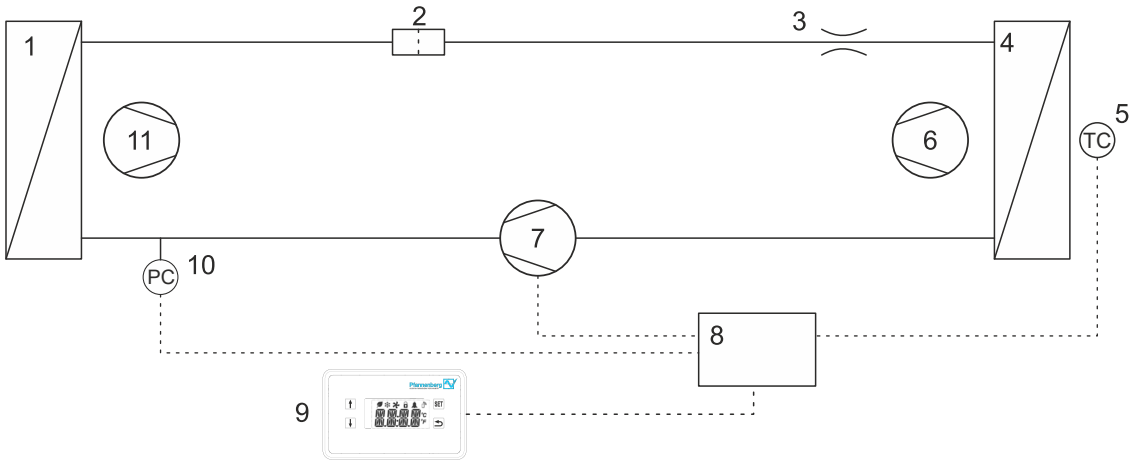


Fig. 5: Refrigeration circuit

1	Condenser	7	Compressor
2	Filter dryer	8	Electronic control
3	Expansion throttle	9	Display (LED) / control panel (DIS)
4	Evaporator	10	High pressure switch
5	Temperature sensor	11	Condenser fan (external)
6	Evaporator fan (internal)		

The cooling units consist of different components, see Fig. 5.

- The compressor (7) compresses the refrigerant at high pressure. The temperature rises.
- This heat is transferred to the ambient air in the condenser (1). The refrigerant liquefies.
- The condenser fan (11) draws in ambient air through the condenser (1) and releases it back into the environment.
- The expansion throttle (3) expands the refrigerant to the evaporation pressure.
- In the evaporator (4), the refrigerant extracts heat from the internal cabinet air which then evaporates. The air inside the cabinet is cooled and, if necessary, dehumidified.
- The evaporator fan (internal) (6) extracts the internal cabinet air via the evaporator (4) and returns it to the switch cabinet after cooling.

The cooling unit is controlled by an air temperature sensor (5). It measures the temperature of the air inside the switch cabinet.

3.7 Safety concept

⚠ WARNING

Risk of injury if safety devices are modified.

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

- Any modifications to the unit, in particular to the safety devices, are prohibited.
- If safety devices are defective, shut down the unit and decommission it immediately.

3.7.1 Safety devices

The cooling units have a pressure switch that has been tested in accordance with EN 12263. The pressure switch automatically switches off if the pressure in the refrigeration circuit rises.

3.8 Handling condensate

⚠ CAUTION

Risk of slipping due to leaking condensate

Risk of slipping due to condensate leaking from the condensate drain onto the floor.

Collect any condensate leaking from the condensate drain.

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.

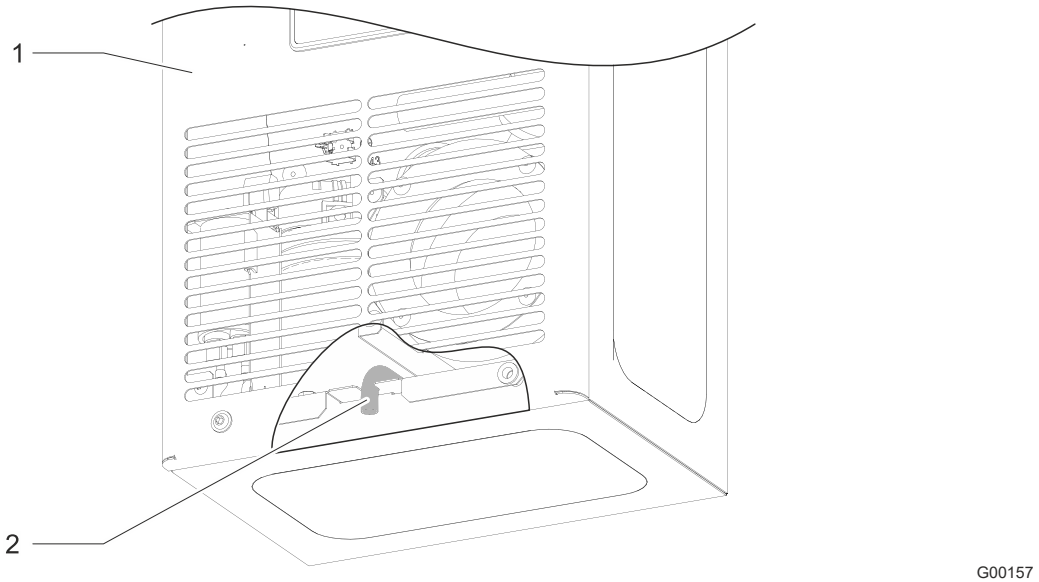


Fig. 6: Condensate drain (DTFS cooling unit)

1	Cooling unit	2	Condensate drain

During cooling, the evaporator can cool the switch cabinet air below the dew point, causing condensate to form. To prevent damage to the switch cabinet and cooling units, the condensate is drained.

In the LED versions, the condensate is collected in a condensate collection bottle via a condensate drain hose.

The condensate evaporation system integrated in the DIS variants discharges the condensate into the ambient air.

For safety reasons, there is a condensate drain (2) at the condensate evaporation point, through which excess condensate is drained out of the unit.

The condensate leaking from the condensate drain (2) can be collected using the condensate collection bottle available as an accessory (see Chapter "Spare parts and accessories", Page 80).

3.9 Energy-saving mode

3.9.1 Introduction

The energy-saving mode (energy mode) is designed to reduce energy consumption by operating the internal components less frequently.

3.9.2 Function

There are currently three energy mode variants for the controller in use. Only the behavior of the evaporator fan (internal) together with the start value of the compressor differs between the variants. (see "Shifting the compressor start value", Page 21)

Mode 1:

The evaporator fan (internal) is switched off 15 minutes after the last demand for cooling.

If the temperature sensor detects a temperature increase, the evaporator fan is switched on for 3 minutes.

If a demand for cooling is registered during the evaporator fan's switch-off time (internal), the evaporator fan is switched on regardless of the increase in temperature.

In addition, the start value of the compressor is shifted by +1K.

Mode 2:

The evaporator fan (internal) is switched off 15 minutes after the last demand for cooling.

If the temperature sensor detects a temperature increase, the evaporator fan is switched on for 3 minutes.

If a demand for cooling is registered during the evaporator fan's switch-off time (internal), the evaporator fan is switched on regardless of the increase in temperature.

Energy mode 2 is set by default at the factory.

Mode 5:

The evaporator fan (internal) runs continuously and the start value of the compressor is shifted by +1K.

3.9.3 Shifting the compressor start value by 1K

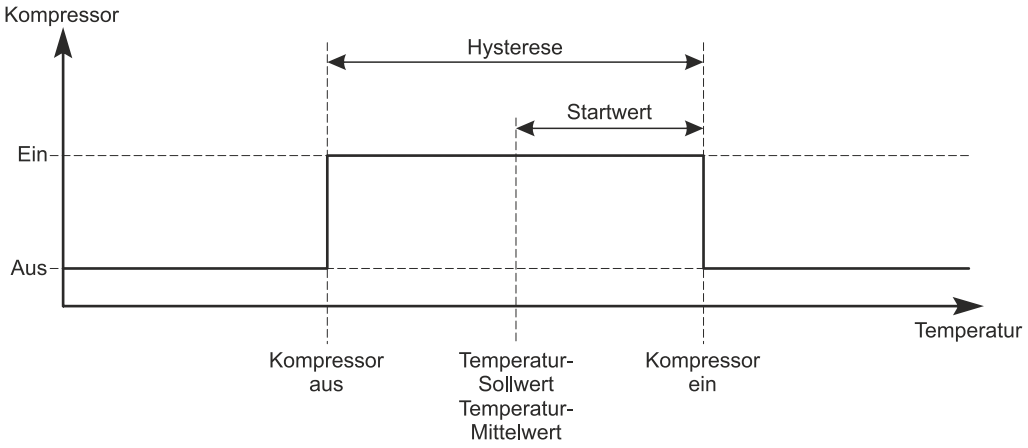


Fig. 7: Compressor default setting

"Fig. 7" shows the default setting of the compressor.
The start value is set to 2 K and the hysteresis to 4 K.
The average temperature over time corresponds to the temperature setpoint.

If energy mode 1 or 5 is selected, the compressor start value is shifted by +1K.
This results in the following behavior:

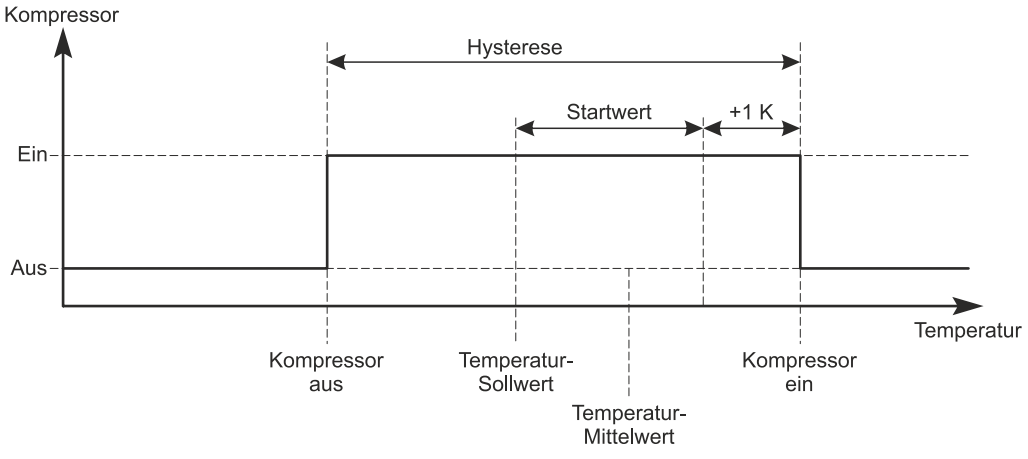


Fig. 8: Compressor start value shifted by +1K

This asymmetrical shift results in a higher average switch cabinet temperature and, consequently, lower energy consumption by the cooling unit.

3.10 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 located on the back side of the cooling unit.
- The illustration shows the standard design of the EU member states. The design of the type plate may differ in other countries.

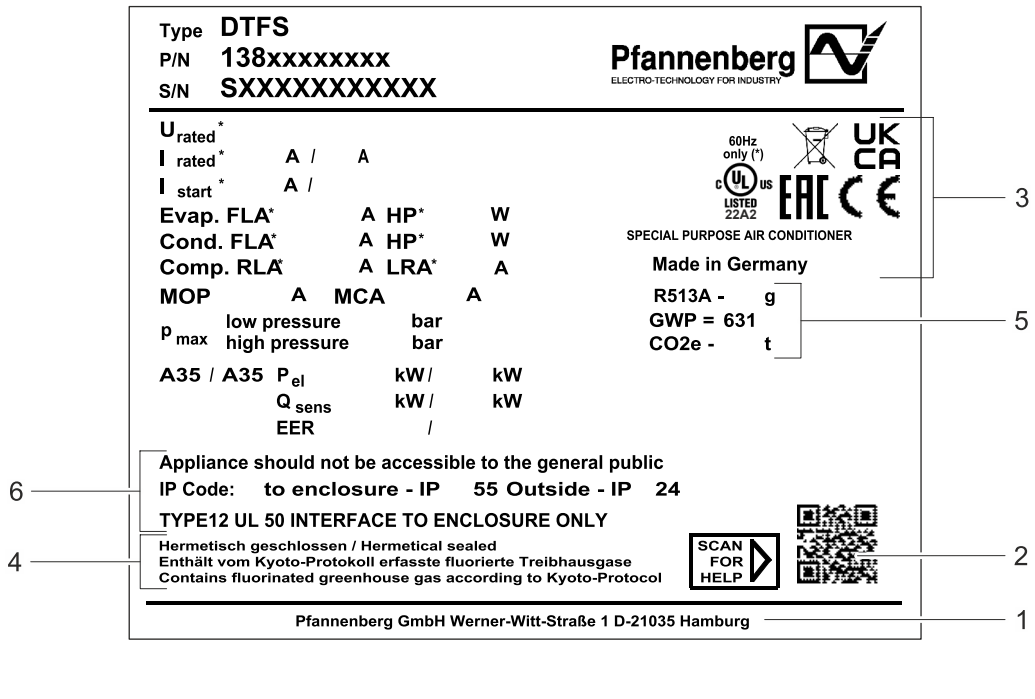


Fig. 9: Type plate (example)

1	Manufacturer's address	5	Refrigerant / filling quantity
2	QR code	6	Housing protection type / NEMA/UL protection classification
3	Markings / approvals		
4	Refrigerant notes: hermetically sealed, contains fluorinated greenhouse gases covered by the Kyoto Protocol		

Value	Description
Type	Unit type
P/N	Part number
S/N	Serial number
Urated	Rated operating voltage / frequency
Irated	Nominal current
Istart	Start-up current
Evap. FLA / HP	Evaporator fan full load amperage / horsepower Full load amperage of evaporator fan / power of evaporator fan in horsepower
Cond. FLA / HP	Condenser fan full load amperage / horsepower Full load amperage of condenser fan / power of condenser fan in horsepower
Comp. RLA / LRA	Compressor rated load amperage (RLA) / locked rotor amperage (LRA) Nominal current of compressor / blocking current of compressor
MOP*	Maximum Overcurrent Protection
MCA*	Minimum Circuit Ampacity
Pmax	Refrigerant pressures
A35 / A35	Ambient temperature / temperature in the switch cabinet
Pel	Electrical power consumption
Qsens	Cooling capacity
EER	Relationship between power consumption and cooling capacity (Energy Efficiency Ratio)
GWP	Global Warming Potential (Global Warming Potential) of the refrigerant
CO2e	CO_2-equivalent of the refrigerant charge

Table 2: Type plate information

* Information for UL-approved units on the design of the fuse (MOP) and cable cross-sections (MCA).

3.11 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
	Rear of unit at the connection for the function equipotential-bonding	Functional equipotential-bonding for a signal reception with low interference between the unit and the switch cabinet.
	Rear of unit at the connection for the protective equipotential-bonding	Protective equipotential-bonding for the connection of metal components and dissipation of a possible touch voltage.
	Back side of unit For units with rated voltage 230V 50/60 Hz and 115 V 60 Hz	**Connection diagram** **Warning** – disconnect the unit from the power supply before opening. **X12 / X16** – connection terminals for door contact and fault signal **X50** – connection terminals for the power supply
	Back side of unit For units with rated voltage 400V 50 Hz and 460 V 60 Hz	**Connection diagram** **Warning** – disconnect the unit from the power supply before opening. **X12 / X16** – connection terminals for door contact and fault signal **X50** – connection terminals for the power supply

Tab. 3: Signs and symbols on the unit

3.12 Technical data

3.12.1 **Refrigeration circuit -** DTFS 6021

Designation		**Unit**	**Model DTFS 6021**		
Rated operating voltage			230V 50/60Hz	400V 50Hz / 460V 60Hz	115V 60Hz
Cooling capacity at A35 / A35 */**	Q_0	W	370 / 450	370 / 450	450
at power consumption * A35 / A35	P_{el} 50Hz	W	180	185	—
	P_{el} 60Hz	W	190	195	195
Cooling capacity at A50 / A35 */**	Q_0	W	320 / 350	320 / 350	350
at power consumption * A50 / A35	P_{el} 50Hz	W	210	215	—
	P_{el} 60Hz	W	230	235	235
Refrigerant type *		–	R513A		
Refrigerant quantity *		g	150		
Temperature setpoint (factory setting)		°C (°F)	+35°C (+95°F)		
Fault signal: switch cabinet interior temperature (factory setting)		°C (°F)	> +50°C (+122°F)		
Ambient air temperature		°C (°F)	+15…55°C (+59…131°F)		
Switch cabinet interior temperature		°C (°F)	+25…45°C (+77…113°F)		
Air volume flow exterior circuit (free-blowing)		m³/h	290 / 340	290 / 340	340
Air volume flow interior circuit (free-blowing)		m³/h	290 / 340	290 / 340	340
Sound pressure level (1m)		dB (A)	59 / 60	59 / 60	60

Table 4: Refrigeration data for model DTFS 6021

* Data on the type plate.

** The use of optional filter mats reduces the cooling capacity

3.12.2 Electrical data - DTFS 6021

Designation		Unit	Model DTFS 6021		
Rated operating voltage */**	50 Hz	V	230V 1~	400V 2~	—
	60 Hz	V	230V 1~	460V 2~	115V 1~
Rated frequency *		Hz	50 / 60	50 / 60	60
Functional area		—	DIN IEC 60038		
Power consumption* A35 / A35	P_{el} 50Hz	W	180	185	—
	P_{el} 60Hz	W	190	195	195
Power consumption* A50 / A35	P_{el} 50Hz	W	210	215	—
	P_{el} 60Hz	W	230	235	235
Nominal current *	I_{nom} 50Hz	A	1.1	0.7	—
	I_{nom} 60Hz	A	1.2	0.7	2.5
Start-up current *	$I_{Start\ max}$ 50Hz	A	2.9	1.7	—
	$I_{Start\ max}$ 60Hz	A	2.9	1.5	6
MOP (Maximum Overcurrent Protection) ***		A	15	15	15
MCA (Minimum Circuit Ampacity) ***		A	1.6	0.8	3.3
Internal control fuse for transformer. Category "ClassCC", slow-blow, suitable for transformer protection.	F2	A	—	3.0	3.0
Unit back-up fuse	Type K	A	13	13	13

Table 5: Electrical data for model DTFS 6021

* Data on the type plate.

** In case the rated voltage changes, adapt the upstream fuse, see "Adapting the unit to the mains voltage", Page 53.

*** Data for UL-approved units on the design of the protection (MOP) and cable cross-sections (MCA).

3.12.3 Dimensions - DTFS 6021

Designation	Unit	Model DTFS 6021		
Height	mm	550		
Width	mm	280		
Depth with cover (standard)	mm	210		
Installation depth (unit complete without cover)	mm	190		
Weight	kg	17	20	20
Installation attitude	—	Vertical		
Unit design	—	Steel sheet		

Table 6: Dimensions and weight of model DTFS 6021

3.12.4 **Refrigeration circuit -** DTFS 6031

Designation		**Unit**	**Model DTFS 6031**		
Rated operating voltage			230V 50/60Hz	400V 50Hz / 460V 60Hz	115V 60Hz
Cooling capacity at A35 / A35 */**	Q_0	W	570 / 670	570 / 670	670
at power consumption * A35 / A35	P_{el} 50Hz	W	245	255	—
	P_{el} 60Hz	W	270	280	280
Cooling capacity at A50 / A35 */**	Q_0	W	450 / 530	450 / 530	530
at power consumption * A50 / A35	P_{el} 50Hz	W	280	290	—
	P_{el} 60Hz	W	305	315	315
Refrigerant type *		–	R513A		
Refrigerant quantity *		g	180		
Temperature setpoint (factory setting)		°C (°F)	+35°C (+95°F)		
Fault signal: switch cabinet interior temperature (factory setting)		°C (°F)	> +50°C (+122°F)		
Ambient air temperature		°C (°F)	+15…55°C (+59…131°F)		
Switch cabinet interior temperature		°C (°F)	+25…45°C (+77…113°F)		
Air volume flow exterior circuit (free-blowing)		m³/h	290 / 340	290 / 340	340
Air volume flow interior circuit (free-blowing)		m³/h	290 / 340	290 / 340	340
Sound pressure level (1m)		dB (A)	58 / 61	58 / 61	61

Table 7: Refrigeration data for model DTFS 6031

* Data on the type plate.

** The use of optional filter mats reduces the cooling capacity

3.12.5 Electrical data - DTFS 6031

Designation		Unit	Model DTFS 6031		
Rated operating voltage */**	50 Hz	V	230V 1~	400V 2~	—
	60 Hz	V	230V 1~	460V 2~	115V 1~
Rated frequency *		Hz	50 / 60	50 / 60	60
Functional area		—	DIN IEC 60038		
Power consumption* A35 / A35	P_{el} 50Hz	W	245	255	—
	P_{el} 60Hz	W	270	280	280
Power consumption* A50 / A35	P_{el} 50Hz	W	280	290	—
	P_{el} 60Hz	W	305	315	315
Nominal current *	I_{nom} 50Hz	A	1.4	0.8	—
	I_{nom} 60Hz	A	1.5	0.8	3.2
Start-up current *	$I_{Start\ max}$ 50Hz	A	4.1	2.5	—
	$I_{Start\ max}$ 60Hz	A	4.1	2.1	8.5
MOP (Maximum Overcurrent Protection) ***		A	15	15	15
MCA (Minimum Circuit Ampacity) ***		A	2.1	1.1	4.3
Internal control fuse for transformer. Category "ClassCC", slow-blow, suitable for transformer protection.	F2	A	—	3.0	3.0
Unit back-up fuse	Type K	A	13	13	13

Table 8: Electrical data for model DTFS 6031

* Data on the type plate.

** In case the rated voltage changes, adapt the upstream fuse, see "Adapting the unit to the mains voltage", Page 53.

*** Data for UL-approved units on the design of the protection (MOP) and cable cross-sections (MCA).

3.12.6 Dimensions - DTFS 6031

Designation	Unit	Model DTFS 6031		
Height	mm	550		
Width	mm	280		
Depth with cover (standard)	mm	210		
Installation depth (unit complete without cover)	mm	190		
Weight	kg	18	21	21
Installation attitude	—	Vertical		
Unit design	—	Steel sheet		

Table 9: Dimensions and weight of model DTFS 6031

3.12.7 **Refrigeration circuit -** DTFS 6041

Designation		**Unit**	**Model DTFS 6041**		
Rated operating voltage			230V 50/60Hz	400V 50Hz / 460V 60Hz	115V 60Hz
Cooling capacity at A35 / A35 */**	Q_0	W	870 / 940	870 / 940	940
at power consumption * A35 / A35	Pel 50Hz	W	425	440	—
	Pel 60Hz	W	425	440	440
Cooling capacity at A50 / A35 */**	Q_0	W	690 / 730	690 / 730	730
at power consumption * A50 / A35	Pel 50Hz	W	475	485	—
	Pel 60Hz	W	495	515	515
Refrigerant type *		–	R513A		
Refrigerant quantity *		g	225		
Temperature setpoint (factory setting)		°C (°F)	+35°C (+95°F)		
Fault signal: switch cabinet interior temperature (factory setting)		°C (°F)	> +50°C (+122°F)		
Ambient air temperature		°C (°F)	+15…55°C (+59…131°F)		
Switch cabinet interior temperature		°C (°F)	+25…45°C (+77…113°F)		
Air volume flow exterior circuit (free-blowing)		m³/h	540 / 590	540 / 590	590
Air volume flow interior circuit (free-blowing)		m³/h	290 / 340	290 / 340	340
Sound pressure level (1m)		dB (A)	66 / 69	66 / 69	69

Table 10: Refrigeration data for model DTFS 6041

* Data on the type plate.

** The use of optional filter mats reduces the cooling capacity

3.12.8 Electrical data - DTFS 6041

Designation		Unit	Model DTFS 6041		
Rated operating voltage */**	50 Hz	V	230V 1~	400V 2~	—
	60 Hz	V	230V 1~	460V 2~	115V 1~
Rated frequency *		Hz	50 / 60	50 / 60	60
Functional area		—	DIN IEC 60038		
Power consumption* A35 / A35	P_{el} 50Hz	W	425	440	—
	P_{el} 60Hz	W	425	440	440
Power consumption* A50 / A35	P_{el} 50Hz	W	475	485	—
	P_{el} 60Hz	W	495	515	515
Nominal current *	I_{nom} 50Hz	A	2.4	1.4	—
	I_{nom} 60Hz	A	2.5	1.3	5.2
Start-up current *	$I_{Start\ max}$ 50Hz	A	5.4	3.2	—
	$I_{Start\ max}$ 60Hz	A	5.4	2.8	11.2
MOP (Maximum Overcurrent Protection) ***		A	15	15	15
MCA (Minimum Circuit Ampacity) ***		A	3.2	1.9	7.1
Internal control fuse for transformer. Category "ClassCC", slow-blow, suitable for transformer protection.	F2	A	—	5.0	5.0
Unit back-up fuse	Type K	A	13	13	13

Table 11: Electrical data for model DTFS 6041

* Data on the type plate.

** In case the rated voltage changes, adapt the upstream fuse, see "Adapting the unit to the mains voltage", Page 53.

*** Data for UL-approved units on the design of the protection (MOP) and cable cross-sections (MCA).

3.12.9 Dimensions - DTFS 6041

Designation	Unit	Model DTFS 6041		
Height	mm	550		
Width	mm	280		
Depth with cover (standard)	mm	280		
Installation depth (unit complete without cover)	mm	260		
Weight	kg	22	25	25
Installation attitude	—	Vertical		
Unit design	—	Steel sheet		

Table 12: Dimensions and weight of model DTFS 6041

3.12.10 Other unit data

Designation	
Anti-corrosion protection	Standard: galvanized, electrostatically powder-coated (200 °C)
	Variants: stainless steel housing and cover (material 1.4301, polished)
Housing protection category (according to EN 60529)	When used as intended:
	• IP 55 internal – protection category for the switch cabinet with an attached cooling unit. • IP 24 external - protection category of the cooling unit during operation.

Table 13: Other unit data for all DTFS cooling units

4 Assembly and initial commissioning

4.1 Safety information

⚠ DANGER

Danger to life from electric shock!

Parts may be live when the unit is open and cause electric shock when touched.

When working on the opened unit, note the following points:

- Only authorized electricians are allowed to work on the electrical system.
- Before starting work on the electrical system, switch off the electrical supply, check that the voltage is off, and secure it against restart.
- Cordon off the work area and mark it with a warning sign.
- The electrical connection must be made according to the locally applicable regulations.

⚠ 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.

⚠ WARNING

Risk of injury for persons!

Risk of injury due to tipping of the unit in case of 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.
- Secure the unit against tipping during transport.

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 by the factory.

4.2.1 Transporting the cooling unit

Requirements

The cooling unit is delivered in the packaging provided at the factory.

Required tools and materials

Lashing straps, loading crane if necessary

Procedure

1. Secure the unit properly with lashing straps for transportation. Always transport in the operating position.
2. Only lift the unit on the housing.
3. Always lift the unit slowly and steadily and set it down in a safe place.

⇨ Ensure proper transportation and loading of the cooling unit.

NOTE

The cooling unit can also be loaded using M6 crane lugs.

Observe the information in chapter "Transportation with crane", Page 35 for transportation with a crane.

4.2.2 Transportation with crane

DANGER

Danger to life due to suspended loads

Tipping or falling loads can lead to serious or even fatal injuries.

- Never walk under suspended loads.
- Only use approved lifting gear and slings that are designed for the total weight of the suspended load.
- Only use slings/load handling attachments that are in perfect technical condition.
- Pay attention to the attachment points and the center of gravity of the load.
- Use suitable equipment to secure loads.

WARNING

Risk of injury due to improper crane transportation

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

- Lifting with M6 crane lugs is only permitted for the cooling unit.
- Make sure that the crane lugs and threads on the device are not damaged or deformed.
- Only use crane lugs with a sufficient thread length in accordance with DIN 580 and make sure they are properly installed.

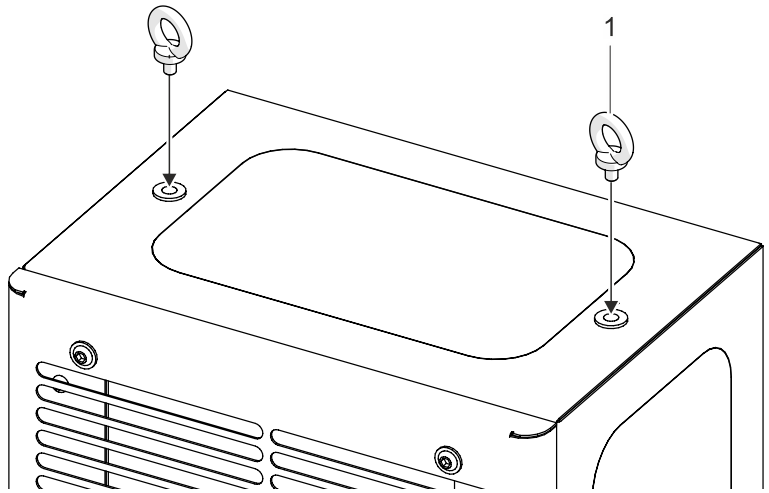


Fig. 10: M6 crane lugs DTFS cooling unit

1	M6 crane lugs	

The cooling units have screw-in threads for M6 crane lugs. Cooling units with bolted M6 crane lugs can be used for transport with a crane .

NOTE

The M6 crane lugs are not included in the cooling unit's scope of delivery.

Requirements

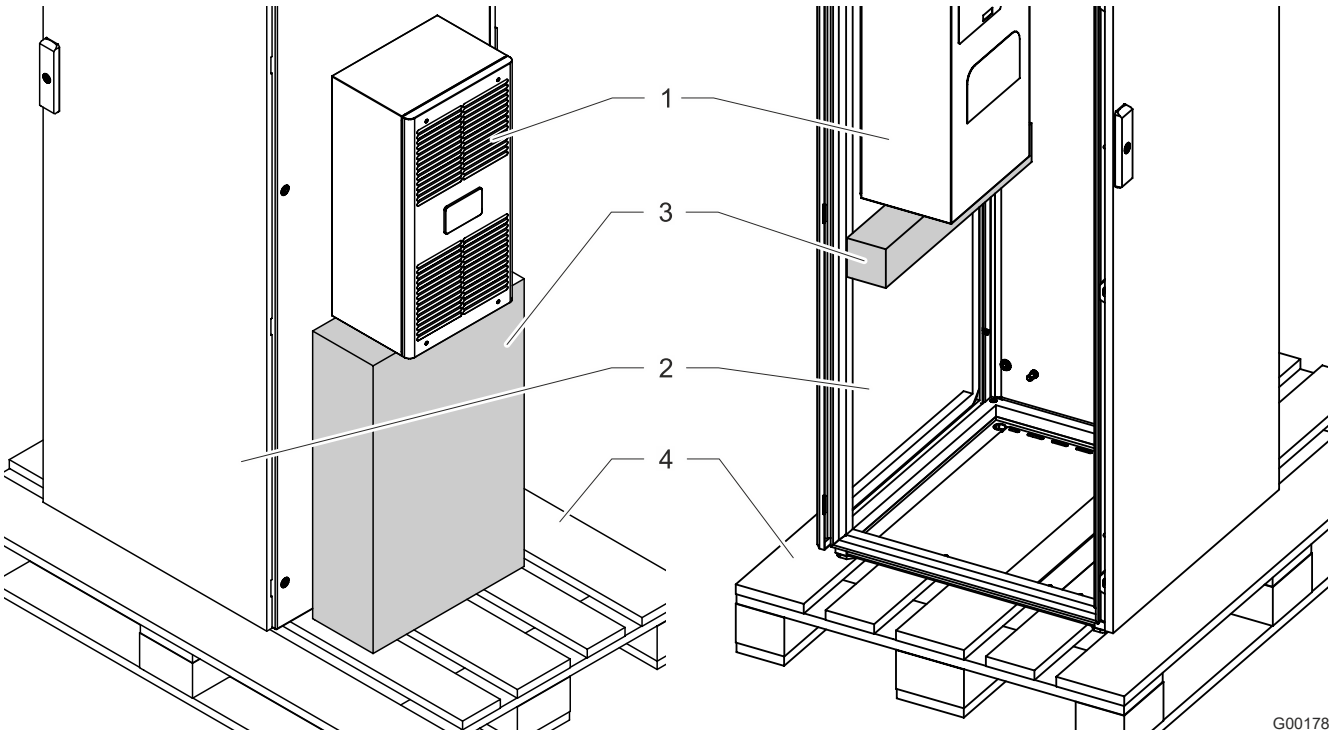
- The unit has been fully unpacked.
- Observe the minimum screw-in depth of the M6 crane lugs in accordance with DIN 580.
- The M6 crane lugs and cooling unit threads are damage-free (corrosion, deformation).

Procedure

1. Screw the M6 crane lugs (2×) all the way in.
2. Make sure that the M6 crane lugs are properly installed in the cooling unit.

⇨ The M6 crane lugs are bolted to the cooling unit and the unit can be moved.

4.2.3 Transporting the switch cabinet with pre-installed cooling unit



Cooling unit installed on surface

Cooling unit installed fully integrated

Fig. 11: Transport of the switch cabinet (2) with pre-installed cooling unit(1)

Requirements

The cooling unit (1) is already installed in a switch cabinet (2).

Required tools and materials

Transport protection devices (e.g. support structure made of squared timber or boards), protective film

Procedure

1. To transport the cooling unit (1) after installation in the switch cabinet (2), use a suitable transport protection device (3) (e.g. support structure made of squared timber or boards) for support. This protects the unit against sagging or damage to the mounts in the event of impact during transportation. If necessary, a protective film can be used between the cooling unit (1) and the transport protection device (3).
   – The support structure may not result in any additional mechanical load to the cooling unit.
2. Place the switch cabinet on a pallet (4) that is large enough to minimize the risk of tipping.
3. Close the switch cabinet doors and keep them closed during transport. Always transport the cooling unit in its operating position.
4. Always lift the unit together with the switch cabinet slowly and evenly and set it down in a secure position.

⇨ Ensure proper transportation and loading of the cooling unit.

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:

- Observe the permissible storage temperature of -20 °C … +70 °C (-4 °F … +158 °F).
- 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 "Technical data", Page 25.
- 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

⚠ 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 "Technical data", Page 25.
- 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.

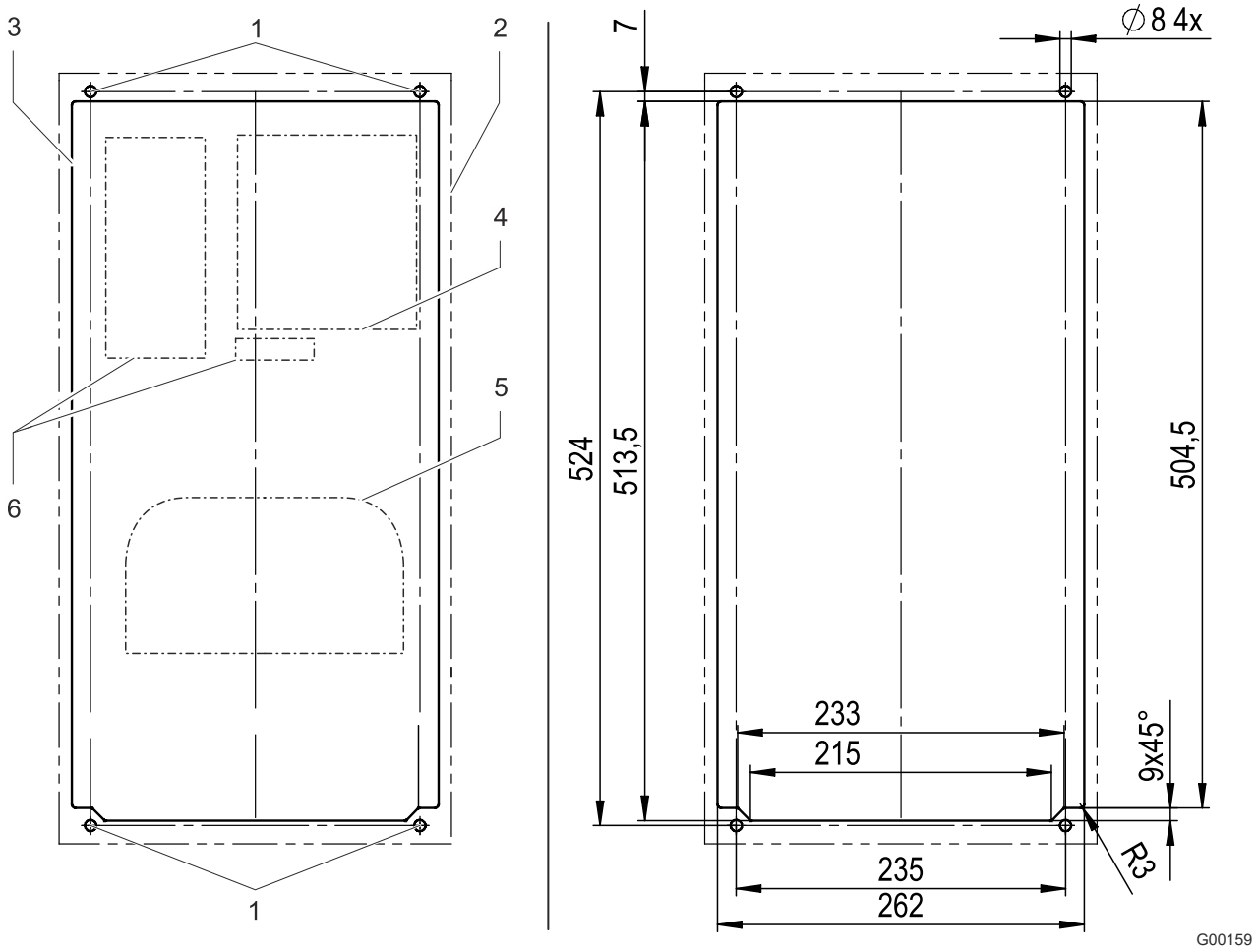
- Use personal protective equipment (cut-proof gloves).
- Handle with care.

4.5.1 General

Ensure that the following general requirements are met for safe and reliable operation of the cooling units:

- Choose an installation site for the switch cabinet that ensures adequate ventilation of the cooling unit. 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 switch cabinet against tilting.
- Make sure that any hinges can bear the extra weight with cooling unit.
- The cooling unit can be installed with or without an external unit cover.
- Protect the installation site from heavy soiling using covers.

4.5.2 Making cut-outs for the DTFS cooling unit



Contours of the installation cut-outs

Dimensioning of the installation cut-outs/boreholes

Fig. 12: Exterior view of the switch cabinet, assembly boreholes and cut-outs - all dimensions in accordance with ISO 2768-m

1	Boreholes	4	Air inlet
2	Unit contour	5	Air outlet
3	Installation cut-outs	6	Electrical connection

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

- All general requirements are met, see "General", Page 38.

Required tools and materials

- Saw
- Use a switch cabinet milling machine if necessary
- Protective covers

Procedure

1. Line the switch cabinet with a protective cover to protect against chips.
2. Add cut-outs to the switch cabinet. For prescribed dimensions, see *Fig. 12*.
3. The cut-out corners can be rectangular or with a maximum radius of 3 mm.
4. Deburr the cut edge.
5. Remove chips and assembly debris from the switch cabinet.

⇨ The cut-outs and boreholes are in place and the cooling unit can be installed.

4.5.3 Apply sealing tape for side attachment

CAUTION

Damage to the switch cabinet and cooling unit!

Improperly fitted seals can lead to excessive condensation in the switch cabinet and consequently to short circuits or damage caused by the condensate.

- Place the seal so that it seals toward the switch cabinet.
- Make sure that the joint ends of the seals are positioned neatly in front of each other and that the seal joint is centered at the bottom of the cut-out.
- Always check the seals during cleaning and maintenance.

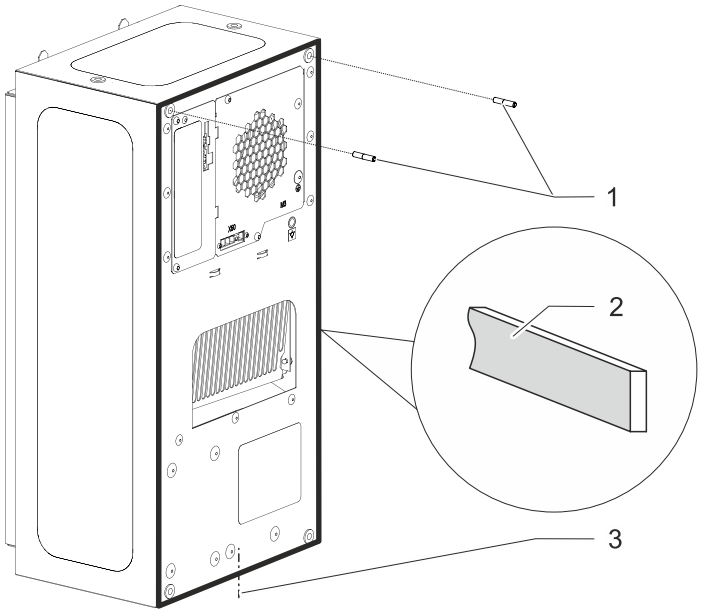


Fig. 13: Apply sealing tape to the rear of the unit - side attachment

1	Threaded bolts for switch cabinet mounting	3	Joint ends of the sealing tape
2	Self-adhesive sealing tape		

Requirements

DANGER – danger to life due to electric shock. Make sure that the unit is de-energized.

- The cut-outs for the DTFS cooling unit are in place, see "Making cut-outs for the DTFS cooling unit", Page 39.

Required tools and materials

- Self-adhesive sealing tape
- Assembly tool
- Accessory pack (threaded bolts)

Procedure

1. Screw the two supplied threaded bolts (1) from the accessory pack into the upper attachment points of the DTFS cooling unit.
2. Attach the self-adhesive sealing tape (2) to the back of the unit as shown in Fig. 13. Install the joint ends of the seal (3) facing downward with an overlap of approx. 20 mm.

⇨ The cooling unit is prepared for attachment on the side of the switch cabinet, "Electrical connection", Page 44.

4.5.4 Installing the cooling unit as a side attachment

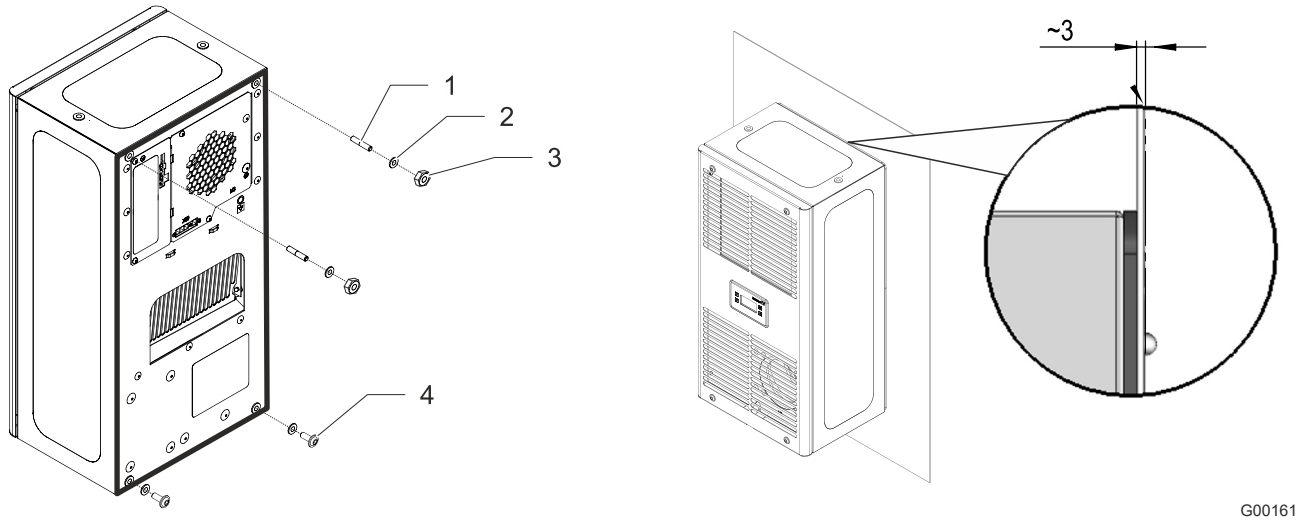


Fig. 14: Installing the cooling unit on the switch cabinet - side attachment

1	Threaded bolts for switch cabinet mounting	3	Nut M6
2	Shim	4	Hexagon socket screw M6

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

- The cut-outs for the DTFS cooling unit are in place, see "Making cut-outs for the DTFS cooling unit", Page 39.
- The sealing tape is attached to the back of the unit and is damage-free, see "Apply sealing tape for side attachment", Page 40.
- The two supplied threaded bolts (1) from the accessory pack are screwed in the upper attachment points of the DTFS cooling unit.

Required tools and materials

- Assembly tool
- Accessory pack (threaded bolts, nuts, screws)

Procedure

1. Make sure that the sealing tape is attached to the back of the unit and that it is not damaged.
2. Hang the cooling unit on the switch cabinet from the outside using the screwed-in threaded bolts (1).
3. Screw the cooling unit to the inside of the switch cabinet. Use the supplied washers (2), nuts (3) and screws (4) from the accessory pack to fasten. Tighten until the sealing tape (originally 6 mm) is compressed to a thickness of approx. 3 mm.

⇨ The cooling unit is now installed on the switch cabinet and ready for electrical connection, see "Electrical connection", Page 44.

4.5.5 Apply sealing tape for fully recessed installation

CAUTION

Damage to the switch cabinet and cooling unit!

Improperly fitted seals can lead to excessive condensation in the switch cabinet and consequently to short circuits or damage caused by the condensate.

- Place the seal so that it seals toward the switch cabinet.
- Always check the seals during cleaning and maintenance.

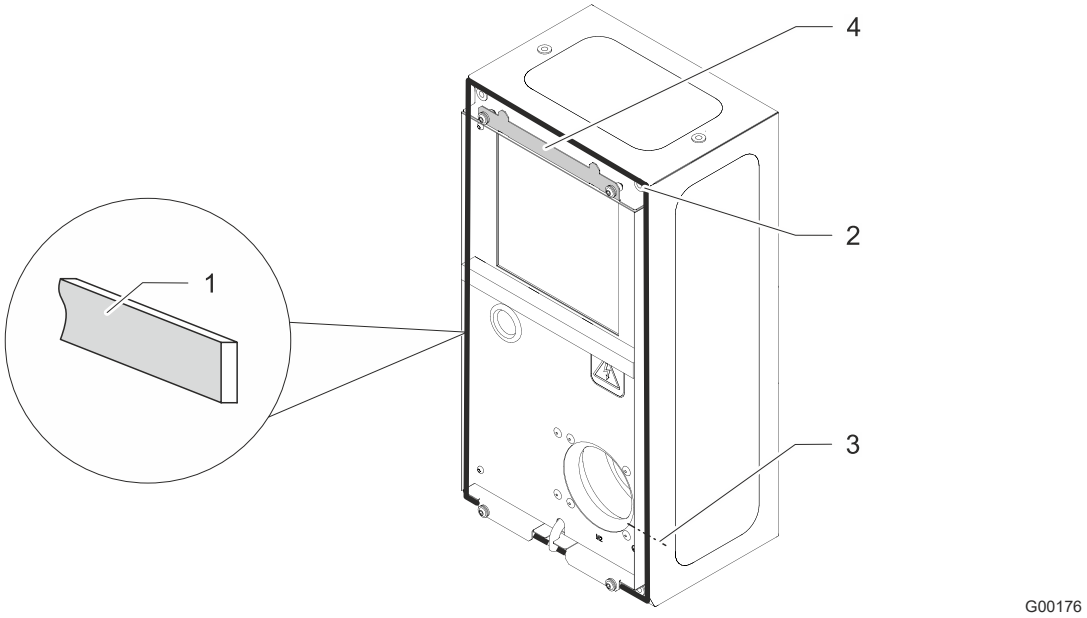


Fig. 15: Apply sealing tape to the front of the unit - fully recessed installation

1	Self-adhesive sealing tape	3	Joint ends of the sealing tape
2	Screw boreholes for switch cabinet mounting	4	Insertion protection

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

- The cut-outs for the DTFS cooling unit are in place, see "Making cut-outs for the DTFS cooling unit", Page 39.

Required tools and materials

- Self-adhesive sealing tape
- Assembly tool
- Accessory pack: threaded bolts, screws, nuts, washers

Procedure

1. Remove the unit cover.
2. Apply the self-adhesive sealing tape (1) to the front of the unit as shown in Fig. 15. Install the seal with the joint ends (3) overlapping by approx. 20 mm at the bottom right. The screw boreholes (2) for the switch cabinet mounting must remain open.

⇨ The cooling unit is prepared for attachment on the side of the switch cabinet.

4.5.6 Installation of fully recessed cooling unit

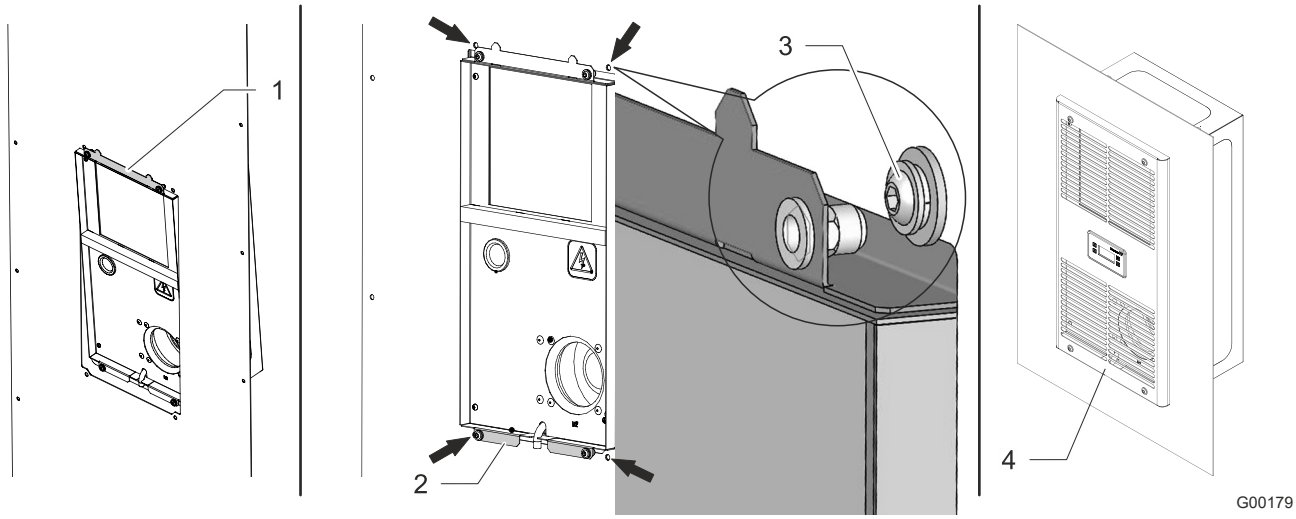


Fig. 16: Fully recessed installation of cooling unit in the switch cabinet

1	Insertion protection, top	3	Screw connection for switch cabinet mounting
2	Insertion protection, bottom	4	Unit cover

Requirements

DANGER – danger to life due to electric shock. Make sure that the unit is de-energized.

- The cut-outs for the DTFS cooling unit are in place, see "Making cut-outs for the DTFS cooling unit", Page 39.
- The sealing tape is attached to the back of the unit and is damage-free, see "Apply sealing tape for fully recessed installation", Page 42.

Required tools and materials

- Assembly tool
- Accessory pack (threaded bolts, nuts, screws)

Procedure

1. Remove the unit cover (4).
2. Make sure that the sealing tape is attached to the front of the unit and is not damaged.
3. Open the switch cabinet door and place the front of the unit close to the installation cut-out on the inside of the switch cabinet door.
4. Tilt the unit slightly and guide it through the installation cutout with the insertion protection at the top (1).
5. Place the unit against the switch cabinet door until it is flush and lower it into the installation cutout with the insertion protection at the bottom (2).
6. Screw on the cooling unit. Use the supplied screw connection set (3) (nuts and washers from the accessory pack) for installation. Tighten until the sealing tape (originally 6 mm) is compressed to a thickness of approx. 3 mm.
7. Close the switch cabinet doors.
8. Install the cover (4) on the cooling unit at the front of the control cabinet.

⇨ The cooling unit is now installed on the switch cabinet and ready for electrical connection, see "Electrical connection", Page 44.

4.6 Electrical connection

DANGER

Danger to life from electric shock!

Parts may be live when the unit is open and cause electric shock when touched.

When working on the opened unit, note the following points:

- Only authorized electricians are allowed to work on the electrical system.
- Before starting work on the electrical system, switch off the electrical supply, check that the voltage is off, and secure it against restart.
- Cordon off the work area and mark it with a warning sign.
- The electrical connection must be made according to the locally applicable regulations.

CAUTION

Malfunction of the unit

Malfunction of the unit due to high-frequency interference (EMC interference).

- Interfering electrical installations (high frequency) must be avoided.
- Signal lines must be routed separately from supply lines.

CAUTION

Incorrect connection voltage!

Incorrect connection voltage can lead to component damage.

- Check the connection voltage against the unit type plate of the corresponding unit model.
- Required fuse in accordance with chapter "Electrical data - DTFS 6021", Page 26, "Electrical data - DTFS 6031", Page 28, "Electrical data - DTFS 6041", Page 30.

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 mm² (AWG 14).
- Observe the stripping length of the cable wires for plugs, see connection diagrams of the plugs.
- Observe the connection assignment according to the circuit diagram.

4.6.2 Electrical circuit diagram

4.6.2.1 Rated operating voltage 115 V

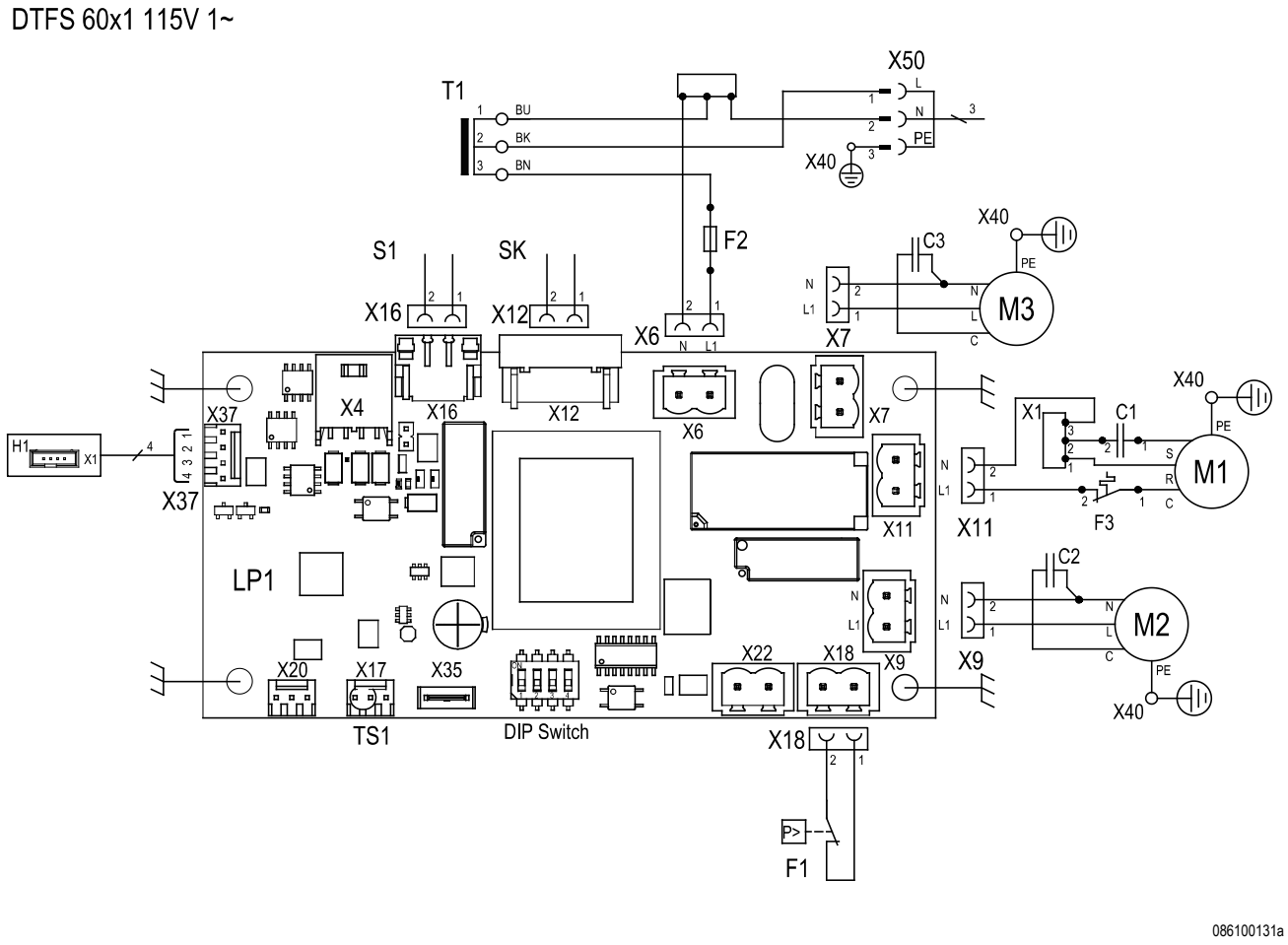


Fig. 17: Electrical circuit diagram - DTFS 60x1 115V

C1-C3	Capacitor	S1	Door contact	X4	Service interface
F1	High-pressure pressostat	SK	Fault signal contact	X40	Ground terminal contact
H1	DIS control panel or LED display unit	T1	Transformer	X50	Power connection plug strip
LP1	Control board	TS1	Temperature sensor (internal)		
M1	Compressor				
M2	Condenser fan (external)				
M3	Evaporator fan (internal)				

4.6.2.2 Rated operating voltage 230 V

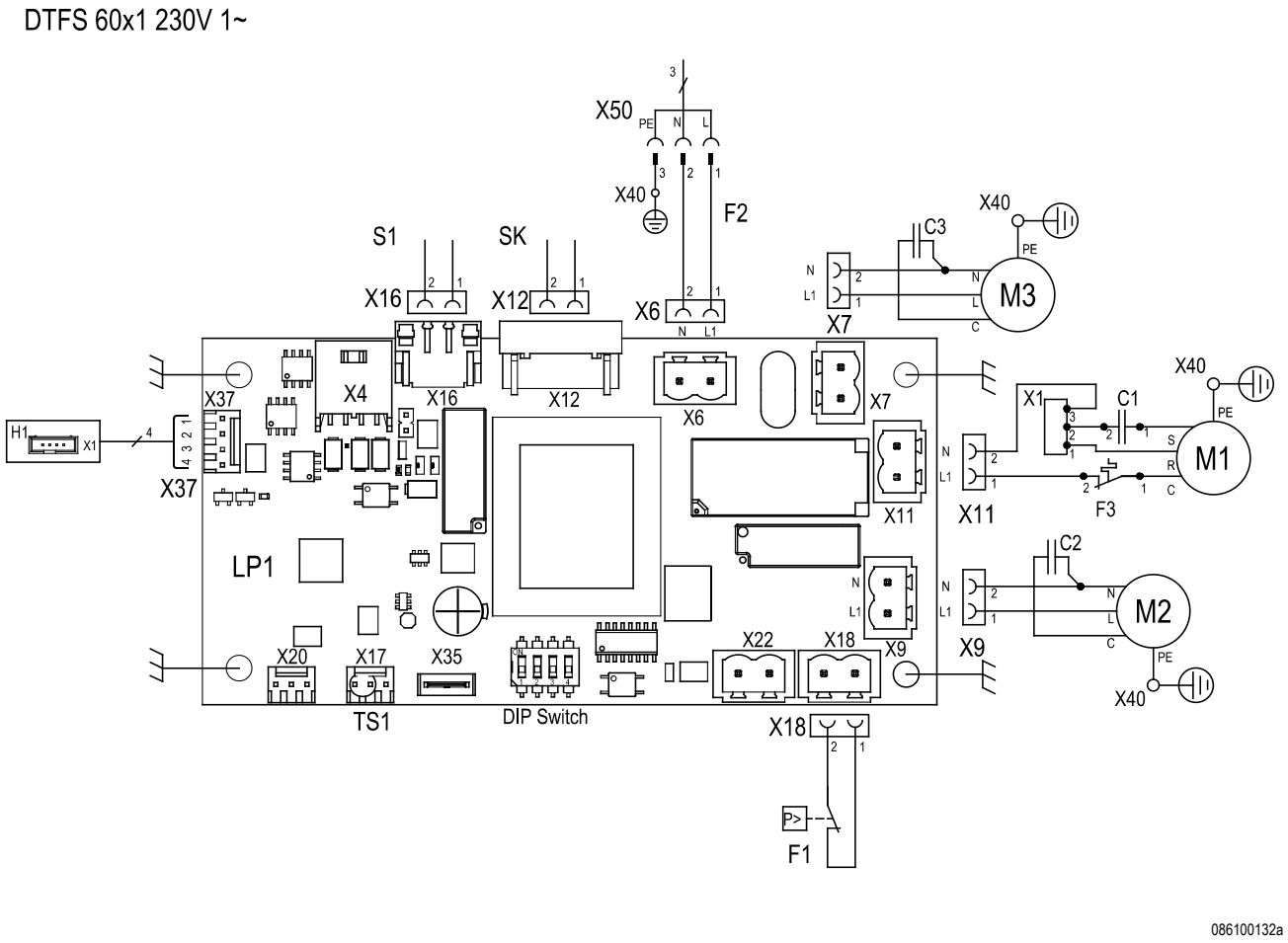


Fig. 18: Electrical circuit diagram - DTFS 60x1 230V

C1-C3	Capacitor	S1	Door contact	X4	Service interface
F1	High-pressure pressostat	SK	Fault signal contact	X40	Ground terminal contact
H1	DIS control panel or LED display unit	T1	Transformer	X50	Power connection plug strip
LP1	Control board	TS1	Temperature sensor (internal)		
M1	Compressor				
M2	Condenser fan (external)				
M3	Evaporator fan (internal)				

4.6.2.3 Rated operating voltage 400 V

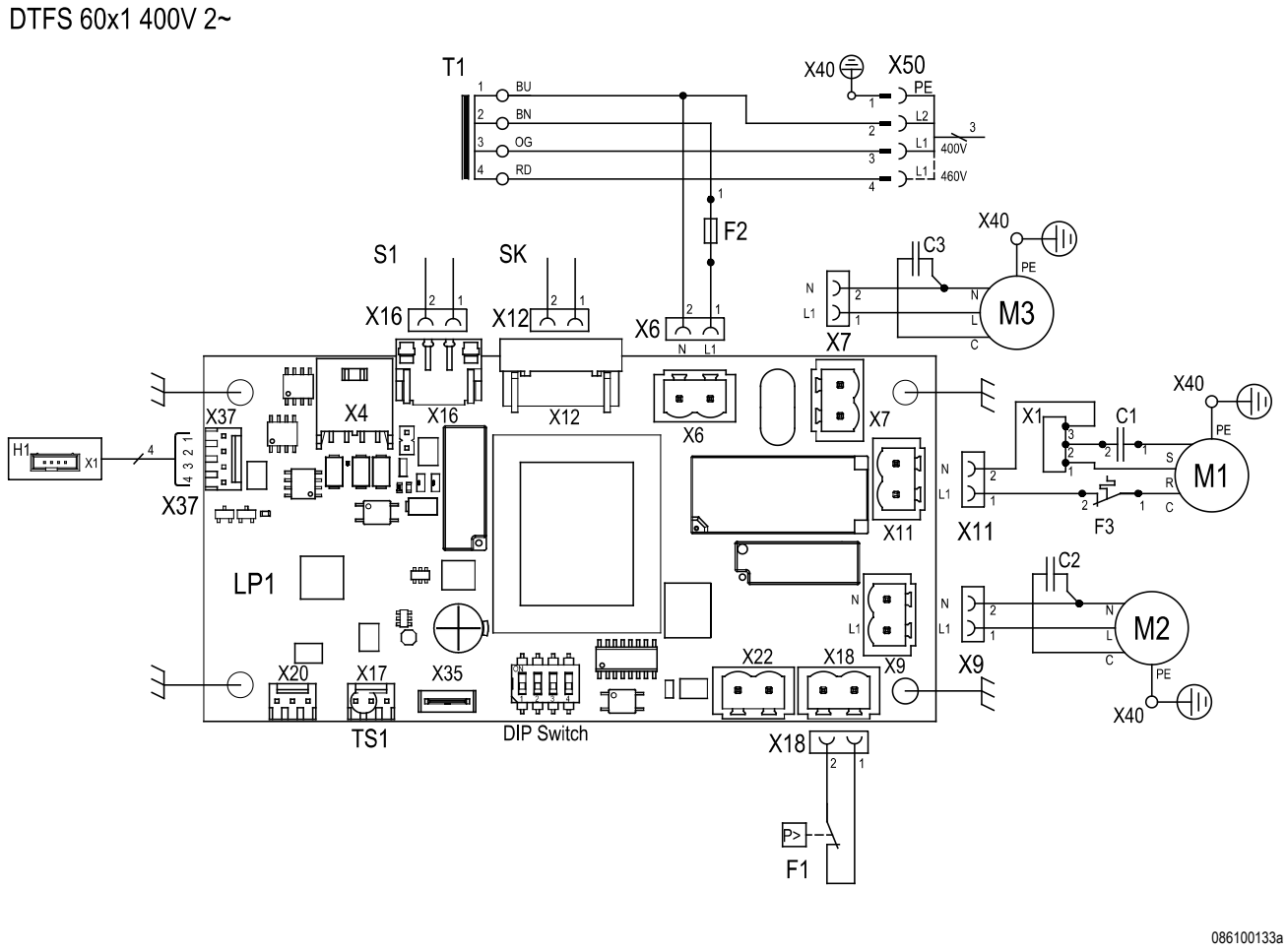


Fig. 19: Electrical circuit diagram - DTFS 60x1 400V

C1-C3	Capacitor	S1	Door contact	X4	Service interface
F1	High-pressure pressostat	SK	Fault signal contact	X40	Ground terminal contact
H1	DIS control panel or LED display unit	T1	Transformer	X50	Power connection plug strip
LP1	Control board	TS1	Temperature sensor (internal)		
M1	Compressor				
M2	Condenser fan (external)				
M3	Evaporator fan (internal)				

4.6.3 Connection area

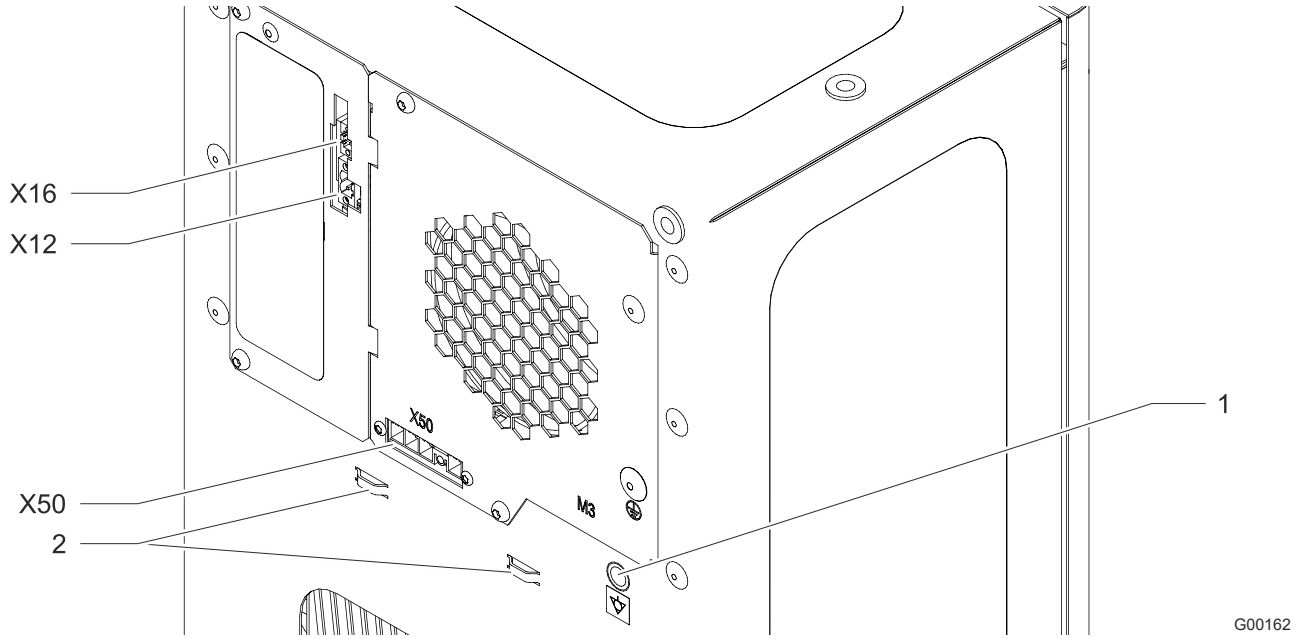


Fig. 20: Connection space

1	Functional equipotential bonding	X50	Power connection plug strip
2	Cable tie loops for strain relief	X12	Fault signal plug strip
		X16	Door contact plug strip

Requirement

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

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

4.6.4 Door contact switch

CAUTION

Damage to the unit!

Damage to the unit and the controller due to the application of external voltage to the door contact input.

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

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

The door contact switch must interrupt the connection between terminals **X16.1** and **X16.2** when the switch cabinet door is open.

4.6.4.1 Connecting the door contact switch

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

Procedure

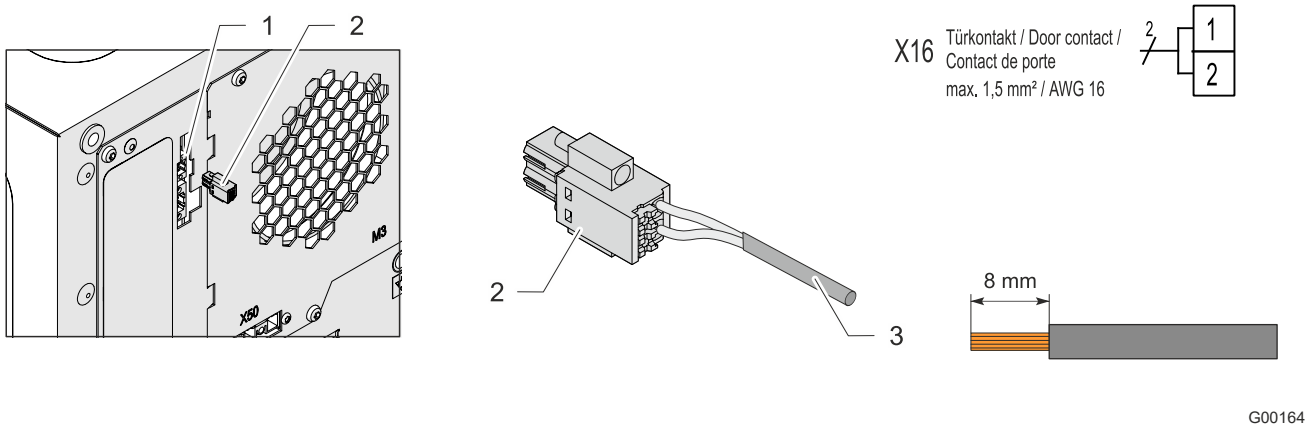


Fig. 21: Connecting the door contact switch X16

1	Door contact plug strip X16	3	Shielded cable, stripping length approx. 8 mm with wire end ferrule
2	Door contact connection plug X16.1/16.2		

1. Connect the door contact switch (X16) to the corresponding terminal block of the controller according to the connection plan, see "Electrical circuit diagram", Page 45.
   – To prevent interference, use a shielded cable with twisted pairs (and wire end ferrules). Connect the shield to the functional ground terminal on one side.
   – If no shielded cables are used, make sure there are no sources of interference in the immediate vicinity. Sources of interference are: supply lines and components with increased electromagnetic radiation, such as frequency converters or motor drives.
2. Close the switch cabinet, restart the unit and make sure the door contact switch is functioning properly:
   – Open the switch cabinet doors while the unit is running, the motors (fan, compressor) for the cooling unit must switch off.

⇨ The door contact switch is connected.

4.6.5 Collective fault signal

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

Two connections are provided for connecting the collective fault signal. The terminals are marked with the device tag SK.

4.6.5.1 Connecting the collective fault signal

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

Procedure

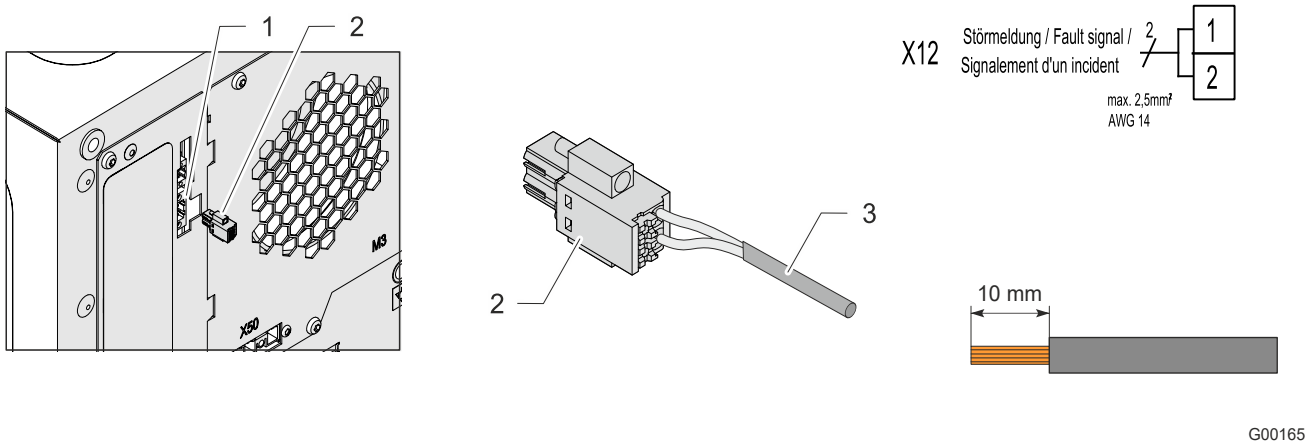


Fig. 22: Connecting the collective fault signal (example)

1	Fault signal terminal block X12	3	Shielded cable for fault signal, stripping length approx. 10 mm with wire end ferrule
2	Fault signal connection plug X12.1/12.2		

Terminals	Voltage	Ampacity	Type
X12.1 Normally closed contact (NC) X12.2 Normally closed contact (NC)	max. 230 V	max. 1 A	Potential-free normally closed contact

Table 14: Collective fault signal

1. Connect the collective fault signal (SK) to the corresponding terminal block of the controller according to the connection diagram, see "Electrical circuit diagram", Page 45.
   – Observe the plug coding
2. Place the cable shield on the switch cabinet side.

⇨ The collective fault signal is connected.

4.6.6 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.
- 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.

4.6.6.1 Connecting the cooling unit to the power supply

The unit corresponds to overvoltage category II.

To ensure safe and reliable operation of the cooling unit, the following general requirements must be met:

- The installation of a temperature control system on the feed-in side is prohibited.
- For cable protection, connect the fuse specified on the type plate, see chapter "Type plate", Page 22und "Adapting the unit to the mains voltage", Page 53.
- Always connect the cooling unit to the mains via a disconnecting device (switch/contactor).
  - The disconnecting device must have a contact opening of 3 mm and correspond to overvoltage category III. The disconnecting device is provided and installed by the customer.
- When using a variable frequency drive, install an all-pole sine filter (phase-phase and phase-ground).

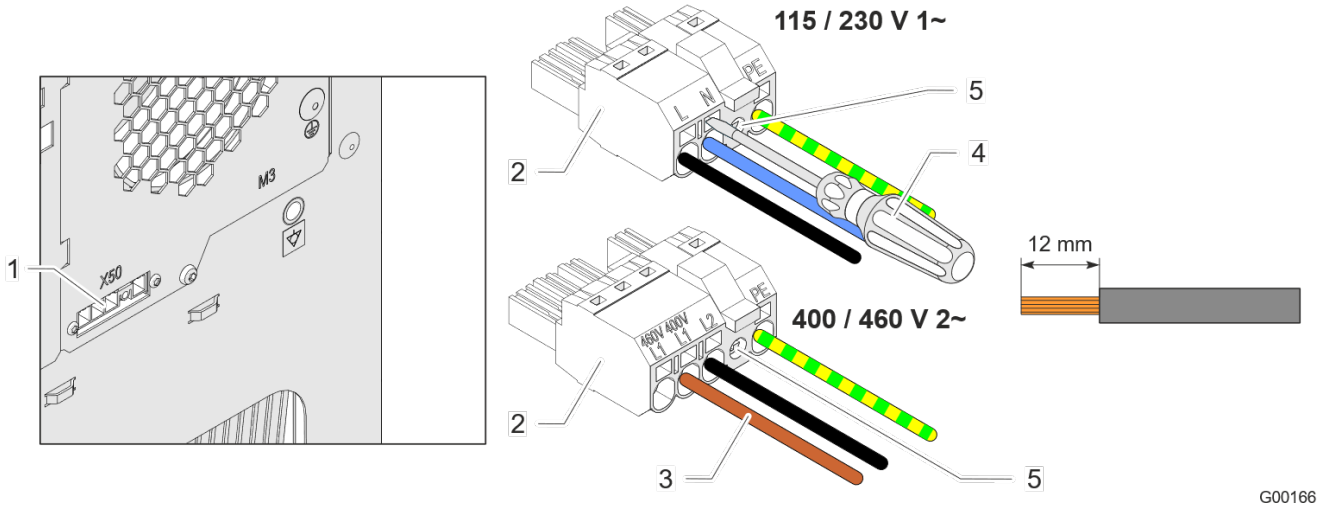


Fig. 23: Mains connection plug cooling unit - example: phase reconnection 400/460 V

1	Mains power strip X50	4	Screwdriver (flat-head, max. 3.5 mm)
2	Mains connection plug X50	5	Fastening screw
3	Cable 1.5 to 2.5 mm², stripping length 12 mm		

NOTE

Protective conductors in the mains connection cable are not considered equipotential bonding conductors.

Requirement

⚠ **DANGER** – danger to life from electrical shock. Make sure that the unit is de-energized.

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

Procedure

1. Connect to the mains according to the circuit diagram, see chapter "Electrical circuit diagram", Page 45.
2. Use the flat-head screwdriver to open the cage clamp of the mating connector and connect the cables to the mating connector.
   - Insert the screwdriver firmly into the cage clamp terminal but do not turn it because this will damage the cage clamp terminal.
   - For units 400/460V, 2~, make sure that L1 (400V) or L1 (460V) is correctly connected inside the plug.
3. Insert the mating connector into the mains connction plug X50 and secure it with the fastening screw (5).
4. Before switch-on make sure that the mains voltage matches the information on the type plate.

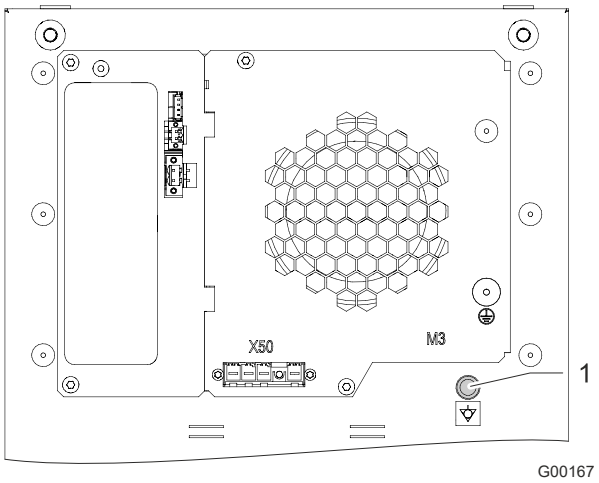
⇨ The cooling unit is electrically connected.

4.6.7 Adapting the unit to the mains voltage

NOTE

Only cooling units with a rated voltage of 400 / 460 V, 2~ can be switched between these mains voltages as an option.
Cooling units with a rated voltage of 230 / 115 V, 1~ do not have transformer options.

4.6.8 Equipotential bonding connections



1 Functional equipotential bonding ⏚ (M8 thread), for a low-interference signal reference between the unit and the switch cabinet.

Fig. 24: Equipotential bonding

NOTE

Potential equalization provided by customer
If the device is to be integrated into the customer's existing potential equalization for EMC reasons, a conductor can be connected at the connecting point of the function potential equalization.
The connecting point is labeled with the necessary circuit symbol.

5 Operation

5.1 General functions - LED display

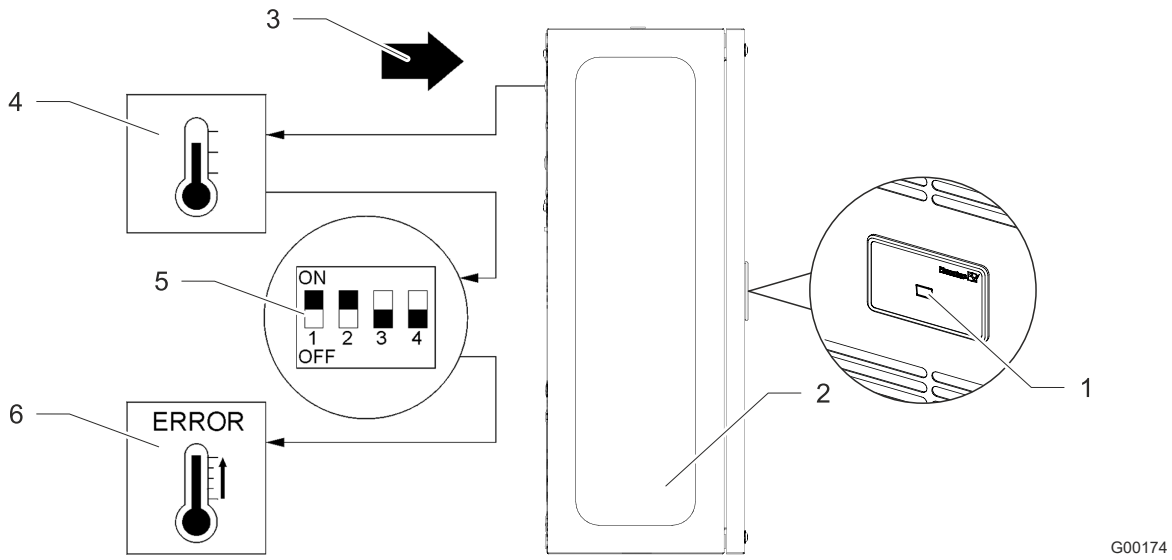


Fig. 25: Electronic control function

The cooling units in the LED version have a green/red illuminated LED (1). Various switch cabinet setpoint temperatures and upper limit temperatures can be set via the DIP switch (5). If there is a warning, the LED flashes between "green" and "red"; if there is an alarm, the LED flashes "red".

- Once the assembly and installation work is complete, switch on the power supply to the cooling unit.
- The cooling unit (2) starts operation and the LED light (1) on the display unit switches to continuous green light. After the supply voltage is applied and the door is closed, the units run continuously.
- The cooling unit (2) is equipped with an electronic control system. A temperature sensor (4) measures the temperature of the switch cabinet's internal air (3).
- The various switch cabinet temperature setpoints and upper limit temperatures are set via the DIP-switch (5) on the circuit board, see chapter "DIP-switch setting options - LED version", Page 55.
- Exceeding the upper limit temperature or falling below the lower limit temperature triggers the fault signal (6).
- The red LED light flashes in the event of a fault signal.
- In the LED version, system messages or error information can only be read out with USB driver software and via the USB adapter for the "Pfannenberg Control Center" configuration software.

NOTE

The ambient conditions and switch cabinet interior temperatures must comply with the prescribed technical data, see chapter "Technical data", Page 25.

5.1.1 DIP-switch setting options - LED version

NOTE

If the red LED light on the LED version operating display flashes, the cooling unit is energized. Always ensure that the unit is de-energized before carrying out any work on electrical connections.

DIP switch				Energy mode 1*	Temperature setpoints / alarm limits		
1*	2	3	4		Setpoint	Limit value min.	Limit value max.
OFF	–	–	–	Inactive	–	–	–
ON	–	–	–	Active	–	–	–
–	OFF	OFF	OFF		25 °C	15 °C	35 °C
–	ON	OFF	OFF		25 °C	20 °C	40 °C
–	OFF	ON	OFF		30 °C	25 °C	35 °C
–	ON	ON	OFF		30 °C	20 °C	40 °C
–	OFF	OFF	ON		35 °C	25 °C	45 °C
–	ON	OFF	ON		Settings from the EEPROM are active		
–	OFF	ON	ON		40 °C	30 °C	50 °C
–	ON	ON	ON		45 °C	35 °C	55 °C

Table 15: DIP-switch setting options - LED version

* The activation of "Energy mode" is independent of the temperature setting.

NOTE

The cooling unit must be switched off and on to accept the changed setting.

5.2 General functions - DIS version

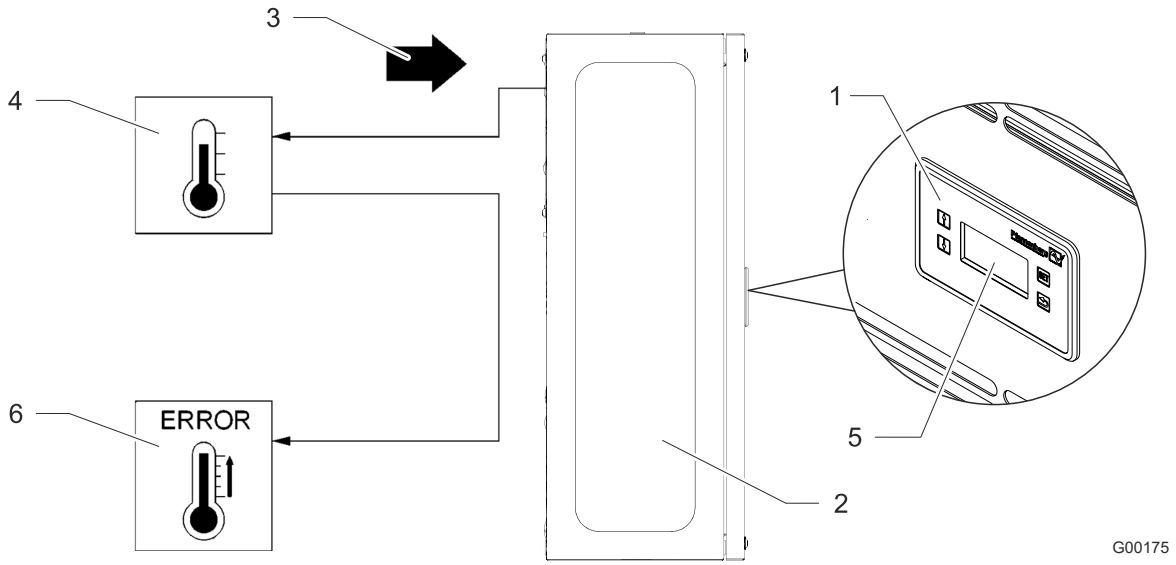


Fig. 26: Electronic control function

DIS version cooling units have an LCD control and display unit (1).
If an error occurs, various system information is shown on the LCD display, see "LCD control panel", Page 16.

- Once the assembly and installation work is complete, switch on the power supply to the cooling unit.
- The cooling unit (2) starts operating and the LCD display unit (1) is ready for operation. After the supply voltage is applied and the door is closed, the units run continuously.
  - Exception: energy saving mode and cooling units with antifreeze option.
  - For information on the energy saving mode “Energy mode", see chapter "Energy-saving mode", Page 20.
- The LCD display (5) indicates the current operating status.
- The cooling unit (2) is equipped with an electronic control system. A temperature sensor (4) measures the temperature of the switch cabinet's internal air (3).
- Exceeding the upper limit temperature or falling below the lower limit temperature triggers the fault signal (6).
- The LCD display (5) indicates the error number alternating with the temperature.

NOTE

The ambient conditions and internal switch cabinet temperatures must comply with the prescribed technical data, see chapter "Technical data", Page 25.

5.3 Control LED

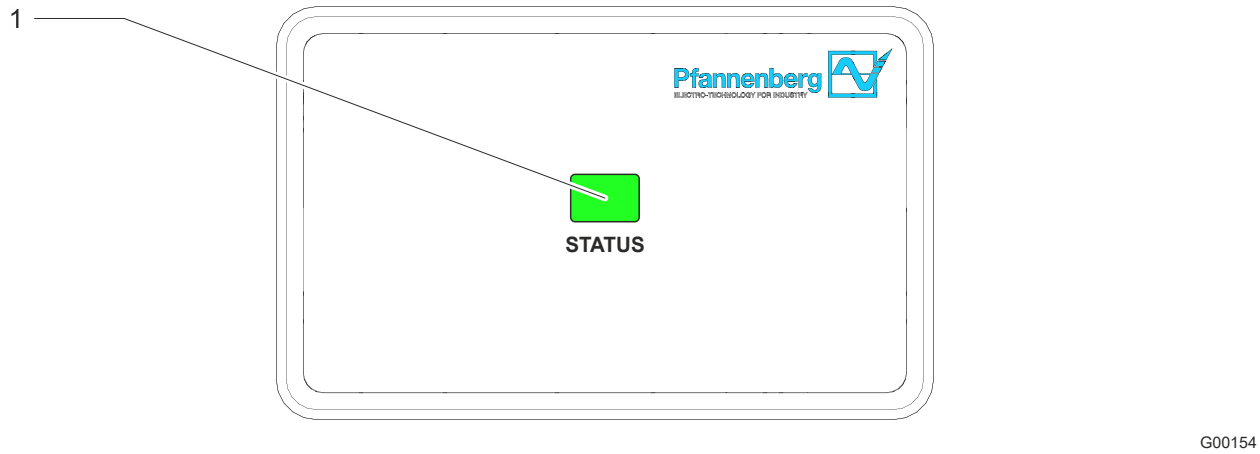


Fig. 27: LED version operating display

The LED version of the cooling units has a display with an LED light (1).

The LED display shows operating information via a two-color LED. More detailed information can be obtained from the Pfannenberg Control Center if a PC is connected to the service interface of the cooling unit.

Mode	Green	Red
Startup	OFF	OFF
Normal	ON	OFF
Warning	Alternating flashing between green and red	
Alarm	OFF	Flashing

Table 16: LED light status displays

If the LED display (1) lights up green continuously when mains voltage is applied, it indicates fault-free operating mode.

The LED light (1) starts to flash if there is an operating fault or malfunction. Detailed information on the error messages, see "Error codes", Page 75.

5.4 LCD control

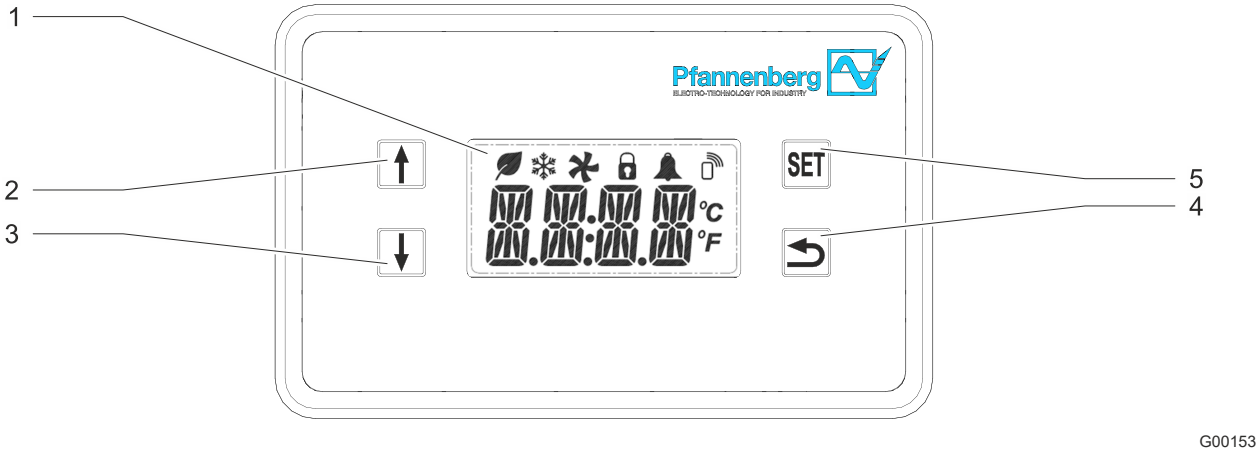


Fig. 28: LCD control panel DIS version

1	LCD display	4	BACK button
2	SCROLL UP button	5	SET button
3	SCROLL DOWN button		

The DIS version of the cooling units has a control panel with an LCD display (1). The control panel is located on the unit cover. Various system information is displayed on the LCD display.

Control and display elements	Function
(1) LCD display (4 digit)	Shows system information: Temperature measuring unit, energy function, operating mode, system data, error number and menu settings / menu items / menu level. Symbols with the following meaning are displayed in the top line of the LCD:
	Indicates that a power saving mode is active.
	Indicates that the compressor is active.
	Indicates that the internal fan is active.
	Indicates that the parameter setting is locked. The PIN must be entered to unlock the parameter. Also see chapter "Locking the parameter settings", Page 59.
	Indicates that a warning or alarm has occurred. In addition, the backlight of the display starts flashing and the corresponding error code appears. For descriptions of all displayed error codes, see chapter "Error codes", Page 75.
(2) Button “UP" 	Allows you to scroll through the current menu or increase a selected value.
(3) Button “DOWN" 	Allows you to scroll through the current menu or decrease a selected value.

Control and display elements	Function
(4) Button "EXIT" 	Allows you to exit a submenu or reject a set value without saving it.
(5) "SET" button 	Allows you to select a menu item or store a set value.

Table 17: Control and display elements - DIS version

5.4.1 Function displays and parameters of the LCD control panel

The display alternates between an identifier and its corresponding value and allows the setting of the following parameters:

Parameter	Identifier	Description
Current temperature	TEMP	Temperature currently measured for unit control
Setpoint	SETP	Displays the setpoint setting
Max. Temp Alarm	MAXA	Displays the alarm value set for the maximum temperature
Min. Temp Alarm	MINA	Displays the alarm value set for the minimum temperature
Temperature Unit	UNIT	Displays the temperature unit (in either °C or °F)
Energy Mode	EMOD	Displays the energy mode that is set
Access Code	PASS	Allows you to enter a PIN to enable the parameters to be changed (see chapter "Locking the parameter settings", Page 59)
Test Mode	TEST	Activation of the test mode
Master Mode	MAST	Is not used by the controller
Address	ADDR	Is not used by the controller
Setpoint	SETP	Temperature setpoint
Max. Temp Alarm	MAXA	Alarm value for maximum temperature
Min. Temp Alarm	MINA	Alarm value for minimum temperature
Temperature Unit	UNIT	Sets the temperature unit (either °C or °F)
Energy Mode	EMOD	Selection of the respective energy mode (1, 2, 5) or OFF (0)

Table 18: Display of functions and parameter settings in the LCD control panel - DIS version

- If the parameter setting is locked, the corresponding PIN code must be entered before setting.
- Once the setting is enabled, you can scroll through the menu using the "Up" or "Down" button.
- Once the desired menu item has been identified, it can be selected by pressing the "Set" button.
- If the selected parameter value is displayed, the value can be changed by pressing the "Up" or "Down" button. A short press of the button changes the value by 0.1, a long press changes the value by 1.0.
- Press the "Set" button again to save the new setting.
- Pressing the "Exit" button interrupts the current setting and the selected value is rejected.

5.4.2 Locking the parameter settings

The parameter settings of the controller can be protected with a PIN.

If the protection function is activated, the user must enter a PIN before the unit can be configured. After 500 seconds, the PIN must be entered again.

5.5 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.

- After the mains voltage is applied, the unit switches to start-up mode and then to operating mode. The mode depends on how the controller is configured.
- The cooling unit switches to cooling mode during operating mode if required. This depends on whether the upper temperature switching threshold is reached or exceeded.
  - The cooling mode switches off when the temperature falls below the lower temperature switching threshold.
  - The evaporator fan (internal), the condenser fan (external) and the compressor switch off when the door is opened (only if the door contact switch is connected).

5.5.1 Operating conditions

- The mains voltage must be within the specified range, see chapter "Technical data".
  - A deviation of ±10 % is permitted.
  - The rated frequency must be within ±3 Hz of the specified value.
- The ambient temperature may not exceed 55°C. For further options, see chapter "Technical data".
  - Only use the cooling unit if the specified cooling capacity can meet the actual demand.
  - Only the specified refrigerant may be used.

NOTE

For Pfannenberg spare part numbers, see chapter "Spare parts and accessories", Page 80.

5.6 Service interface

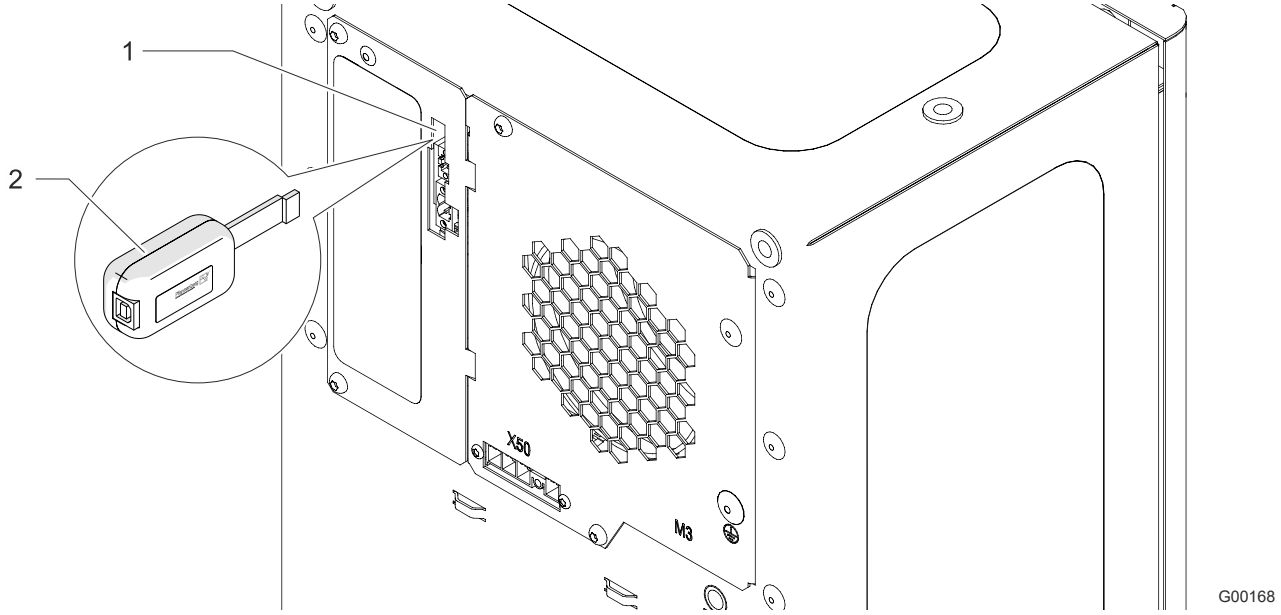


Fig. 29: Service interface

1	Service interface on the controller	2	USB adapter

The service interface allows you to change operating parameters.

- This requires a USB adapter and the "Pfannenberg Control Center" configuration software, including the USB driver software.
- The connection for the USB adapter is marked on the circuit diagram with the equipment identifier X4.
- The USB adapter enables the connection to a computer that works with the "Pfannenberg Control Center" configuration software.
  - The USB adapter is available as an accessory, see chapter "Spare parts and accessories", Page 80.
  - After use, remove the USB adapter from the unit. The service interface is intended only for temporary data exchange, e.g. to read system messages. Permanent use is prohibited.

NOTE

- The "Pfannenberg Control Center" software is available as a free download on the website www.pfannenberg.com/. Simply scan the QR code shown here as an alternative.
- The corresponding operating manual for the "Pfannenberg Control Center" software is available for download at My Pfannenberg.

NOTE

For a detailed description of the error messages and troubleshooting notes, see section "Error codes", Page 75.

5.7 Test mode

DANGER

Danger to life due to electric shock!

There may be increased condensation on the cooling unit during extended test operation if the switch cabinet doors open.

This can lead to an electrical hazard where there is contact with live parts.

- The test mode may only be activated by qualified electricians and authorized specialists.
- The unit may only be operated in test mode under supervision.

The test mode instructs the cooling unit to initiate unrestricted cooling operation for 90 seconds.

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

Normal mode is automatically resumed after 90 seconds.

Requirements

- The cooling unit is ready for operation.

Procedure - DIS variants

1. Select the item "TEST" from the menu.
   - Fans and compressors start running.
2. The active test mode is indicated on the display by "RUN".

⇨ The test mode is active. After 90 seconds, the cooling unit resumes normal mode.

Procedure - LED variants

1. Activation of the test mode in the "Pfannenberg Control Center" software.

6 Service and maintenance

6.1 Safety information

DANGER

Danger to life from electric shock!

Parts may be live when the unit is open and cause electric shock when touched.

When working on the opened unit, note the following points:

- Only authorized electricians are allowed to work on the electrical system.
- Before starting work on the electrical system, switch off the electrical supply, check that the voltage is off, and secure it against restart.
- Cordon off the work area and mark it with a warning sign.
- The electrical connection must be made according to the locally applicable 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/repaired by persons who are familiar with the procedure and aware of the risks as well as having the necessary qualifications.
- Always switch off the disconnector/contactor prior to starting maintenance work.
- Wait for the end of the 10-minute discharge phase of 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.

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.

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 65.
  - 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

Maintenance interval	Carry out every twelve months. In oily and dusty ambient air, carry out every two to six months.
Type:	_____
Serial number:	_____
Date of maintenance:	_____
Specialist in charge (name):	_____

	Unit area designation/ required maintenance work	Visual inspection	To do	Results
1	**Unit before maintenance**			
1.1	General visual inspection of the unit			
1.2	Check for corrosion damage			
2	**Refrigeration circuit**			
2.1	Check parts that come into contact with refrigerant for traces of oil.			
2.2	Check parts that come into contact with refrigerant for leaks.			
2.3	Check electrical connections for damage.			
3	**Condenser / heat exchanger**			
3.1	Check the pipes for deposits			
3.2	Check for general corrosion damage			
3.3	Check, clean and straighten the fins*			
4	**Evaporator / heat exchanger**			
4.1	Check the pipes for deposits			
4.2	Check for general corrosion damage			
4.3	Check, clean and straighten the fins*			
5	**Condenser fan (external)**			
5.1	Check the mounting for loose parts			
5.2	Check the electrical connection for damage			
5.3	Check the motor bearings for noise			
5.4	Check the drive for signs of overheating			
5.5	Clean the fan*			
6	**Evaporator fan (internal)**			
6.1	Check the mounting for loose parts			
6.2	Check the electrical connection for damage			
6.3	Check the motor bearings for noise			
6.4	Check the drive for signs of overheating			
6.5	Clean the fan*			
7	**Pre-filter**			
7.1	Change the filter mats*			
7.2	Clean the filter mats*			
8	**Condensate drain**			
8.1	Check that the condensate drain for blockage.			

Table 19: Cooling unit maintenance plan

* Maintenance intervals should be more frequent, depending on the degree of contamination.

6.4 Cleaning work

⚠ 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.

6.4.1 Removal / installation of the unit cover

⚠ CAUTION

Risk of crushing during removal / installation of the unit cover

Hands and other body parts may be crushed when removing and reinstalling the unit cover.

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

6.4.1.1 Removing the unit cover

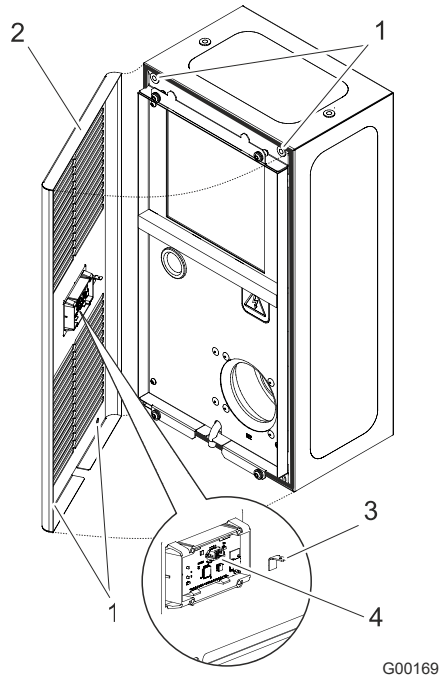


Fig. 30: Removing the unit cover

Requirement

⚠ DANGER – danger to life due to electric shock. Make sure that the unit is de-energized.

Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Procedure

1. Remove the four screws (1) on the unit cover (2).
2. Open the unit cover by approx. 40° to the left.

   CAUTION – damage to the unit

   Before removing the cover of the unit, always disconnect the grounding cable (3) and the supply cable (4) to the control and display unit on its inside.
   The unit cover must be held in a slightly open position (see Fig. 30) in order to release the cables without damaging them.

•⇨ The unit cover has been removed.

6.4.1.2 Installing the unit cover

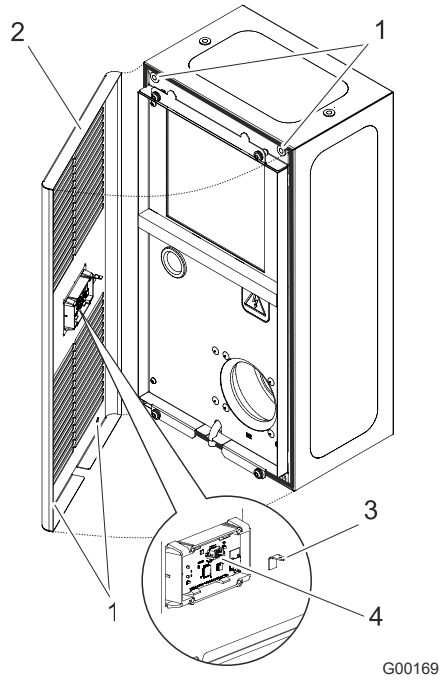


Fig. 31: Installing the unit cover

Requirement

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Procedure

1. Attach the supply cable (4) to the control and display unit and the grounding cable (3) to the inside of the unit cover (2).
2. Place the unit cover on the long side of the unit.
3. Close the cover of the unit again.

   CAUTION – damage to the unit

   When closing the unit cover, make sure that the earthing cable (3) is not pinched.
4. Fasten the unit cover with the four screws (1).

•⇨ The unit cover has been installed.

6.4.2 Removing/installing the fan assembly

⚠ CAUTION

Risk of crushing during removal/installation of the fan assembly

When removing and reinstalling the external/internal fan assembly, hands and other body parts may be crushed.

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

6.4.2.1 External fan assembly removal

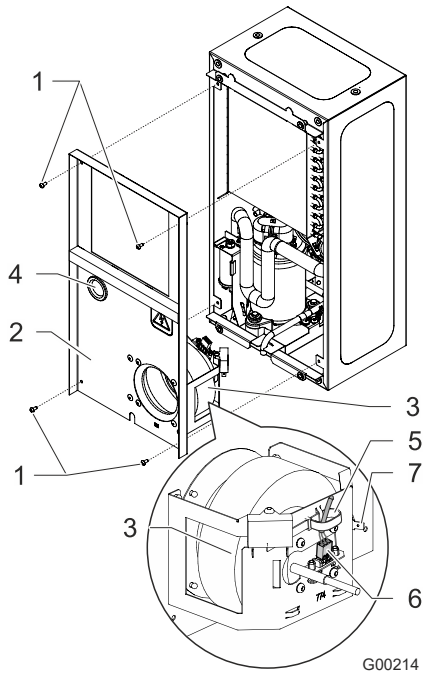


Fig. 32: Removing the external fan assembly

Requirement

⚠ DANGER – danger to life due to electric shock. Make sure that the unit is de-energized.

Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Required tools and materials

- Screwdriver (hexalobular socket)

Procedure

1. Remove the four screws (1) on the external fan assembly (2).
2. Pull the external fan assembly (2) together with the condenser fan (3) forward and out of the unit.
3. Carefully feed the display cable and the ground cable from the cover through the holes provided (4).
4. Open the cable tie (5) and disconnect the cable (with shrink-on sleeve).
5. Pull the plug (6) out of the condenser fan connector.
6. Disconnect the ground cable from the condenser fan connector (7).

⇨ The external fan assembly has been removed.

6.4.2.2 Installing the external fan assembly

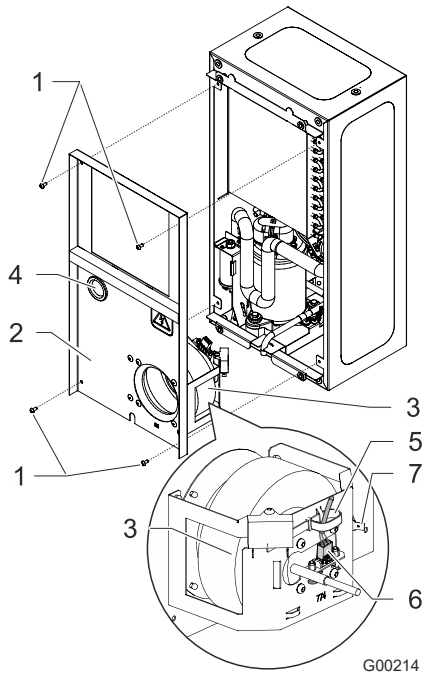


Fig. 33: Installing the external fan assembly

Requirement

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Required tools and materials

- Screwdriver (hexalobular socket)

Procedure

1. Connect the ground cable to the connector (7) of the condenser fan (3).
2. Push the plug (6) through the open loop of the cable tie (5).
3. Connect the plug to the condenser fan connector (5).
4. Connect both connectors and push the connection cable down slightly through the cable tie loop.
5. Close the cable tie (5) tight.

   ATTENTION – Damage to the unit.
   Improper assembly of the connector bears the risk that dirt and moisture penetrate the connection point.
   Make sure that the shrink-on sleeve is pushed over both the cable and the plug.
6. Carefully feed the display cable and the ground cable for the cover through the holes provided (4).
7. Insert the external fan assembly (2) into the unit.
8. Screw the external fan assembly to the unit housing with the four screws (1).

⇨ The external fan assembly has been installed.

6.4.2.3 Internal fan assembly removal

Requirement

DANGER – danger to life due to electric shock. Make sure that the unit is de-energized.
Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Required tools and materials

- Screwdriver (hexalobular socket)

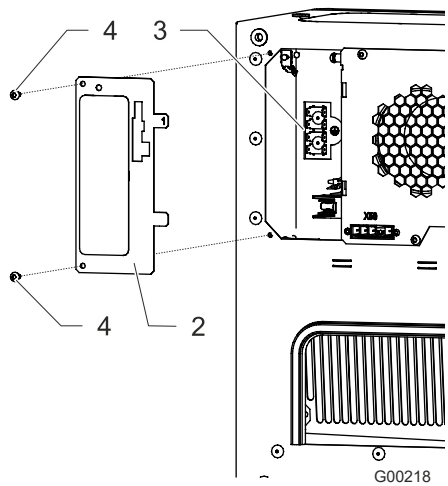


Fig. 34: Removing the circuit board cover

Procedure

1. Undo the two screws (4) and pull the circuit board cover (2) out of the unit housing.
2. Disconnect the ground cable "Wire GNYE" of the circuit board cover from the grounding lug (3) in the unit.

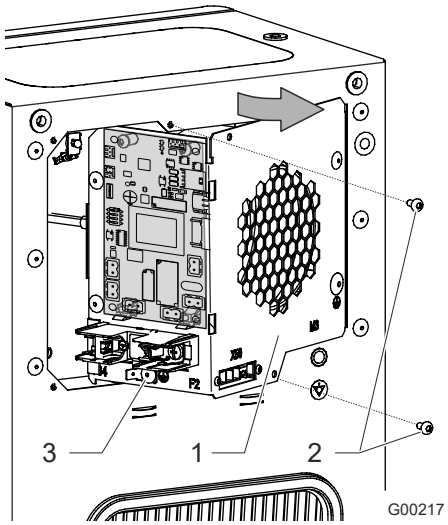


Fig. 35: Internal fan assembly removal

3. Undo the two screws (2) and swing the internal fan assembly (1) out of the unit housing (arrow).
4. Disconnect all fan assembly connectors on the unit.
5. Disconnect the ground cable "Wire GNYE" (3) from the grounding lug in the unit.
6. Remove the internal fan assembly (1) from the unit cut-out.

⇨ The internal fan assembly has been removed.

6.4.2.4 Internal fan assembly removal

Requirement

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.
Allow the electrical components to discharge for 10 minutes. Only then open the unit.

Required tools and materials

- Screwdriver (hexalobular socket)

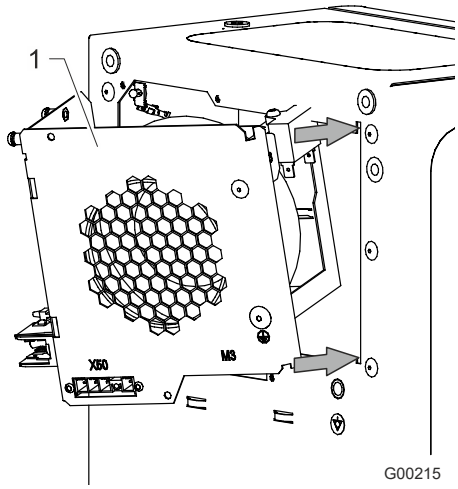


Fig. 36: Hanging in the internal fan assembly

Procedure

1. Hang the internal fan assembly (1) into the unit cut-out (arrows).

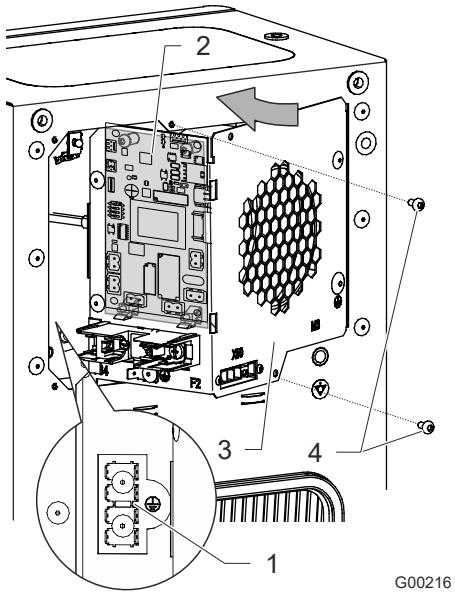


Fig. 37: Connecting and fastening the internal fan assembly

2. Plug the ground cable "Wire GNYE" into the grounding lug (1) in the unit.
3. Connect all other fan assembly connectors according to the electrical circuit diagram ("Electrical circuit diagram", Page 45) on the unit:
   - X50
   - Fan
   - Fan plate
   - Transformer
4. Connect the circuit board (2) according to the current electrical circuit diagram. The cables and terminals are labeled accordingly.
5. In units with 115 V and 400 V, connect the transformer cable and insert the fuse additionally.
6. Swing the internal fan assembly (3) into the unit (arrow).
7. Screw the internal fan assembly to the unit housing with two screws (4).

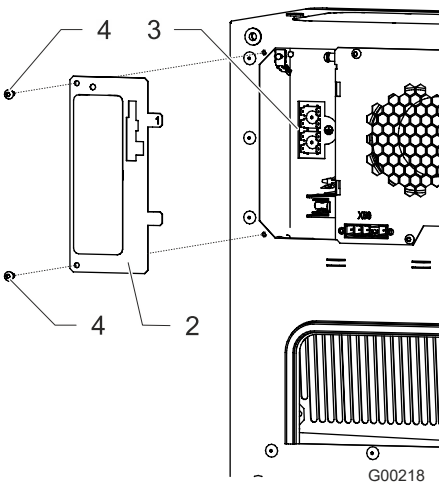


Fig. 38: Connecting and fastening the circuit board cover

8. Plug the ground cable "Wire GNYE" (1) of the circuit board cover (2) to the grounding lug (3) in the unit.
9. Observe the terminal assignments on the grounding lugs:
   - 7 terminals are occupied for 230 V
   - 8 terminals are occupied for 114/400 V.
10. Insert the circuit board cover (2) and screw it to the unit housing with two screws (4).

⇨ The internal fan assembly has been installed.

6.4.3 Cleaning the heat exchanger

CAUTION

Damage to components

Damage to the heat exchanger fins due to improper 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 heavily on the air pollution in the surrounding area.

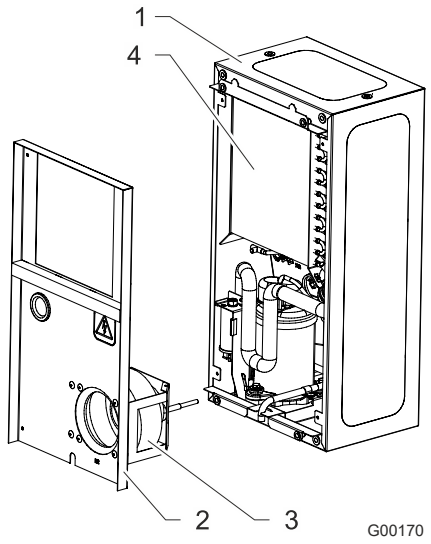


Fig. 39: Cleaning the heat exchanger

Requirements

⚠ **DANGER** – danger to life due to electric shock. Make sure that the unit is de-energized.

- The unit cover has been removed. See chapter "Removing the unit cover", Page 66.
- The external fan assembly (2) together with the condenser fan (3) have been removed. See chapter "Installing the external fan assembly", Page 69.

Required tools and materials

- Soft brush
- Vacuum cleaner with brush attachment or compressed air cleaner
- Lamellar ridge

Procedure

1. Clean the condenser fan (3) at the back of the external fan assembly (2) and the heat exchanger fins (4) in the cooling unit (1) with a soft brush, compressed air or a vacuum cleaner with a brush attachment.

   ⚠ **CAUTION** – risk of injury. Do not touch the sharp edges on the heat exchanger fins.

   ⚠ **CAUTION** – dust formation when cleaning with compressed air. When cleaning with compressed air, wear eye and breathing protection.
2. Check the heat exchanger for bent fins, straighten the fins with a fin comb.
3. Reassemble the cooling unit. See chapter "Installing the external fan assembly", Page 69 and "Installing the unit cover", Page 67.
4. Make sure that proper and safe operation is guaranteed after cleaning.

⇨ The heat exchanger has been cleaned.

7 Rectification of operating faults

7.1 General

NOTE

The flashing red LED on the controller board is **not** a fault indication or error message.
The red LED indicates that the cooling unit is energized.

Error	Possible cause	Remedy
No display but the unit still runs	Display cable not plugged in or cable broken	Inform authorized specialist.
Unit does not cool	Temperature sensor faulty or defective	Inform authorized specialist.
	Setpoint too high	Correct the setpoint.
	Evaporator fan defective	Call an authorized specialist; replace the fan.
	Condenser fan defective	Call an authorized specialist; replace the fan.
	Compressor defective	Call an authorized specialist.
	Lack or loss of refrigerant	Inform authorized specialist; check the unit for leaks. Are there any oil stains?
Unit does not cool sufficiently	Operational limits exceeded	Check the ambient temperature and internal load.
	Heat exchanger soiled	Clean the heat exchanger.
	Pre-filter heavily soiled (if installed)	For aluminum filters: clean filter. For fleece filter: order new pre-filter and replace.
	Air circulation in the switch cabinet impaired	Check the installed components and circulation channels in the switch cabinet. Check the inflow and outflow of air from the cooling unit into the inlet and outlet openings of the switch cabinet. Check the DIP switches and cable connections.
Condensation in the switch cabinet	The switch cabinet is not sealed properly	Eliminate leaks or faulty seals on the switch cabinet.
		Check the temperature setting.
	Switch cabinet doors are often opened but the unit continues to run	Install door contact switch.
Condensate does not drain	Condensate drain is clogged	Clean the condensate drain.
		Make sure the condensate drain hose is properly routed without bends and downward gradient.
	The switch cabinet is not sealed properly	Eliminate leaks or faulty seals on the switch cabinet.
Condensate leaking from the unit	Condensate drain is clogged	Clean the condensate drain.

Table 20: General malfunctions

7.1.1 Error codes

The error numbers are not displayed with LED version units:
The error codes can be read-out on the computer using the "Pfannenberg Control Center" software.

For DIS version units:

	The symbol shown here in the LCD display indicates that a warning or an alarm has occurred. In addition, the backlight of the display flashes and the corresponding error code is displayed.

Error code	Description	Connection on circuit board
E000	Door contact (door open)	X16
E001	High pressure switch triggered	X18
E002	Motor protection switch triggered	X22
E016	Temperature sensor 1 error	X17
E017	Temperature sensor 1 min. alarm	
E018	Temperature sensor 1 max. alarm	
E019	Temperature sensor 2 error	X20
E020	Temperature sensor 2 min. alarm	
E021	Temperature sensor 2 max. alarm	

Table 21: Error codes

8 Decommissioning

DANGER

Danger to life from electric shock!

Parts may be live when the unit is open and cause electric shock when touched.

When working on the opened unit, note the following points:

- Only authorized electricians are allowed to work on the electrical system.
- Before starting work on the electrical system, switch off the electrical supply, check that the voltage is off, and secure it against restart.
- Cordon off the work area and mark it with a warning sign.
- The electrical connection must be made according to the locally applicable regulations.

8.1 Temporary decommissioning

WARNING

Risk of injury from materials and substances

Improper work on the unit or opening the cooling circuit can cause damage to health.

- Before working on the unit, always make sure that it is disconnected from the power supply.
- The unit may only be disposed of by qualified persons and in accordance with the applicable environmental regulations.

During periods of extended non-use, the cooling unit must be disconnected from the power supply.

- Ensure that improper commissioning by third parties is not possible.

8.2 Final decommissioning

CAUTION

Risk of crushing when decommissioning units

Hands and other body parts can get crushed when uninstalling the units.

- Do not place any body parts between the frame and the unit cut-outs.

When cooling units are permanently decommissioned or disposed of, observe the notes in the chapter "Dismantling and disposal", Page 77!

NOTE

Pfannenberg also ensures that old units are disposed of properly. Delivery to one of our manufacturing plants must 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.

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 to life from electric shock!

Parts may be live when the unit is open and cause electric shock when touched.

When working on the opened unit, note the following points:

- Only authorized electricians are allowed to work on the electrical system.
- Before starting work on the electrical system, switch off the electrical supply, check that the voltage is off, and secure it against restart.
- Cordon off the work area and mark it with a warning sign.
- The electrical connection must be made according to the locally applicable 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 de-energized.

Procedure

1. Switch off the unit, secure it against being switched on again and wait until all components have a temperature of below 40 °C.
2. Physically disconnect the entire energy and media supply from the unit, and allow any stored residual energy to be discharged.
3. Remove dirt and impurities from the unit.
4. Check the load-bearing capacity of the attachment points before use.
5. Remove operating and auxiliary materials and dispose of them in an environmentally friendly manner.
6. Disassemble the unit into the various separate materials.
   – Observe the applicable local occupational health 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 "Technical data", Page 25)

10 Spare parts and accessories

NOTE

- Always state the Pfannenberg spare part and accessory part number when placing an order.
- The Pfannenberg part number for the controller is located on the controller's transformer.

No.	Designation
18810000110	LCD control panel
18810000111	LED display
18810200165	Cover DTFS 60x1
18811100109	Internal fan assembly (evaporator) 6021/ 6031 230V
18811100110	Internal fan assembly (evaporator) 6021/ 6031 400V
18811100111	Internal fan assembly (evaporator) 6021/ 6031 115V
18811100112	Internal fan assembly (evaporator) 6041 230V
18811100113	Internal fan assembly (evaporator) 6041 400V
18811100114	Internal fan assembly (evaporator) 6041 115V
18811100115	External fan assembly (condenser) 6021
18811100116	External fan assembly (condenser) 6031
18811100117	External fan assembly (condenser) 6041
18310000004	USB adapter
18310000161	Filter adapter DTFS 60x1
18300000206	Fleece filter (standard, air containing dust without oil vapors)
18300000207	Aluminum filter (air containing oil)
18314000100	Condensate collection bottle

Table 22: Spare parts and accessories list

11 Index

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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