Technical Manual

Operation and installation cooling units
DTS 5000 COOLING UNIT SERIES

885505109 05.26



Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

Preface

The skills and information provided in the ORIGINAL OPERATING MANUAL are required for assembly and safe operation of Pfannenberg's DTS 5000 Series Cooling Units. Read carefully before use, keep for future reference.

The information is presented in a brief, clearly arranged format. The chapters are numbered throughout. If you have the operating manual in digital format, the links are interactive.

DTS 5000 unit variants are labelled as DTS 5341, 5361, 5381, 5541, 5561, and 5581. These are intended for indoor, outdoor and washdown conditions, respectfully.

Pfannenberg cooling units are subject to continuous improvement. We reserve the right to make changes to the design, equipment and technology. For this reason, no claims to specific features of the unit can be derived from the content of this operating manual.

Safety Instructions and Symbols



DANGER

Identifies an exceptionally hazardous situation. Severe, irreversible injuries or death will occur if this notice is not observed.



DANGER

Identifies an exceptionally hazardous situation in connection with electrical voltage. Severe, irreversible injuries or death will occur if this notice is not observed.



WARNING

Identifies an exceptionally hazardous situation. Severe, irreversible or deadly injuries could occur if this notice is not observed.



CAUTION

Identifies a hazardous situation. Minor or moderate injuries could occur if this notice is not observed.



NOTICE

Notice is used to address practices not related to physical injury.

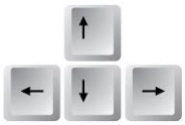


This symbol on warning labels on the unit directs the operator or technician to refer to this manual before proceeding.

Digital operating manual:

If you have the operating manual in digital format, the links are interactive.

Clicking  on links takes you to the target text position.



- The table of contents is also interactive.

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1 : INTENDED USE

1.1 General Overview

The attachment and installation of the Pfannenberg DTS 5000 series cooling units are intended as stationary cooling units for the dissipation of heat from switch cabinets. NOT TO BE ACCESSIBLE TO THE GENERAL PUBLIC.

For exact specifications on power consumption and performance, see Technical data in section 2.8 of this manual.

Use of aluminum filters, fleece filters and fluted filters is possible with an additional adapter.

The LED version have thermostat controllers that can be adjust via dip-switches.

The DISPLAY version have thermostat controllers that can be adjusted via the display and also indicates error codes to assist in troubleshooting diagnosis.

- For detailed specifications for the controller, see Technical data and Operation.

All Pfannenberg cooling units are ROHS & TSCA compliant and free from:
- PCT, asbestos, formaldehyde, cadmium
- Moisture-impairing substances.
- PBT, TTBP, Deca-BDE, PIP-3:1, PCTP, HCBD.

1.2 Duty of the Operator

The operator must ensure that the cooling units are used exclusively as intended and dangers of all types to the life and limb of users or third parties are avoided. In addition, accident prevention regulations and recognized safety rules are to be observed.

The operator must ensure that all users have read and understood this operating manual. Non-observance of 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 approval of the manufacturer.

2 : UNIT DESCRIPTION

2.1 Description of Use

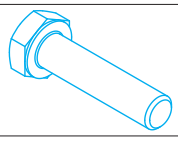
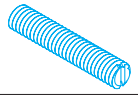
WARNING

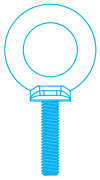
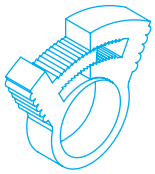
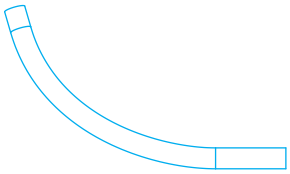
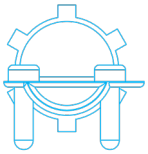
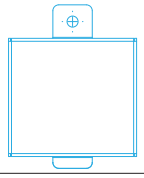
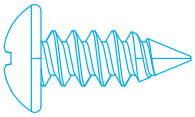
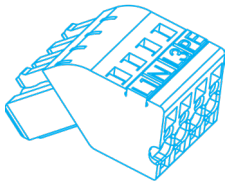
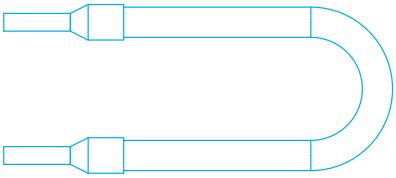
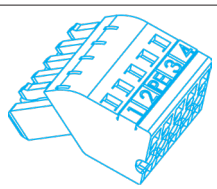
Hazardous due to impermissible use of units

Inappropriate use of the units can cause severe accidents.

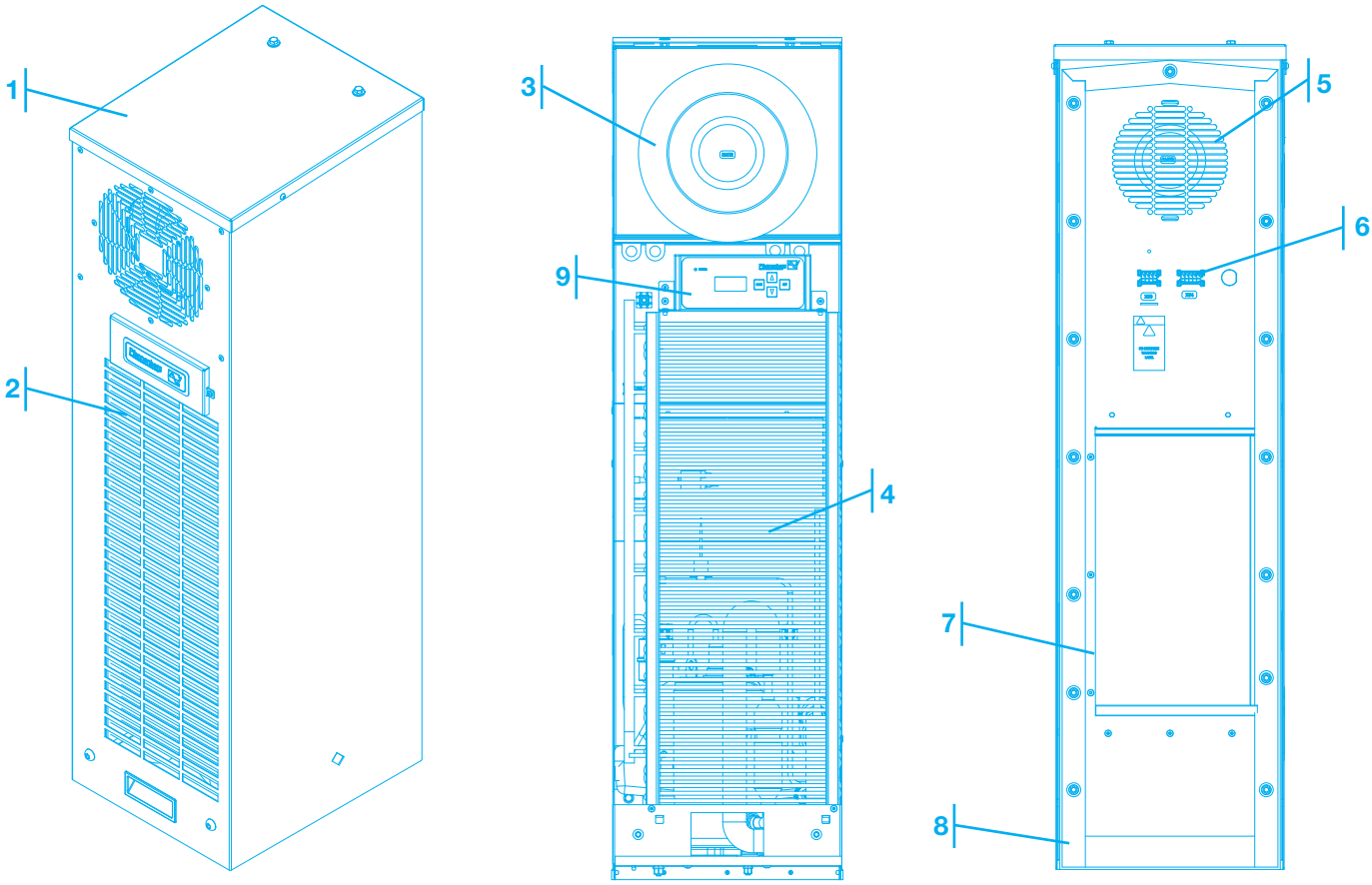
- Cooling units must only be used in stationary and upright operation with closed switch cabinets. As cooling units with protection rating IP 55, the cooling units are effectively dust-protected and can withstand waterjet spray for a limited time. Limitation: Dust and water can still penetrate after continuous exposure.
- Pfannenberg DTS series cooling units are designed to dissipate heat from switch cabinets. with intention to maintain the air temperature inside the switch cabinet to allow for normal operation of sensitive components.

2.2 Scope of Delivery

Description	Image	QTY.
DTS 5000 Cooling Unit with cabinet interface gasket installed		1
Drilling Template DTS 5000		1
Manual quick guide		1
CE Letter of Conformity - DTS		1
10mm Hex screw M6x25mm		13
Split lock washer 6mm		15
Washer ID 6.4		15
Slotted Threaded Stud M6x30mm		2
10mm Hex nut M6		2

Description	Image	QTY.
Eye bolt M6		2
Hose clip 17-18,5mm		1
PVC clear hose 12x2mm		260mm
Romex clamp connector 3/8”		1
Power Supply Strain Relief Box		1
Screw Phillips M3.9X9.5		1
Power supply connector 4 pole		1
WIRE BK 16AWG 110 AE AE		1
Alarm and door contact 5 pole connector		1

2.3 Physical Layout

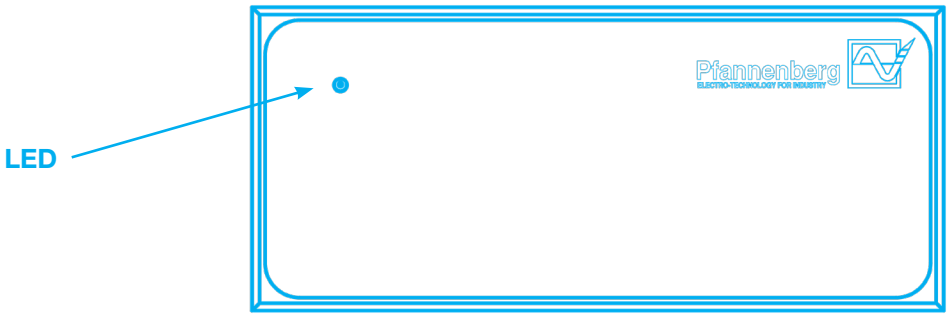


1	Unit cover	6	Connection compartment with cover
2	Condenser Outlet	7	Evaporator (internal) with grill outlet
3	Condenser Fan	8	Pre-installed gasket
4	Condenser	9	Display/LED
5	Evaporator Fan		

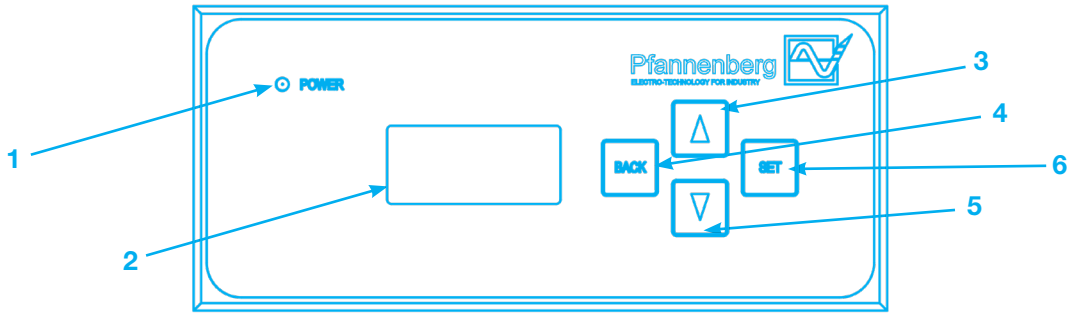
2.4 Controller

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. These functions are only available through Pfannenberg certified service team. Please contact Pfannenberg for more information

Standard units come with an LED status indicator. The LED indicator shows operating status via a blinking green LED. More detailed information can be obtained through Pfannenberg service team. Please contact Pfannenberg for details.



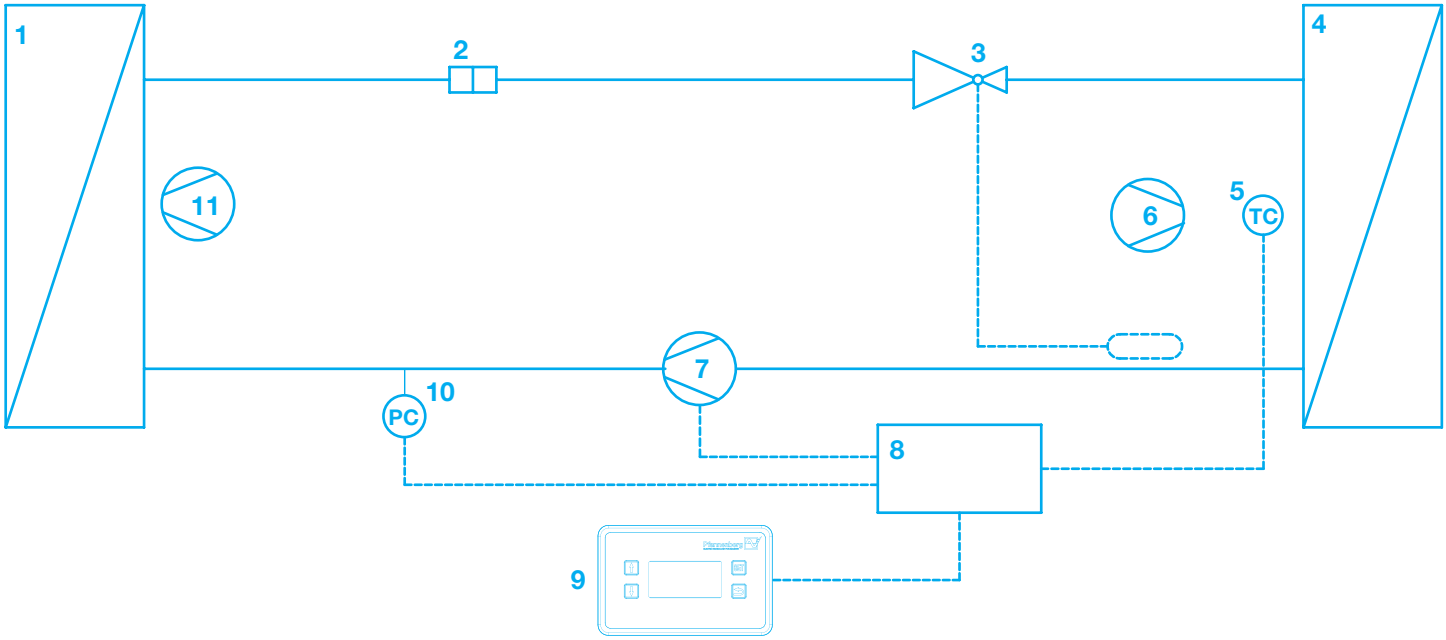
As an option, Pfannenberg offers a LCD Digital Display. The Digital Display shows the temperature of the enclosure air getting pulled into the unit, allows changing of the setpoint, and shows error codes for troubleshooting.



1	Power Indicator	4	Scroll DOWN Button
2	LCD Display	5	BACK Button
3	Scroll UP Button	6	SET Button

2.5 Refrigeration Circuit

The following lays out the active refrigeration circuit within the cooling unit



The following lays out the active refrigeration circuit within the DTS cooling unit.

1	Condenser	5	Temperature sensor	9	Display Interface
2	Filter drier	6	Evaporator fan	10	High pressure switch
3	Expansion valve	7	Compressor	11	Condenser fan
4	Evaporator coil	8	Electronic controller		

2.6 Safety Concept

WARNING

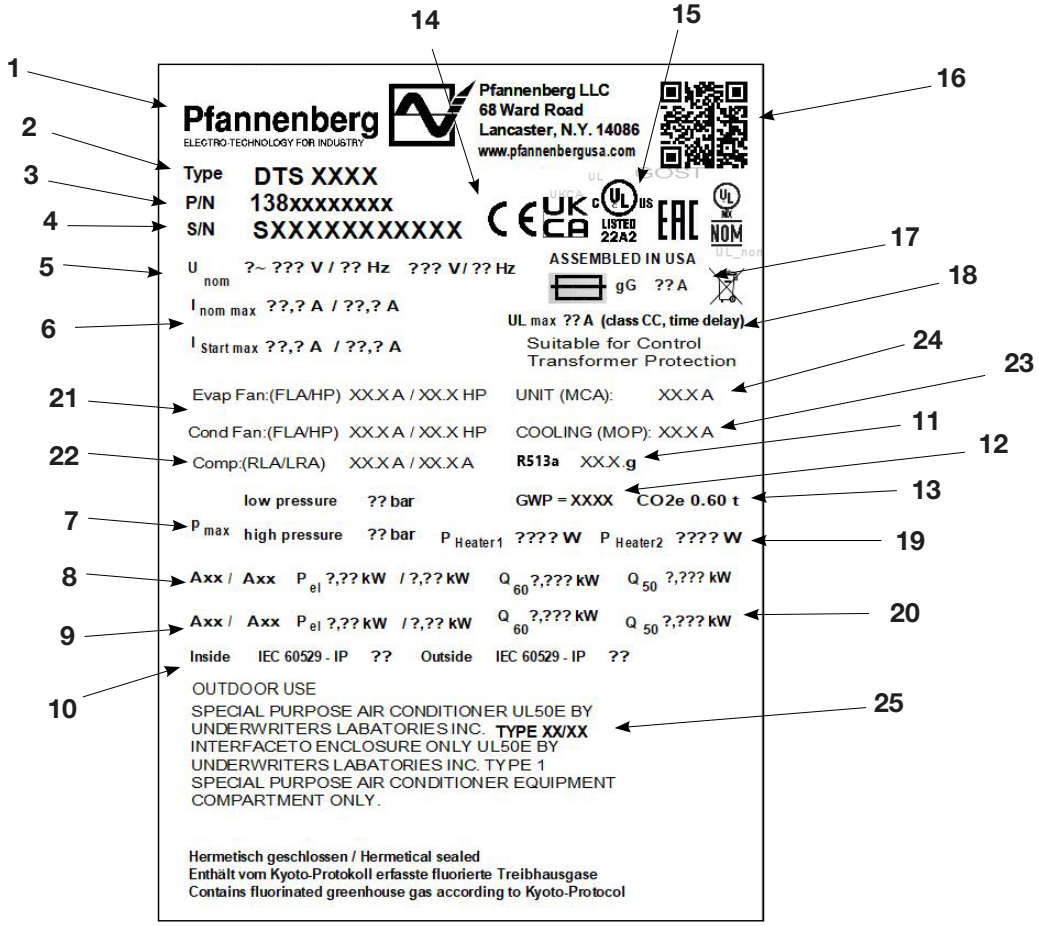
Hazards due to modified safety equipment

Non-functioning or defective safety equipment can cause severe accidents.

- Any changes to the unit, particularly the safety equipment, are prohibited.
- In case of defective safety equipment, shut down the unit and decommission it immediately.
- Fans and compressors are protected from overloading and overheating.
- These cooling units have a pressure switch tested in accordance with UL 60335-2-40. The pressure switch reacts to excessive pressure in the refrigeration system by switching off automatically.

2.5 Type Plate

This figure shows the standard version of type plate.



Item Number	Designation	Item Number	Description
1	Manufacturer logo	14	CE Mark
2	Unit type	15	UL Mark
3	Part number	16	QR Code
4	Serial number	17	Internal Fuse
5	Rated operating voltage & frequency	18	UL Pre-Fuse
6	Current Ratings	19	Heater Power
7	Design Pressures	20	Cooling Capacity
8	Exterior / Interior Temperatures	21	Fan FLA Rating
9	Power ratings	22	Compressor RLA Ratings
10	Protection types (IP, NEMA)	23	Cooling (MOP) Ratings
11	Refrigerant type and weight	24	MCA Ratings
12	Global Warming Potential	25	Protection Types (NEMA)
13	CO2 equivalent value		

Further Explanation of Type Plate Fields

Designation	Explanation
Rated operating voltage & frequency	Criteria for the power supply that must be connected to the unit by the customer.
Current ratings	Inom max: Amperage pull of the cooling unit as a whole at maximum rated ambient condition. Istart max: The maximum amperage pulled for a split second upon compressor start.
Exterior / Interior Temperatures	Temperatures of the external ambient and internal cabinet air for the standard rating conditions where power consumption and cooling capacity were measured.
Power ratings	Power consumption at the standard rating points, and the rated voltage/ frequency inputs.
Protection Types	The level of protection from environmental conditions as designated by the NEMA and IP ratings.
Refrigerant type and weight	The type of refrigerant in the unit followed by the mass in grams in the active system / the passive coil, respectively.
Global Warming Potential	A value that compares the refrigerant type to CO2 on the basis of how long it lasts in the atmosphere, how well it absorbs the sun's radiation, and how it reacts with the atmosphere while breaking down.
QR Code	Scan this to register the product to activate warranty.
Internal Fuse	Fuses internal to the cooling unit that protect control or branch circuits.
UL Pre- Fuse	Fuse to be installed by the customer on the cooling unit's incoming power to comply with UL listing.
Heater Power	Maximum heating power of the enclosure heater. (optional)
Cooling capacity	The amount of heat the unit can effectively remove at the standard rating points.

2.8 Technical Data and Spare Parts

Technical data, spare parts, and cutouts can be found on our website here:
http://pfannenbergusa.com/thermal-management-downloads/

Cooling Data	DTS 5341	DTS 5361	DTS 5381
Cooling capacity A35°C(95°F)/A35°C(95°F)	1600 W / 5600 BTU/h	1500 W / 5100 BTU/h	
Cooling capacity A35°C(95°F)/A50°C(122°F)	1200 W / 4100 BTU/h	1080 W / 3690 BTU/h	
Optional at time of Order: Heating capacity (Q0) A-15°C(5°F)/A20°C(68°F)	1000W / 3400 BTU/h		
Refrigerant type / Refrigerant amount	R-513a: 520 g / 18.3 oz.		
Adjustable thermostat setting LP2 (factory setting)	+25°C-45°C / +77°F-113°F (+35°C / +95°F)		
COP / EER A35°C(95°F)/A35°C(95°F)	1.72 / 5.38		
COP / EER A35°C(95°F)/A50°C(122°F)	1.28 / 3.71		
Failure indication: Enclosure internal temp. (factory set)	> +50°C / +122°F		
Ambient air temperature rating	-25°C / -13°F . . . +55°C / +131°F		
Max. External Air Circulation	1056 m³/h / 621 CFM		
Max. Internal Air Circulation	886 m³/h / 521 CFM		
Condensation discharge	active evaporation tray; Condensate overflow via hose		
Physical Specifications			
Height	925 mm / 36.41 inch	925 mm / 36.41 inch	925 mm / 36.41 inch
Width	300 mm / 11.81 inch	300 mm / 11.81 inch	300 mm / 11.81 inch
Depth	359 mm / 14.13 inch	485 mm / 19.1 inch	
Weight (230V models are 5.1 kg / 11.3 lb lighter)	47.9 kg / 106 lb	49.2 kg / 108 lb	
Unit construction	Electrostatic powder coated G90 Galvanized Steel		304 Stainless Steel
Protection classification (against the enclosure, under correct operating conditions)	Type 12 , IP 54 (EN 60529)	Type 3R/4 , IP 55 (EN 60529)	Type 4/4X, IP 55 (EN 60529)
Electrical Data			
Voltage (All SIngle Phase)	115V 1Φ	230V 1Φ	400/460V 1Φ
Mains frequency	60 Hz	50/60 Hz	50/60 Hz
Operating range	103 V .. 127 V	207 V .. 253 V	360 V.. 440 V / 414 V .. 506 V
Power consumption @ A35°C(95°F)/A35°C(95°F)	1075 W		
Nominal Running Current	11.9 A	5.9 A	2.9 A
Maximum starting current	45 A	22 A	10A
Recommended Maximum Fuse Size	20 A (Time Delay Fuse Class CC)	10 A (Time Delay Fuse Class CC)	4.5 A (Time Delay Fuse Class CC)
Max. Running Current with Heating Option	10.5 A	5.3 A	2.7 A
Short-Circuit Current rating (SCCR)	5 kA	5 kA	5 kA
Certifications	cULus	CE, cULus	CE, cULus

Cooling Data	DTS 5541	DTS 5561	DTS 5581
Cooling capacity A35°C(95°F)/A35°C(95°F)	2600 W / 8900 BTU/h	2370 W / 8100 BTU/h	
Cooling capacity A35°C(95°F)/A50°C(122°F)	1900 W / 6480 BTU/h	1700 W / 5800 BTU/h	
Optional at time of Order: Heating capacity (Q0) A-15°C(5°F)/A20°C(68°F)	1500W / 5200 BTU/h		
Refrigerant type / Refrigerant amount	R-513a: 700 g / 24.7 oz.		
Adjustable thermostat setting LP2 (factory setting)	+25°C-45°C / +77°F-113°F (+35°C / +95°F)		
COP / EER A35°C(95°F)/A35°C(95°F)	1.88 / 7.43		
COP / EER A35°C(95°F)/A50°C(122°F)	1.18 / 4.07		
Failure indication: Enclosure internal temp. (factory set)	> +50°C / +122°F		
Ambient air temperature rating	-25°C / -13°F . . . +55°C / +131°F		
Max. External Air Circulation	1315 m³/h / 774 CFM		
Max. Internal Air Circulation	886 m³/h / 521 CFM		
Condensation discharge	active evaporation tray; Condensate overflow via hose		
Physical Specifications			
Height	1073 mm / 42.24 inch	1073 mm / 42.24 inch	1073 mm . 42.24 inch
Width	300 mm / 11.81 inch	300 mm / 11.81 inch	300 mm / 11.81 inch
Depth	359 mm / 14.13 inch	485 mm / 19.1 inch	
Weight (230V models are 5.1 kg / 11.3 lb lighter)	52 kg / 115 lb	53.5 kg / 118 lb	
Unit construction	Electrostatic powder coated G90 Galvanized Steel		304 Stainless Steel
Protection classification (against the enclosure, under correct operating conditions)	Type 12 , IP 54 (EN 60529)	Type 3R/4 , IP 55 (EN 60529)	Type 4/4X, IP 55 (EN 60529)
Electrical Data			
Voltage (All SIngle Phase)	115V 1Φ	230V** 1Φ	400/460V 1Φ
Mains frequency	60 Hz	50/60 Hz	50/60 Hz
Operating range	103 V .. 127 V	207 V .. 253 V	360 V.. 440 V / 414 V .. 506 V
Power consumption @ A35°C(95°F)/A35°C(95°F)	1275 W		
Nominal Running Current	12.9 A	6.4 A	3.2 A
Maximum starting current	46 A	23 A	11 A
Recommended Maximum Fuse Size	20 A (Time Delay Fuse Class CC)	10 A (Time Delay Fuse Class CC)	5 A (Time Delay Fuse Class CC)
Max. Running Current with Heating Option	16.8 A	10.1 A	5.1 A
Short-Circuit Current rating (SCCR)	5 kA	5 kA	5 kA
Certifications	cULus	CE, cULus	CE, cULus

3 : ASSEMBLY AND INITIAL COMMISSIONING

Safety Information



DANGER

Danger of fatal injury due to electric shock

- Parts may be under voltage when the unit is opened and can cause an electric shock if touched.
- Observe the following points when working on the open unit:
  - Work on the electrical system may only be carried out by authorized electricians.
  - Before commencing work on the electrical system, switch off the power supply, check that no voltage is applied.
  - Secure against being switched back on.
  - Cordon off the working area and post a warning sign.
  - The electrical connection must be made according to nationally valid regulations.



CAUTION

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.



NOTICE

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.

3.1 Storage

- Do not expose the cooling unit to temperatures below -40°C or above +70 °C during storage.
- Unit must be in the upright position.
- The warranty will no longer apply if these instructions are not observed.

3.2 Transport

WARNING

Hazards due to uncontrolled movements

Improper securing of the unit can result in severe accidents.

- Loading must only be carried out by trained, qualified personnel.
- Lash the unit correctly for transport on a truck or trailer.
- Only use lashing straps with an adequate rated strength.
- Use slip-resistant materials for securing, e.g. anti-slip mats.
- When loading by crane, do not walk or stand under the raised units

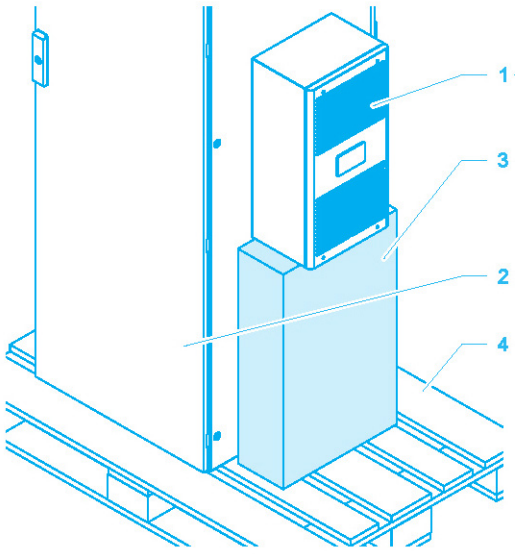
NOTICE

Danger of material damage during transport and setting down of the units.

- Improper device securing or uncontrolled movements can cause damage.
- Exercise maximum caution during movement and transport of the units.
- See Technical Data for unit weight.

Requirements:

- Cooling units must be in the packaging provided by the factory, banded to pallet.
- Unit must be in the upright position.
- If the unit is being shipped after installation to an enclosure, it shall be packed with a support to prevent mounting failure see figure below.



1	Cooling unit
2	Enclosure
3	Support structure made of squared timber or boards
4	Palette large enough to prevent tipping

REQUIRED TOOLS AND MATERIAL:

- Lashing straps, loading crane, if applicable

PROCEDURE:

- Always raise cooling units by the pallet they are secured to from the factory.
- Always raise cooling units slowly and evenly and set down safely.
- Secure correctly for transport with lashing straps.
- Verify no physical damage to cooling unit.

Crane transport:

DANGER

Danger to life due to suspended loads. Tipping or falling loads. Can cause severe to fatal injuries.

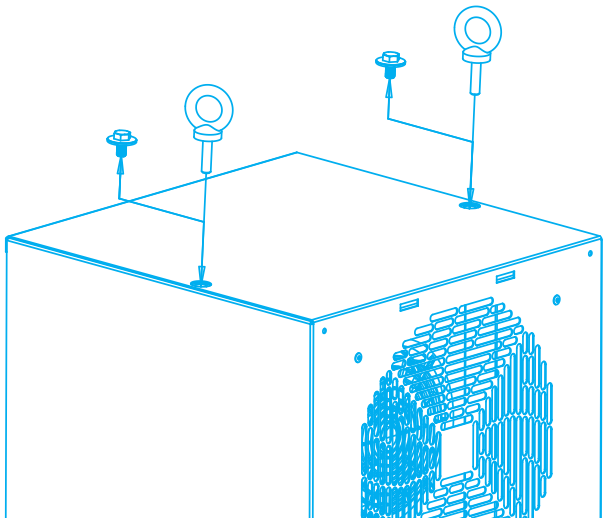
- Never stand beneath suspended loads.
- Only use approved lifting gear and slings which are designed for the total weight of the attached load.
- Only use slings/load handling devices in technically perfect condition.
- Observe the sling points and center of gravity of the load.
- Secure loads with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

WARNING

Risk of injury due to improper crane transport. Moving switch cabinets with integrated cooling units can lead to accidents.

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

Note: Be sure to replace the torx star drive screws and sealing washers.



3.3 Unpacking

WARNING

Hazard of accidents due to the heavy weight of the units

Uncontrolled movements of the units during assembly can cause accidents.

- Use suitable lifting equipment and secure units to prevent accidents.
- Secure assembled components.

CAUTION

Hazard of injury due to sharp edges

- For manufacturing reasons, the metal edges of the unit may have burrs.
- Wear gloves during service and assembly work.

NOTICE

- Perform a visual inspection for transport damage when unpacking the cooling units. Take note of any loose parts, dents, scratches, visible loss of oil etc.
- Inspect and secure the packaging material for any loose functional parts before disposal.
- Report any damages to the freight carrier immediately. Observe the “Terms for Cases of Damage”.
- When reporting, use precise information about defects, including possible photos must be provided for the handling of warranty claims. Always specify the type designation and serial number.

Unpacking Procedure:

- Cut banding straps.
- Remove staples from bottom.
- Pull box sleeve up and off the unit.
- Remove protective cardboard collar, careful not to damage interface gasket.
- Employ team lift, or replace the bolts on the top of the unit with the bolts from the access pack to use a crane, to lift the unit out of the bottom packaging and off the pallet.

3.4 Assembly

CAUTION

Hazard of crushing during assembly of the unit

There is a hazard of crushing between the switch cabinet and frame of the unit during assembly.

- Keep body parts out of the space between the frame and unit cut-out.
- Work carefully and wear gloves.
- Employ crane or team lift to position unit.
- Secure the cabinet against tipping.
- If mounting on a door, the hinges must be able to support the weight of the unit in the open position.

3.4.1 General Assembly Requirements

- Select an assembly location for the switch cabinet which will guarantee adequate ventilation of the cooling unit.
- Installed components in the switch cabinet must not impede air circulation.
- Protect the installation location from heavy contamination with covers.
- Inside of the switch cabinet a minimum clearance of 200mm between the back of the cooling unit to the nearest component must be observed to prevent obstruction of airflow and allow access to electrical panel of cooling unit during service and maintenance.
- If ducting is used, contact Pfannenberg for information
- Installed location should not be accessible to the general public.

Make cut-outs for the DTS cooling unit

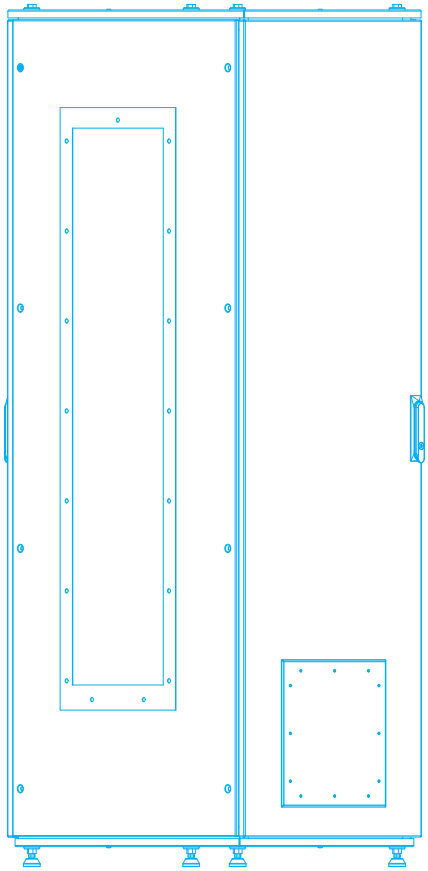
REQUIRED TOOLS AND MATERIAL:

- Saw or switch cabinet cutter
- Drill and 3/8” (10mm) drill bit
- Protective covers
- Accessory kit: Threaded bolts, screws, nuts, washers, cut out template. Eye bolts optional for crane lift option.
    - o 1:1 scale PDF and STEP file type of cutout could be downloaded on www.pfannenbergusa.com

PROCEDURE

Cabinet Cut Out

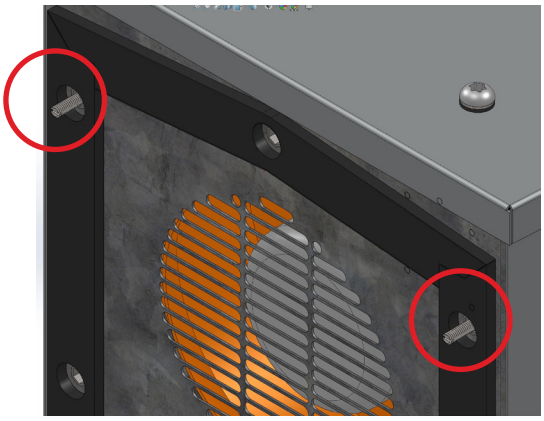
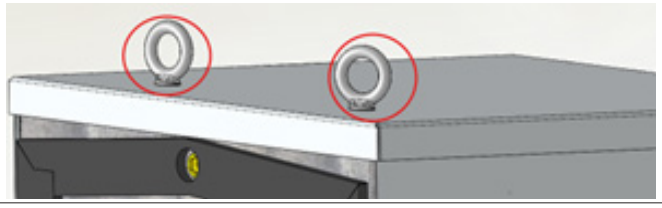
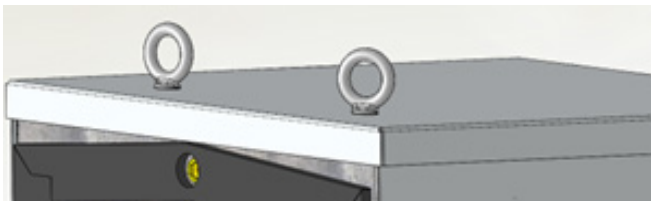
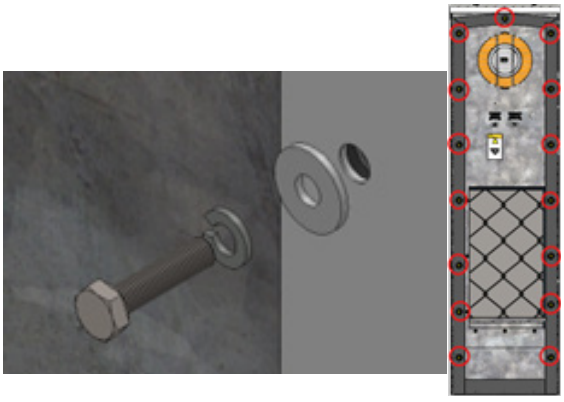
- Use a protective cover to protect the switch cabinet from chips.
- Use the provided template to mark the prescribed cut out. Check for level square and center, if applicable.
- Cut along lines and drill holes at center points.
- Deburr the cut edges.
- Remove chips and assembly waste from the switch cabinet



DTS 5000 SERIES COOLING UNIT INSTALLATION

REQUIRED TOOLS AND MATERIAL

PROCEDURE

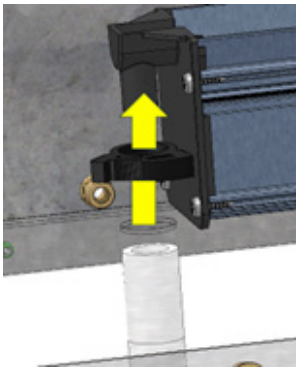
• Screw in the two supplied threaded studs (accessory kit) in the upper fastening points of the DTS cooling unit	
• Follow crane lift instructions for eye bolts, or team lift into position. • Be sure to replace the bolts and washers removed to ensure stated IP protection.	
• Suspend the cooling unit on the switch cabinet with the threaded studs installed from outside. • Install flat washer, lock washer and nut to each stud.	
• Thread and tighten the screws on the DTS cooling unit onto the switch cabinet interior. Use the supplied screws, nuts and washers (accessory kit) to fasten the unit. Firmly tighten the screw fasteners to 12 ft · lbf, or until gasket is tightly compressed.	

CONDENSATE DRAIN HOSE INSTALLATION

NOTICE

Unit comes standard with an active condensate management system which collects and burns off normal amount of condensation. In situations where excessive condensation is formed condensate may drain from unit and cause slippery conditions.

- Be sure to install condensate drain tube to collect or manage water draining from unit.

• Remove covers screws (x2 small screws. X2 small washers, x8 large screws) to lift or tilt up bottom of cover **CAUTION** • If completely removing cover, grounding cable must first be disconnected from the tab attached to the cover, to avoid damage to the cable connection. • Use plyers to pull connection from its base.	
• Push the plastic tube through the hole in the baseplate, and the hose clamp. Then push the tube over the nipple on the condensate tray.	
• Position hose clamp over the nipple so that there is still some tube showing at the end. Squeeze hose clamp by its tabs so that it is tight and secure to the nipple.	

- Re-install cover.

NOTICE

- Be sure to reconnect display and cover grounding wire if removed.

- **The DTS cooling unit is now fully installed and ready for electrical connection; see Electrical connection.**

3.5 Electrical Connection

3.5.1 Main supply connection

DANGER

Danger of fatal injury due to electric shock!

- Work on electrical connections must be carried out exclusively by trained, qualified electricians
- Equipment grounding must be provided in accordance with NFPA 79 chapter 8.2 or DIN EN 60204-1, chapter 8.2.
- Each element of electrical equipment must be connected to the equipment grounding.
- If parts are removed, e.g. for maintenance work, ensure that equipment grounding is not interrupted for the remaining parts.

Electric arcing can cause electric shock and burns.

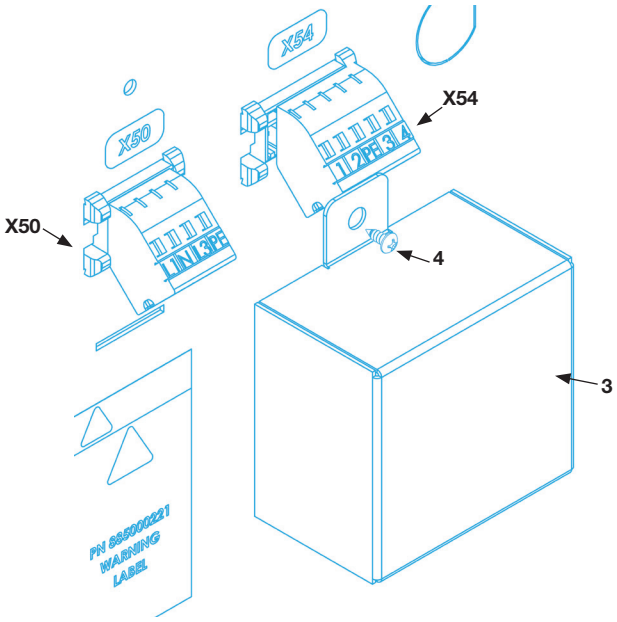
- The plug connector for mains connection must never be plugged in or disconnected under load/voltage.
- Before assembly, de-energize all supply lines to the separate fuse or a main switch, disconnect the system and secure to prevent re-connection of the Cooling unit electrical connection
- Switch off 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!

An incorrect cable cross-section will cause the cable to overheat. Scorched insulation can cause fires.

- The cable cross-section matches the output required for the power consumption and is 1.5 – 2.5mm² or AWG 16 to AWG 14.
- Applying incorrect power will void warranty and can cause operational issues.



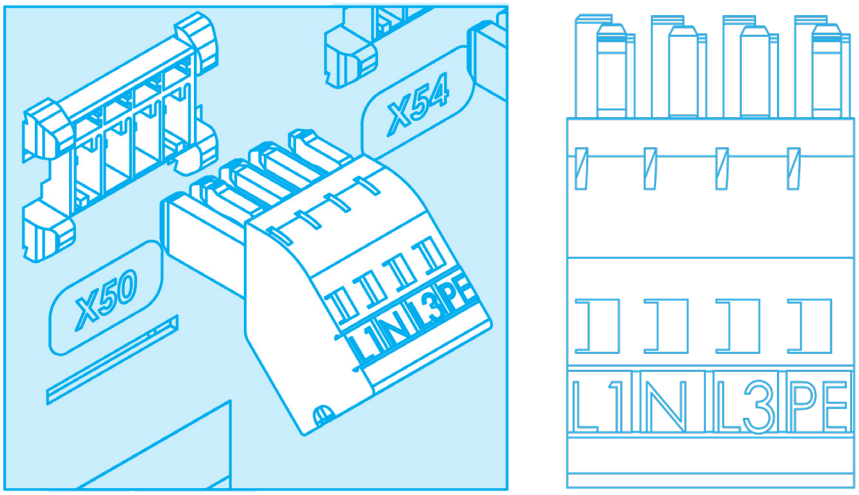
X50	Mains power strip X50	3	Strain Relief Box with Romex Clamp
X54	Fault Signal & Poor Contact Plug	4	Fastening screw

Electrical connection of the cooling unit

The device corresponds to overvoltage category II.

Follow these general requirements to ensure safe and reliable operation of the cooling unit:

- Connection of an upstream temperature control on the feed side is prohibited.
- Connect the fuse or circuit breaker specified on the type plate as line protection to the voltage mains.
- Always connect the cooling unit to the mains via a disconnecting device (switch/contactor).



Refer to Connection Diagrams:

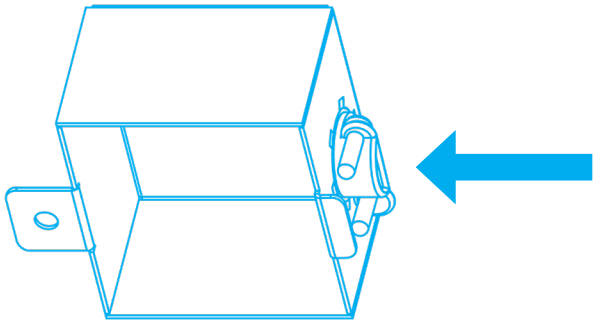
	115V	230V	460V
L1	L	L/L2	L1
L2/N	N	L2/N	L2
L3	N/A	N/A	N/A
PE	⏚	⏚	⏚

Procedure

1. Connect to the mains according to the circuit diagram, see chapter “Electrical circuit diagram”, Page 25.

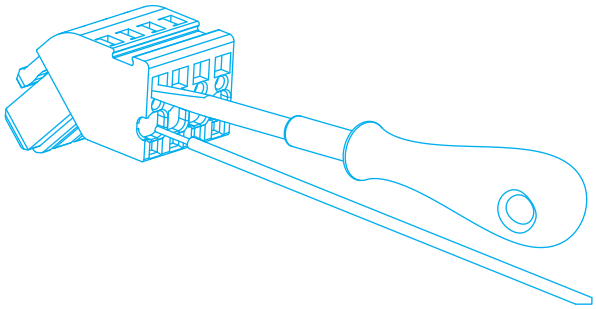
2. Use at minimum 14 AWG wire. Strip insulation back 1/2” to 9/16” or 13 – 15mm from ends.

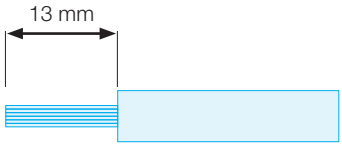
3. Assemble Romex clamp to the strain relief box and feed the cable through the clamp so that the connector side will be inside the box.



4. Open the cage clamp terminal of the mating plug with the flat screwdriver and connect the cables on the mating plug according to diagram in page 22.

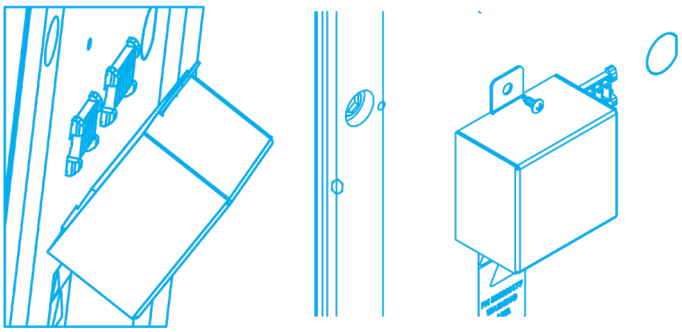
– Firmly insert the screwdriver into the cage clamp terminal. Never turn, this will damage the cage clamp terminal.





5. With power switched off, plug the mating plug into the mains plug at X50.

6. Secure the strain relief box to the unit with the slot and sheet metal screw. Tighten the Romex clamp. Leaving some slack inside the box.



7. Before switching on, make sure that the mains voltage and upstream fuse matches the data on the type plate.

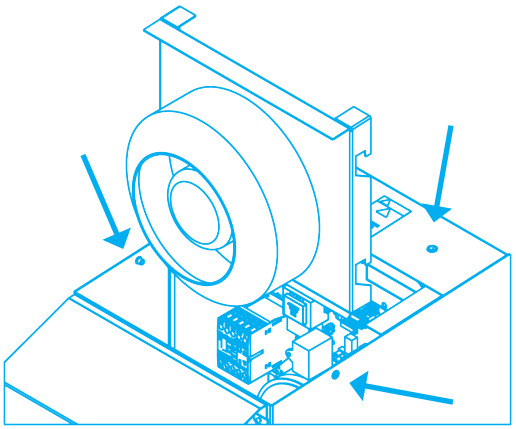
8. The cooling unit is now connected electrically, but not operational. See section 3.5.3 door contact switch to complete the wiring of cooling unit.

400/460V voltage selection

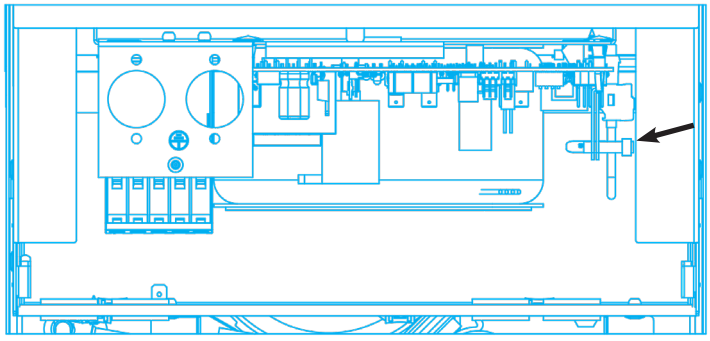
*for units rated for 400/460V the unit comes ready to transform down from 460V input from the factory. To switch to 400V input, do the following:

1. Remove unit cover top hat, 4 screws.

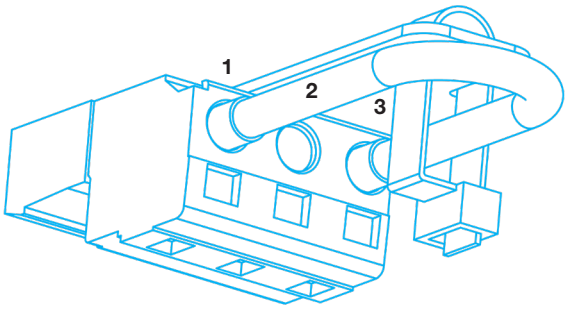
2. Lift the fan bracket up and remove it; there should be no need to disconnect any of the fan wiring. Carefully place the fan on top of the unit.



3. Looking down in the electrical panel, locate the yellow voltage-jumper tag. Pull the connecter attached to the tag straight away from the panel to remove it.



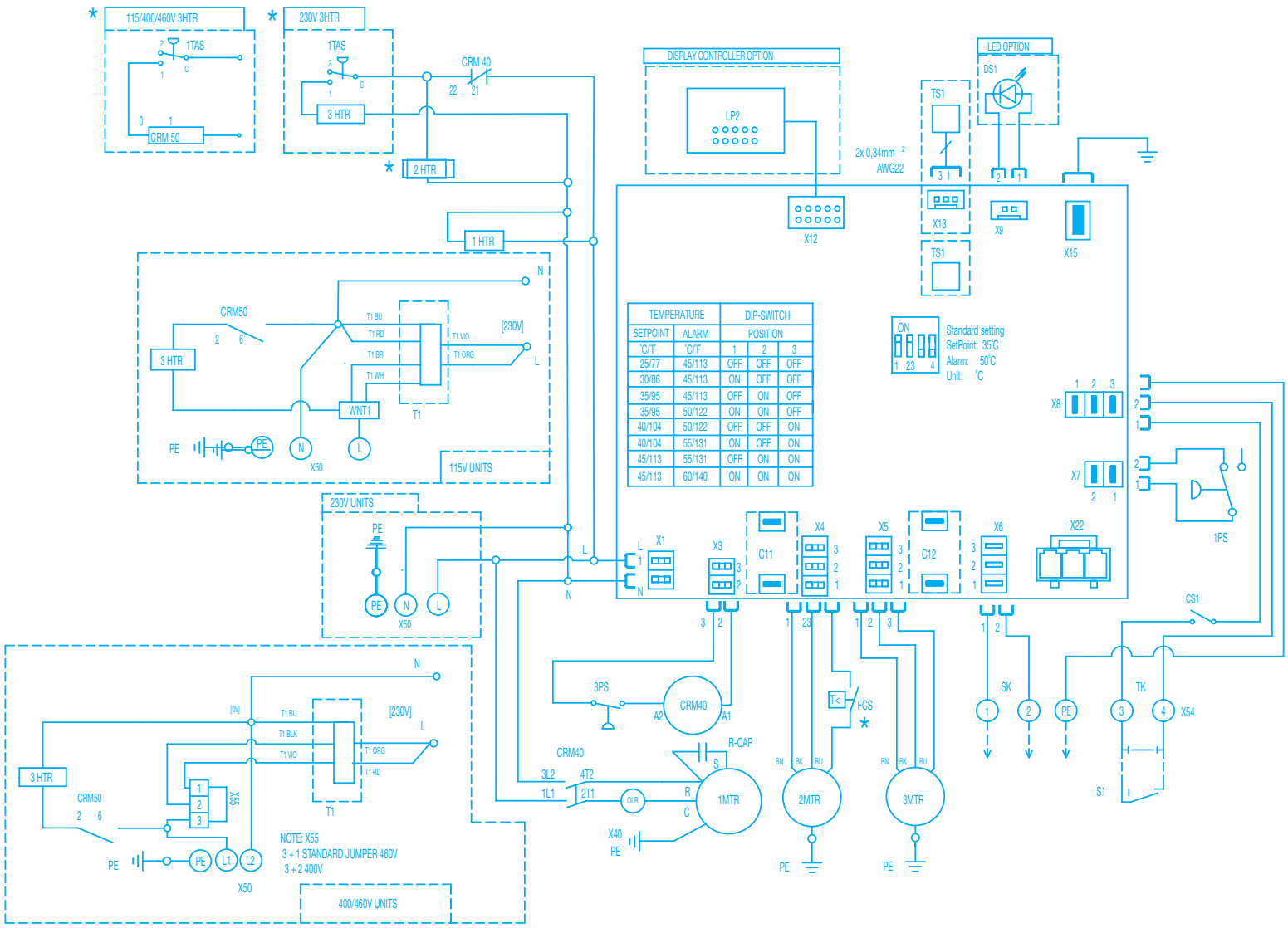
4.Open the cage clamp terminal of the jumper connecter at “1” and pull out the wire and move the wire over to “2” using the cage clamp as show on the previous page.



1 & 3	460v
2 & 3	400v

5. Plug connecter back in and reassemble fan and cover top hat.

3.5.2 Electrical circuit diagram DTS 5000 115V/230V/460V



Circuit Diagram Legend					
2CAP	Evaporator run capacitor	1HTR	Condensate evaporating heater	S2	Door contact
CRM20	Compressor Sump Heater	2HTR	Compressor sump heater	TS1	Thermostat
CRM40	Compressor Relay	3HTR	Heater (options only)	X40/42	Earthing Connection
1PS	High Pressure Switch	LP1	PCB	X50	Power Supply
2PS	Fan Cycle Switch	1MTR	Compressor	X54	Door Contact
3PS	Low Pressure Switch	2MTR	Condenser Fan	S1	Start Cap.
1DS	Operating Indicator	3MTR	Evaporator Fan	K1	Potential Relay
		CS1	Cover Switch	R-CAP	Run Cap.

3.5.3 Door Contact Switch

WARNING

Hazard due to connection of external voltage at the input of the door contact

External voltage can cause severe accidents.

- Connection of external voltage to the input for the door circuit will cause damage to the unit.
- Installation of a door contact switch increases safety and prevents increased accumulation of condensate.
- If a door contact switch has not been connected, the connection contact (X54 / S1) must be jumped with the 16AWG supplied in access pack.

Fitting a door contact switch increases safety and prevents increased condensate formation. The door contact switch switches off the cooling unit motors (fan, compressor) when the switch cabinet is opened. The door contact switch must interrupt the connection between the terminals X54:3 and X54:4 when the switch cabinet door is open.

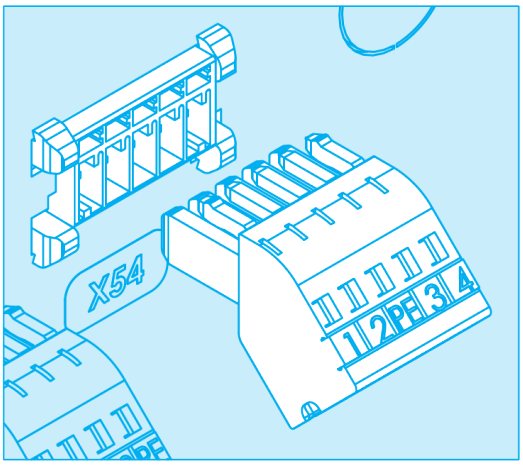
Door contact switch installation

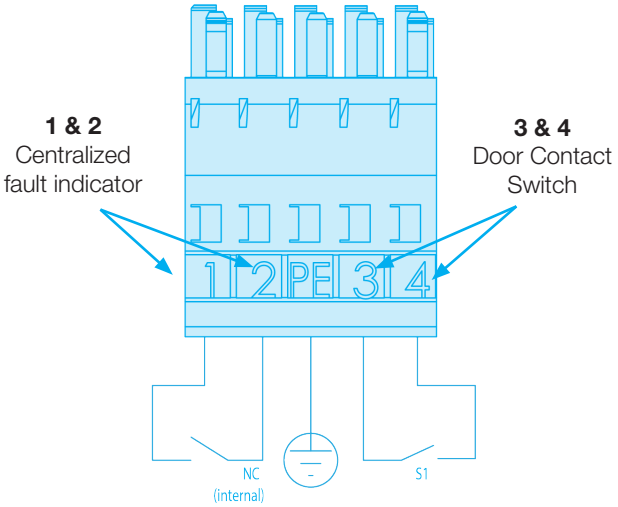
REQUIREMENTS:

- The cooling unit is de-energized.

PROCEDURE:

- The cabinet door contact switch - S1 (not included with unit) should be connected to the X54 connection at 3&4
- The door contact is supplied with low voltage from the control board on DTS 5000 series units.
- When wired correctly, the fan and compressor switch off if the cabinet door is opened.
- If a door switch is not present, install the cable provided in the accessory bag to jump between 3 & 4 to a complete the circuit allowing normal operation of the cooling unit





3.5.4 Centralized Fault Indicator

- On the same plug as the door contact (X54), connections at 1 & 2 can be used to connect a fault signal line.
- The alarm circuit inside the unit is normally closed (NC) and will open when a fault is present.

WARNING

- Fault connection points may be connected to a live electrical line with a maximum 230V, 5A.

4 : OPERATION

4.1 General Functions



NOTICE

Danger of damage to the cooling unit

- Operation without the unit cover prevents the adequate supply of air to the condenser, and limits stated capacity.
- Only operate the cooling unit with the unit cover installed.
- The ambient temperature must be less than 55°C.

4.2 Operation of the cooling unit

- After connection and switching on of the mains voltage, the device switches to test mode.
- 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
- The cooling unit is equipped with an electronic control unit. A temperature sensor detects the temperature of the air sucked in from the interior of the switch cabinet.
- All unit motors switch off when the door contact is opened.
- If the upper or lower limit temperature is exceeded or undercut, a fault indication is triggered.
- See LED Indicator for fault type, see troubleshooting section.

Operating conditions

- The mains voltage must lie within the specified range.
- A deviation of ± 10 % is permissible.
- The ambient temperature must be below 55°C.
- The cooling unit must only be used in such a manner to ensure that the specified cooling capacity is able to meet actual demands.
- Only the specified refrigerant may be used.

4.3 Testing full functionality

All Pfannenberg cooling units are factory tested for function of all components. The following are for the installer or end user to verify the full functionality of the unit.

1. Remove the cover top panel
2. With unit powered on and the door switch circuit jumped remove the thermosensor connection at X13 at the top of the circuit board.
3. This will trigger a fault mode where the unit will go into full cooling mode with the external fan and compressor running.
4. Be sure to reconnect the thermosensor and include the sealing washers when re-installing the top cover.

OR

With unit powered on and the door switch circuit jumped, the unit is in normal operating mode, the internal fan will run continuously. Apply a heat load (i.e. heat gun) to the internal fan inlet. Once the internal air circuit exceeds the cooling setpoint, the cooling unit should cycle full out.

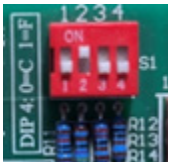
If both fans and compressor are not functioning. Contact your Pfannenberg service representative, or refer to the troubleshooting section of this manual.

4.4 Adjusting Set Points

To adjust the setpoint and over temp alarm of the cooling unit perform the following steps for your type of unit.

4.4.1 LED Unit:

1. Remove the cover top as shown in section 4.7.2.
2. Locate the DIP switches on the top of the circuit board.
3. Refer to the following table of DIP switch combinations for setpoint and over temp alarm. Note: This can be done to change the default settings on display units as well.



Switch down	= o
Switch up	= 1

Setpoint (°C/°F)	Alarm (°C/°F)	DIP switch configuration (the fourth switch is for the units displayed)
25/77	45/113	0000
30/86	45/113	1000
35/95	45/113	0100
35/95	50/122	1100
40/104	50/122	0010
40/104	55/131	1010
45/113	55/131	0110
45/113	60/140	1110

See the following section for adjusting settings on Digital Display units.

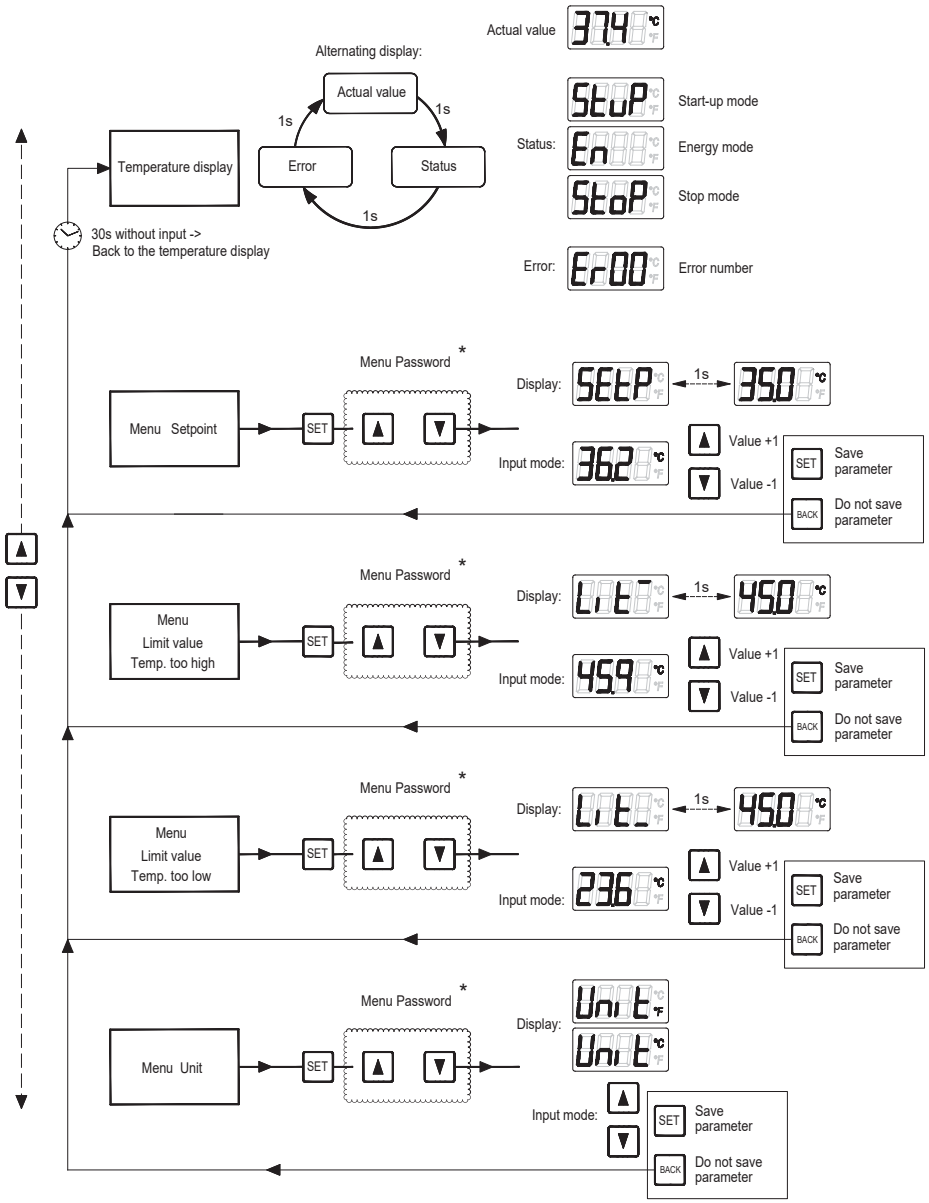
4.4.2 DISPLAY unit

The LCD display will show the internal temperature during normal operation. The following setting are available to modify by scrolling using the up and down arrows.

- SETP : Temperature setpoint
- Lit ¯ : Maximum temperature
- Lit _ : Minimum temperature
- Unit : Display in °C or Fahrenheit

To change these, when scrolled to the desired setting, press “set” and enter the menu password: The default password is press the up arrow for less than 2 seconds and then down arrow for less than 2 second. Then the operator will be able to adjust the parameter with the up and down arrows, pressing set to save the parameter.

The following outlines the Digital Display menu logic



4.5 Service and Maintenance

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”. Shorter maintenance intervals are required for cooling units exposed to ambient air containing oil and dust. A shorter guide value of two to six months applies these cases.
- Pfannenberg add-on filters are designed to fit the cooling unit and have a positive effect on the scope of cleaning maintenance.



DANGER

Life-threatening hazard due to electric shock

- Live units and exposed connection cables can generate an electric shock and cause severe accidents.
- Work on electrical connections must be carried out exclusively by trained, qualified electricians.
- Before working on the unit, de-energize all supply lines to the separate fuse or a main switch, disconnect the system and secure to prevent re-connection.
- Test to ensure the absence of voltage on the unit.



CAUTION

Hazards of crushing during removal of the unit cover

- Hands and other body parts can be crushed during removal and re-installation of the unit cover.
- Keep body parts out of the space between the frame, springs and unit cut-out.
- Work carefully and wear gloves.



NOTICE

Danger of unit damage due to incorrectly performed maintenance

- Disregard of the recommended maintenance work reduces the cooling capacity of the cooling unit and could result in reduced machine availability.
- Maintenance work must be carried out regularly, as specified in the maintenance checklist.
- Warranty claims are only valid for units that have been maintained according to specification.

4.6 Maintenance checklist template

Cooling Unit Maintenance Checklist

Maintenance Interval:

- Conduct maintenance every twelve months.
- Conduct maintenance every two to six months in oil and dust-laden environmental air.

Type: _____

Serial number: _____

Date of maintenance: _____

Technician: _____

	Unit range designation/ Required maintenance tasks	Visual inspection	To Do	Result
1	**Assess before maintenance**			
1.1	General visual inspection of the cooling unit			
1.2	Inspection for corrosion damage			
2	**Refrigeration circuit**			
2.1	Check refrigerant carrying parts for oil traces			
2.2	Check refrigerant carrying parts for leaks			
2.3	Check electrical connections for damage			
3	**Condenser & passive heat exchanger**			
3.1	Inspection for general corrosion damage			
3.2	Inspect for blockage from contaminants			
3.3	Check, clean and align fins*			
4	**Condenser fan (external)**			
4.1	Inspect mount for loose parts			
4.2	Inspect the electrical connection for damage			
4.3	Check motor bearings for noises			
4.4	Check the drive for signs of overheating			
4.5	Clean fan*			
5	**Evaporator fan (internal)**			
5.1	Inspect mount for loose parts			
5.2	Inspect the electrical connection for damage			
5.3	Check motor bearings for noises			
5.4	Check the drive for signs of overheating			
5.5	Clean fan*			

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

4.7 Removing and Installing Cover

WARNING

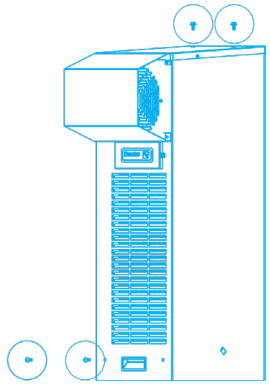
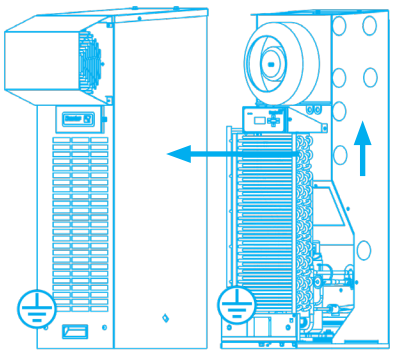
Hazard due to improper maintenance work

Damage of components and faulty replacement of components can cause accidents.

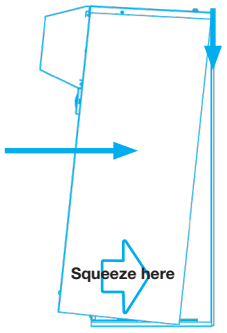
- Always switch off the disconnector/contactor before beginning maintenance work.
- Wait For unloading phase of 5 minutes for the electric components, to open unit cover.
- Ensure that the fans are in idle position and are no longer rotating.
- After replacement of defective parts or components, inspect the unit for correct and safe operation.
- After all maintenance check to ensure the full capability of the condensate drain.
- Condenser coil may be as hot as 80°C (176F) after running for extended periods. Wait to cool before operating in it's space.

4.7.1 Procedure: remove cover

1. See illustrated procedure for cover removal in the condensate hose installation section.
2. Remove the (2) T30 Torx Screws and (2) hex screws on top of the unit cover. Do not lose gasket washers.
3. Lift the unit cover about 15 mm
4. Pull the cover off, away from enclosure
   ATTENTION – Damage to grounding cable
   Always pull off the grounding wire from the inside of the unit cover before fully removing the unit cover.
5. Re- Installing: move the cover into position and connect display and grounding connections. Be sure that they do not get caught in the cover. Be sure to engage the side hook lance.
6. Replace cover and be sure to hook the flange on the front of it over the unit. Then line up and re install the 2 hex screws and 2 sealing washers on top.

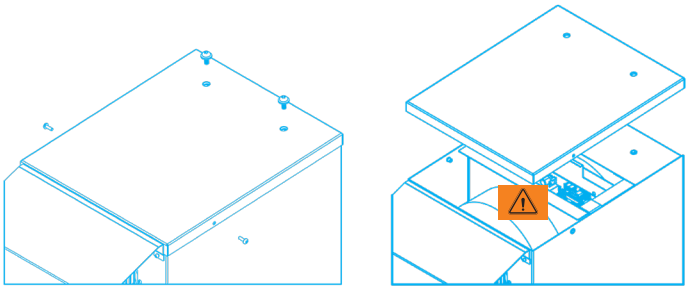
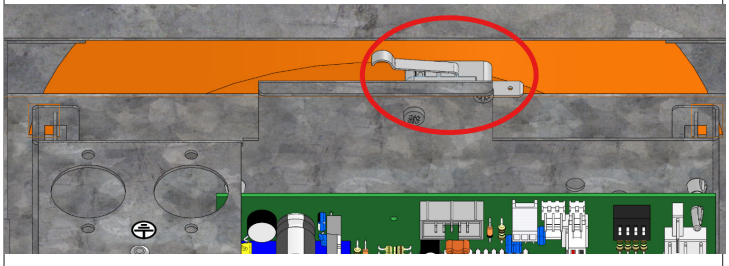
1. Identify the four T30 torx screws on the front and top of the cover and remove them. Do not lose gasket washers.	
2. Lift the unit cover up to clear the lip over the top and pull the cover away from the unit. Detach the grounding cable from the left side of the unit base or the bottom of the cover.	

Procedure: re-install cover

4. Re- Installing: move the cover into position and connect grounding cable. Be sure to not get it caught in the cover.	
5. Place cover over the unit so the lip on the top is over the internal side. Pull back on the lower part of the cover and squeeze the sides in while pushing it forward to engage the side hook lances	
6. Fasten the cover with the four T30 torx screws on the front and top of the cover. Be sure to use the gasket washers on top.	

4.7.2 Procedure: remove cover top only

There are a few procedures that require only access to the top of the unit for maintenance and installer modification/testing. This outlines how to remove only the cover top to access the control panel and the fans.

Remove the two T30 screws on the top of the unit and the 2 T20 screws on the side of the top cover. Then pull the cover top off. **WARNING** The removal of this cover exposes the external fan. Performing any procedure with the power on with this cover removed imposes risk of injury when/if the fan turns on.	
The unit is equipped with a cover switch designed to enhance operator safety. This switch automatically disables the fans when the top cover is removed, preventing accidental contact with moving components. Please note that while the fans will be shut off, the unit still has live power connected to the unit and power should be turned off or disconnected completely while servicing the unit.	

4.7.3 Cleaning fans and heat exchanger

Hazards of accidents due to component damage during cleaning

Cleaning of cooling units with water jet, steam jet, high-pressure washer or sharp objects can damage the electrical and electronic assemblies. Malfunctions can cause accidents.

- Do not clean with a water jet, pressure washer or flammable cleaning agents.
- Protect electrical components from the penetration of moisture.
- Do not use pointed or sharp-edged objects to clean the fins.
  They must not be pinched or damaged.

Procedure

1. Clean heat exchanger fins and condenser fan with a soft brush,
   with compressed air or with a vacuum cleaner with brush attachment.

CAUTION

CAUTION: risk of injury. Do not touch the sharp heat exchanger fins.

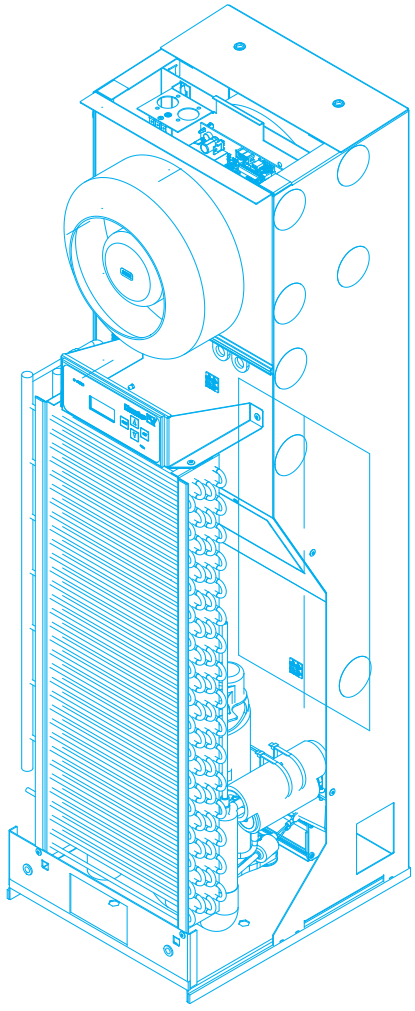
CAUTION: dust development when cleaning with compressed air.

Wear eye, mouth and nose protection when cleaning with compressed air.

2. Check heat exchanger for bent fins; straighten fins with fin comb.

3. Refit the unit cover.

4. Check that the cooling unit works properly and safely after cleaning.



5 : TROUBLESHOOTING

General

Fault	Possible causes	Corrective measures
Unit does not cool; evaporator fan (internal) running	Temperature setting too high	Check the temperature setting
Unit does not cool sufficiently	Operating limits exceeded	Check the ambient temperature and internal load
	Too little refrigerant	Call in authorized qualified personnel; check the unit for leakage
	Heat exchanger dirty	Clean the heat exchanger
	Evaporator fan (internal) defective Condenser fan (external) defective	Call in authorized, qualified personnel; replace fan
	Disruption in the air circulation inside the cabinet	Check the installation and the path of air circulating in the switch cabinet
		Check air flow path of the outlet and return air of the cooling unit and the air paths through the cooling unit
Excessive Condensation is accumulating inside of the switch cabinet	Temperature setting is too low	Check the set point value
	Switch cabinet is not sufficiently sealed	Check that electrical enclosure is properly sealed to prevent ingress of humidity
Condensate fails to drain	Condensate drain is clogged	Clean condensate drainage hose; ensure that drainage hose is angled downward without bending

5.1 ERROR CODES

Standard cooling units in this series do not display errors, the green LED on the front of the unit (solid under normal operation) will blink indicating an error. Refer to the **Unit Behavior** in the table below to diagnose the fault condition.

Units with the LCD Digital Display on the front of the unit will display the Error number and flash.

NOTE: Flashing of the red LED light on the controller card is not a fault indication or error message. The red LED light indicates that the cooling unit is carrying voltage.

Error no.	Fault / Unit Behavior		Possible Causes	Corrective Measures
Er00	LED	Flashes	**Door contact:** The door contact circuit is interrupted.	Close the door. Connect the door contact switch. Bridge the door contact. Check wiring. Check the cover switch located beneath the top cover of the unit
	Compressor	OFF		
	Evaporator Fan (internal)	OFF		
	Evaporator Fan (external)	OFF		
	Fault Signal Contact	Closed		
Er01	LED	Flashes	**High pressure safety tripped:** Excessively high pressure has built up in the refrigerant circuit. The cooling unit cannot dissipate the heat from the refrigerant circuit.	Let unit cool, clean heat exchanger fins, check condenser fan.
	Compressor	OFF		
	Evaporator Fan (internal)	ON		
	Evaporator Fan (external)	ON		
	Fault Signal Contact	Open		
Er06	LED	Flashes	**Sensor 1 Minimum:** The minimum value of the switch cabinet temperature 'Lit_' has been reached or exceeded.	Select a higher switch cabinet temperature setpoint.Check switch cabinet for leakages. Move components located in the vicinity of the air inlet and air outlet further away to prevent an air short-circuit. (The cold air is deflected directly to the air inlet by components.)
	Compressor	OFF		
	Evaporator Fan (internal)	ON		
	Evaporator Fan (external)	OFF		
	Fault Signal Contact	OPEN		
Er07	LED	Flashes	**Sensor 1 Maximum:** The maximum value of the switch cabinet temperature 'Lit¯' has been reached or exceeded. The cooling unit cannot sufficiently cool the air in the switch cabinet.	Check settings of the cooling unit. Clean the fins of the heat exchanger (internal/external). Check the function of the evaporator fan (internal). Check the refrigeration circuit for spilled refrigerant or leakage. Install a cooling unit with a higher cooling capacity if necessary.
	Compressor	ON		
	Evaporator Fan (Internal)	ON		
	Evaporator Fan (External)	ON		
	Fault Signal Contact	Open		

6 : SPARE PARTS AND ACCESSORIES

WARNING

Spare parts from third-party manufacturers can damage the unit and cause accidents.

- Only original parts are subject to the manufacturer's quality control.
- Only use specially agreed manufacturer parts for safe and reliable operation.

Note: Always specify the Pfannenberg part numbers when ordering spare parts and accessory parts.

No.	Description	No.	Description
18886000028	Internal (DTS 55x1) and External Fan (DTS 55x1/53x1)	18881500016	Aluminum Mesh Filter for external fan
18840160021	Fan Capacitor 4.5µF	18881500021	Indoor Filter Kit DTS 5k GRAY (with bracket for non-rainhood units)
18511000007	Internal fan (DTS 54x1/53x1)	18881500022	Indoor Filter Kit DTS 5k LTGY (with bracket for non-rainhood units)
18884000004	Fan Capacitor 1.5µF (DTS 53x1 internal fan)	18310000004	Premium TTL-USB Converter, Service Interface
18800500186	PCB	18314000001	External Condensate Evaporation System-KV PTC, 115/230 V 50/60Hz
18830700018	Transformer	18314000100	Condensate Collection Bottle

7 : TERMS OF WARRANTY

The warranty does not apply or is voided in the following cases:

- Improper use of the unit.
- Failure to observe operating conditions or disregard of the operating manual.
- Lack of regular maintenance on the cooling units.
- Damage due to disregard of maintenance recommendations.
- Damage to cooling units due to soiled or clogged filters.
- Damage due to unauthorized opening of the refrigerant circuit.
- Modifications carried out on the unit or a change to the serial number.
- In the event of damage during transport or other accidents.
- Replacement of parts by unauthorized personnel.
- Only original Pfannenberg parts are permitted for use. Violations void the warranty.
- Applying incorrect power will void warranty and can cause operational issues.

For recognition of warranty claims and return of the unit, observe the following:

- Begin warranty claim by submitted a ticket at https://www.pfannenbergusa.com/service-request-form/
- Include a reference document (delivery note or invoice copy).
- Follow instruction provided by Pfannenberg, once ticket is started.
- Observe transport instructions; see Transport.

8 : 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.

DANGER

Danger of fatal injury due to electric shock!

Parts may be under voltage when the unit is opened and can cause an electric shock if touched. Observe the following points when working on the open unit:

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

8.1 Temporary Decommissioning

WARNING

Hazard of injury due to materials and substances

Improper work on the unit can be damaging to health.

- Always ensure that the unit is de-energized before working on the unit.
- The unit must only be disposed of by qualified personnel and in accordance with applicable environmental regulations.

If the cooling unit is no longer needed for a longer period, it must be disconnected from the voltage supply.

- Ensure that improper start-up by third parties is not possible.

8.2 Final Decommissioning

CAUTION

Hazard of crushing during the decommissioning of units

Hands and other body parts can be crushed during removal of units.

- Keep body parts out of the space between the frame, springs and unit cut-out.

If cooling units are to be definitively decommissioned or disposed of, the following must be observed:

- Applicable statutory regulations of the user country and environmental protection regulations must be observed.
- Refrigerant must be professionally extracted from the refrigerant system. Avoid refrigerant emissions.
- The cooling unit must only be disposed of by authorized, qualified personnel.
- Waste equipment can be disposed of correctly by Pfannenberg. Freight charges for delivery to one of our manufacturing facilities must be pre-paid.

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.

Risk of cutting and injury!

CAUTION

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

- Inspect unit for signs of corrosion damage.
- 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.

NOTICE

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

8.3 Dismantling

DANGER

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

Procedure

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

8.4 Disposal

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



NOTICE

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

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All information contained was thoroughly checked in 2026.
However, we make no guarantee as to the completeness and correctness of the specifications.

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