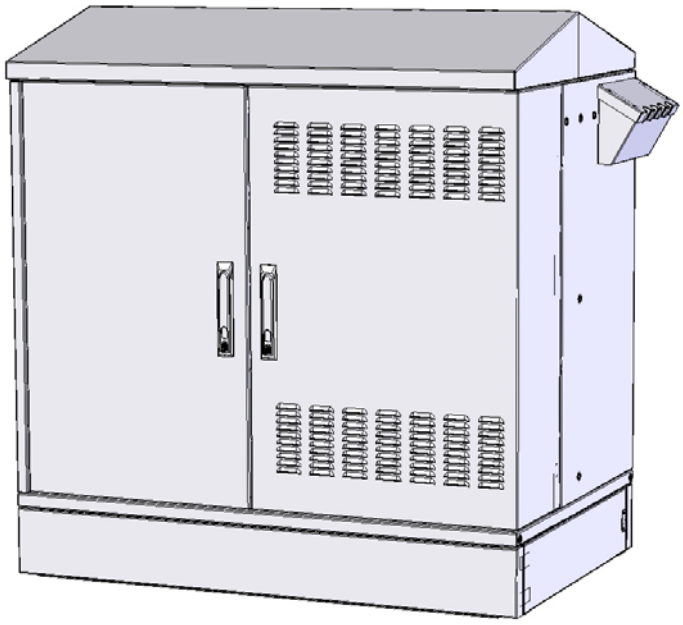
MTS2 Outdoor Solution

Service manual

EN

No. 039131 • rev. 1.0 • 06.06.2007



Introduction

Overview

Serial number

This manual covers Dantherm Air Handling units with serial numbers equal or higher than:

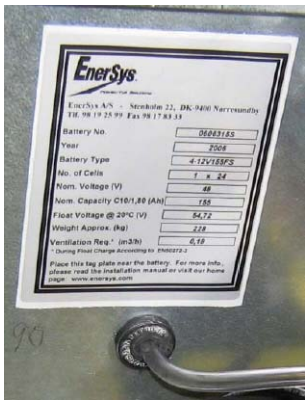
0609220899808

WARNING

It is the responsibility of the operator to read and understand this service manual and other information provided, and to use the correct operating procedures.

Read the entire manual before the initial start-up of the installation of the MTS 2-outdoor enclosure. It is important to know the correct operating procedures for the unit and all safety precautions to prevent the possibility of property damage and/or personal injury.

In case the MTS 2-outdoor enclosure is placed indoor in a closed room, the ventilation capability of the room should minimum be in accordance with the battery standard and battery manufactures recommendations.



This can be found on a label situated next to the batteries (when installed).

The requirement is 0.19 m^3/h.

When the cabinet is installed outdoor, no additional ventilation is required with required degassing kit installed (tube system from battery valve to exterior) through retaining grommet. Always check if this tube has not been damaged or removed.

Left bay of the enclosure above the power distribution panel offers a 19” rack system with 6RU available for auxiliary equipment.

It is important that any active component in the rack, including those components that will be installed later in addition to Dantherm’s deliverable, must have a self-protecting mechanism, which switches off the component in case of an overheat situation.

Further it is important that the heat dissipation of equipment installed do not exceed 100 W or max. permitted ambient temperature will have to be de-rated.

Table of contents

This service manual covers the following main topics:

Continued overleaf

General information, *continued*

Table of contents, ***continued***

General information

Introduction

This section gives the general information about this service manual and about the unit.

Manual, part number

Part number of this service manual is 039131.

Target group

The target group for this service manual is the technicians who install, maintain, and exchange parts on the unit.

Copyright

Reservations

Dantherm Air Handling A/S reserves the right to make changes and improvements to the product and the service manual at any time without prior notice or obligation.

MTS2-outdoor enclosure

CE

Dantherm Air Handling A/S, Marienlystvej 65, DK-7800 Skive hereby declare that the unit mentioned below:

MTS2 Outdoor solution, product no. 352890:

Description: MTS 2 outdoor solution is an outdoor cabinet or enclosure equipped for accommodating and servicing an MTS2 base station. The cabinet has multiple configurations ranging from a standard configuration with only a basic power distribution panel (CE marked) and a heat-exchanger (CE marked) up to a full integrated option list as defined in the service manual no 039131. Basis is equipped with a door mounted heat exchanger (352735)(std.)a battery installation capable of retaining 3 different VRLA size batteries (optional)a power distribution panel (CE-marked) and internal cables routing, cabin lights, battery charger, surge arrestors etc.

Items not listed in the service manual are not covered by this declaration.

- is in conformity with the following directives covering the provisions of the normative European Council Directives:

98/37/EEC	Directive on the safety of machines
73/23/EEC	Low Voltage Directive
89/336/EEC	EMC Directive

- and Manufactured in conformity with the following harmonized standard:

EN60529:2001	IP55* (Degree of protection provided by enclosures) kat.2 verified
EN 292	Machine safety
EN 60 950-1:2001+A11	Installation safety
EN50272-2	Battery installation
EN 61 000-2	Immunity
EN 61 000-3	Emission
EN 61 000-4	Immunity
EN 55022_Class B[*)]	Emission
	[*)] MTS 2 Outdoor Solutions" integrated with Motorola MTS 2 Base Station Type No. FR914B, FR917A or FT917B complies to EN 55022_Class A Emission
ETSI EN 300 019-2-1 T 1.2	Storage: not temperature controlled storage locations

Continued overleaf

General information, *continued*

MTS2-outdoor enclosure

CE, *continued*

ETSI EN 300 019-2-2 T 2.3
Transportation: public transportation
ETSI EN 300 019-2-4 T 4.1 (or T4.1E)
In use: non-weather protected locations
ETSI ETS 300 753
Acoustic noise

and furthermore declares that it is not allowed to put the machinery into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of above-mentioned Directives and with national implementing legislation i.e. as a whole, including the machinery referred to this declaration.

Skive, 28.02.2007

Managing director Per Albæk

Preben H Jensen
Project manager

Recycling

The MTS 2-outdoor enclosure is designed to last for many years. When the time comes for the unit to be recycled, the unit should be recycled according to national rules and procedures to protect the environment.

Product- and functional description

Overview

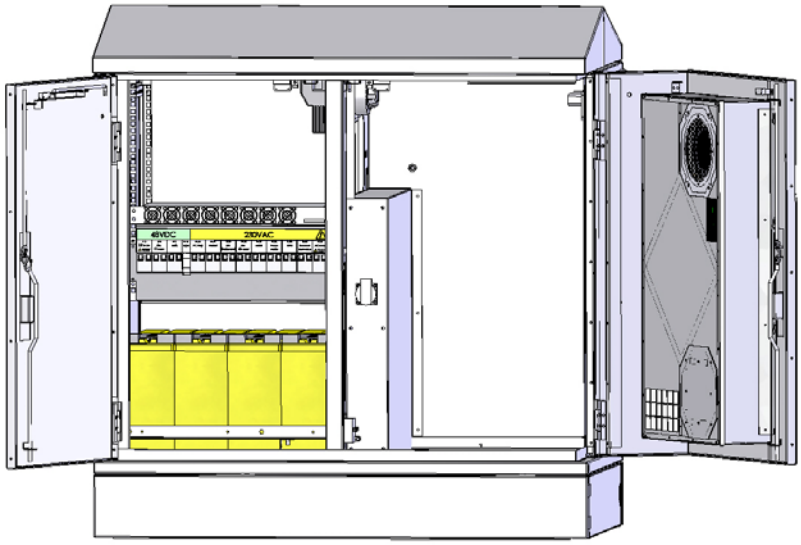
Introduction

This section will give you a product and functional description of both the heat exchanger unit and the MTS 2-outdoor enclosure.

A detailed description of the heat exchanger and the MTS 2-outdoor enclosure is to be found on the following pages.

Illustration

This illustrates the MTS 2-outdoor enclosure with the MHX 35 (heat exchanger unit) hanging on the right door:



Options

The MTS 2-outdoor enclosure might be equipped with one or more options. See a list of options on page 41.

MTS 2-outdoor enclosure

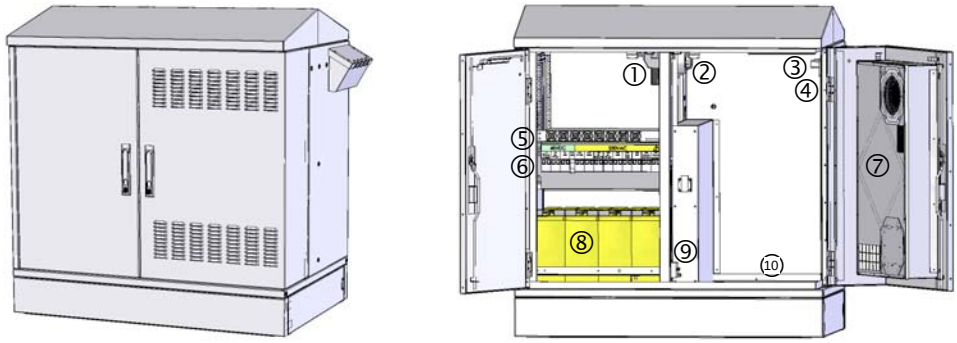
Introduction

This section will give you a description of the MTS 2-outdoor enclosure and its functionality.

The MTS 2-outdoor enclosure is designed to accommodate a Motorola MTS2 base station, which is further described by Motorola. More information is available, please contact Motorola.

Illustration

This illustrates the MTS 2-outdoor enclosure:



Part/function

This table gives information about the single parts of the MTS 2-outdoor enclosure.

NB: All parts marked with a star (*) are options!

Part		Function
①	Heater*	In case of cold external temperatures the heater supplies heat for the enclosure
②	Smoke detector*	Detects smoke and sends an alarm signal
③	GPS Surge arrestor*	Protection of the GPS equipment against lightening or excess voltage
④	Antenna Surge arrestor*	Protection of the receiver against lightening or excess voltage
⑤	External battery charger*	Quick charger for the batteries
⑥	Power meter*	Shows AC power consumption
⑦	Heat exchanger MHX 35	Cools down the electronics in the enclosure
⑧	Batteries*	Supplies backup time when power is unavailable
⑨	Data line Surge arrestor*	Protection of the data line against lightening or excess voltage
⑩	Manifold and three air guides*	Allows heat exchanger to take complete control of the air distribution in MTS 2 base station. Replaces standard fan trays

Power distribution panel

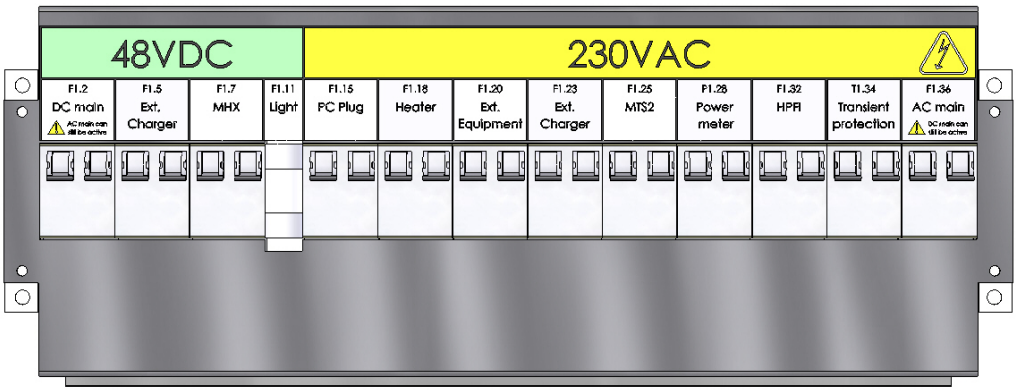
Introduction

This section will give you a description of the power distribution panel and its functionality:

Illustration

These illustrations give an overview of the power distribution panel which is build into the MTS 2-outdoor enclosure.

Please see section “References for the wiring diagrams”, page 39 for further references of the power distribution panel.



Description

The power distribution panel is for mounting to a 19” rack system and offers a 25 module DIN rail space, which is used for various circuit breakers rated to protect the consumer and further surge protection as well as a HPFI relay to protect for potential earth faults. Optional a power meter can be included.

The circuit breakers can also be used to activate or deactivate the user listed on the overlay.

The panel has a clear split between DC and AC power. All DC power is in the left section and AC powered section to the right. DC cables exiting the panel are routed towards left.

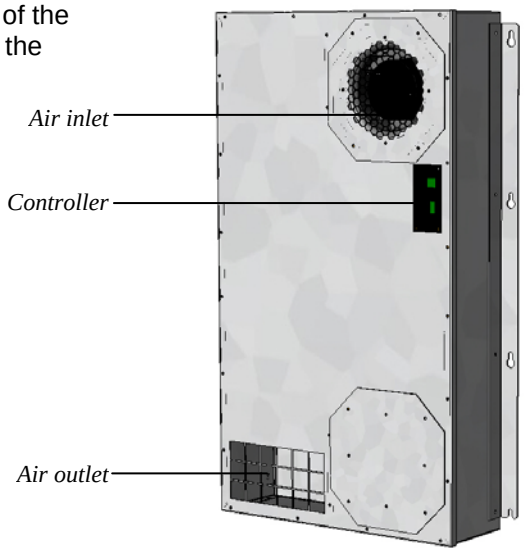
Heat exchanger

Introduction

This section will give you a description of the MHX 35 and its functionality:

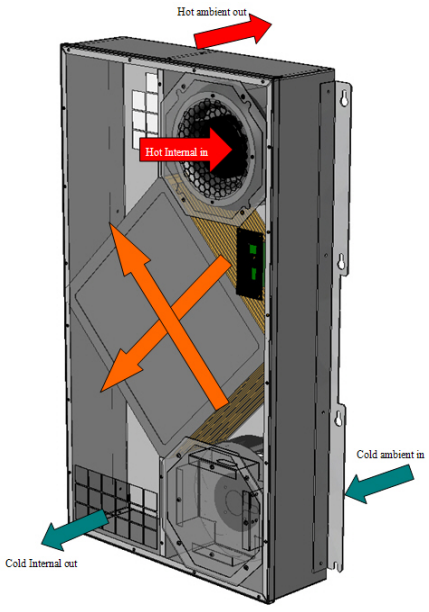
Illustration

This illustration gives an overview of the heat exchanger which is build into the MTS 2-outdoor enclosure:



Two separate air flows

The two air flows (internal/external) are totally separated. The external air is only used to cool down the internal air via the heat exchanger. The air flows are never mixed.



Internal air flow

The warm internal air is sucked from the enclosure into the internal fan at the top of the MHX 35 and let through the heat exchanger, where it is cooled down.

After the cooling in the heat exchanger, the air is let back into the enclosure.

External air flow

The cold external air is sucked into the external fan at the bottom of the MHX 35 and let through the heat exchanger, where it is cooling down the internal air.

After having passed through the heat exchanger, the air is let back to the external environment at the top of the unit.

Continued overleaf

Heat exchanger, *continued*

Control system

The MHX 35 heat exchanger is controlled via a controller that controls the speed of the fans.

The key features of the controller are:

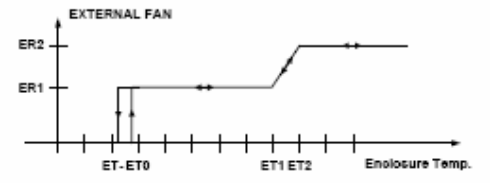
- Onboard temperature sensor (NTC type)
- Microproccesor based control in accordance with preselected strategy
- Minor and major alarm output
- Polarity protection
- Input voltage ÷ 40 V DC to -60 V DC
- Power consumption 80 W

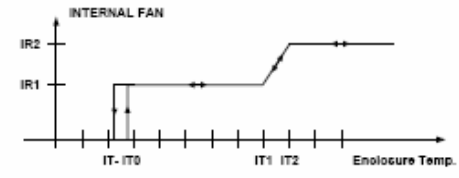
Part	Function
RS 232	To be used for factory testing or to get further information from the controller
Alarm LED	Gives signal about alarms: • Flashing = minor alarm (high temperature) • Constant = major alarm (fan or sensor failure) Both alarms can be monitored (potential free contact) on the power/alarm plug. See more about fault finding in section “Service guide”, page 17
Sub-D 9 pin, male	Power and alarm plug Pin designation: 1 N/C 2 + 48 V DC 3 + 48 V DC 4 Minor alarm + 5 Major alarm + 6 0 V DC 7 0 V DC 8 Minor alarm ÷ 9 Major alarm ÷

Control strategy

This shows the control strategy for the controller:

See the table on the next page for an explanation of the values.





Continued overleaf

Heat exchanger, *continued*

Values

This table shows the set points/control strategy for the MHX 35 heat exchanger.

All listed temperatures are return air temperatures (from the enclosure to the heat exchanger). Fan speeds are detected and controlled from speed signals from the fans.

Reduction	Designation	Value
IR1	Minimum internal fan speed	1400 RPM
IR2	Maximum internal fan speed	2800 RPM
IT-	Cut off temperature, internal fan	÷ 10 °C
IT0	Cut in temperature, internal fan	÷ 5 °C
IT1	Ramp up temperature set point, internal fan	40 °C
IT2	Maximum RPM temperature set point, internal fan	50 °C
ER1	Minimum external fan speed	1300 RPM
ER2	Maximum external fan speed	2600 RPM
ET-	Cut off temperature, external fan	25 °C
ET0	Cut in temperature, external fan	30 °C
ET1	Ramp up temperature set point, external fan	45 °C
ET2	Maximum RPM temperature set point, external fan	50 °C

Set up and transport of the MTS 2-outdoor enclosure including the MHX 35 heat exchanger

Introduction

This section provides information required for the unwrapping of the unit, mounting it and making it ready for use

Transport

The MTS 2-outdoor enclosure including options and MTS2 is designed to withstand public transport.

Necessary tools

The following tools are needed for the installation:

- 27 mm wrench
- 5 mm umbracho
- 10 and 13 mm socket wrench
- Torx 30 screw driver
- Torx 25 screw driver
- Riveting tool for 4mm rivets

Electrical connection

A PG21 cable gland is located at the middle of the bottom and is to be used as main power cable entry. The power cable needs to be attached to the main circuit breaker, with N and L (phase) a ground stud (M6) is next to this serving as main ground.

The installation must be done by authorized personal only.

The main circuit breaker is rated 25 A.

Stacking

Do not stack the enclosures!

Procedure

Follow these steps to unwrap the enclosure and make it ready for use:

Step	Action
1	Remove the wrap and the straps  *Frontal view of cabinet*
2	Prepare the mounting site according to the mounting template in appendix B, page 43
3	Unscrew the 6 mm umbracho screw on one of the bottom side cover plate and dismount it  *Cabinet at left bottom corner towards the backside*

Continued overleaf

Set up and transport of the MTS 2-outdoor enclosure including the MHX 35 heat exchanger, *continued*

Procedure, ***continued***

Step	Action	
4	Unscrew the 8 screws on the inner cover plate and dismount it The unit is now ready to be lifted up *Picture showing low leftside of cabinet*	
5	Lift the unit with a fork lift truck as shown (in the lifting channel) **Be very careful when lifting and secure the enclosure when working under it (use supports)** *Picture taken from the back and right side of the enclosure*	
6	Lead the power cable through the PG cable gland while the enclosure is about to be lifted into place. Data lines: E1, X21 and remote GPS cable entry must be let through the through the PG cable glands on the front of the unit The PG cable glands is placed on the middle of the bottom *Upper picture taken from underneath the enclosure center from left to right* *Lower picture taken from underneath the enclosure from left to right*	 

Continued overleaf

Set up and transport of the MTS 2-outdoor enclosure including the MHX 35 heat exchanger, *continued*

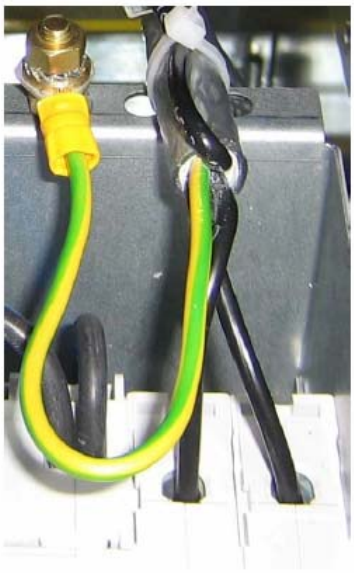
Procedure, ***continued***

Step	Action
7	Unscrew the 6 torx screws on the sheet with the PC plug. Turn the sheet aside and the PG cable glands for the power cable is visible from the inside **NB: Installation must only be carried out by authorized personnel** *Picture taken through an open right door* 
8	Proceed with step 8 if the enclosure needs to be attached with bolts otherwise proceed with step 9
9	Unscrew the two 8 mm screws on both side cover plates and dismount the two plates This gives access to the fixing points *Lower corner of enclosure* 
10	Lower the enclosure to its right position (use the mounting template, page 43) while keeping the cables tight, so they do not get squeezed
11	Attach the enclosure with bolts by the fixing points shown on the mounting template, page 43 (Dantherm Air Handling A/S recommendation)
12	Tighten all PG cable glands
13	Lead the power cable through the rubber grommet and connect it to the AC input on the switchboard according to the wiring diagram *Picture taken trough open right door showing cable entry* 

Continued overleaf

Set up and transport of the MTS 2-outdoor enclosure including the MHX 35 heat exchanger, *continued*

Procedure, ***continued***

Step	Action
14	**Make sure all power has been switched off and secured.** **(authorized personal only).** Remove the cover of the power distribution panel by unscrewing the 4 torx T25 screws and connect the incoming power cord as illustrated to the right. Make sure the M6 marked ground connection is tightened and secured as illustrated *Upper picture showing power distribution board with cover removed.* *Lower picture close up at power entry point to the power distribution board*   Earth and Line connections
15	Connect the buried exterior bare conductor forming a ring around the enclosure according to K56 by ITU-T by using the M8 nut located at the bottom of the enclosure in each corner
16	Remount all cover plates and the MTS 2-outdoor enclosure is ready for use
17	Attach the blinding plates (one on each side) by pulling the enclosed rivets with an appropriate tool, when the endplates have been remounted as shown on the upper picture. The blinding plates are for additional protection towards entry to bottom section *Picture showing the attached blind in position*  

Service guide

Overview

CAUTION Always disconnect the power cable from the unit before doing any service!

Content This chapter covers the following topics:

Preventive maintenance

Introduction

Proper maintenance of the unit is necessary in order to achieve trouble-free operation.

This section contains description of the recommended maintenance.

Contractual service

Dantherm Air Handling A/S provides contractual service agreements covering preventive and/or corrective maintenance – see section ”Service agreement”, page 31 for further information.

CAUTION

Always disconnect the power from the MTS 2-outdoor enclosure before doing any preventive maintenance!

Preventive maintenance, MTS 2-outdoor enclosure

Please follow this procedure to carry out the preventive maintenance, which should not exceed 6 months:

Step	Action
1	Check if door gaskets are damaged – exchange if necessary
2	Check and clean if necessary the door louvres

Preventive maintenance, power distribution panel

Dantherm Air Handling recommends to switch all circuit breakers off an back on (if in use) once a year. Make sure that the base station is not unintentionally affected by this.

The HPFI protection relay (F1.32) has a test button that needs periodically activation.

Recommended every 6 months:

Further the F1.34 transient protection can be damaged by a strike of lightning or similar in the power supply. It has a replaceable cartridge that needs replacement when the indicator in front turns red.

Preventive maintenance, MHX 35

Please follow this procedure to carry out the preventive maintenance, which should not exceed 6 months:

Step	Action
1	Clean the fans, either vacuum clean or use compressed air with caution
2	Clean the cross heat exchanger with compressed air
3	Check the fans and the fan blades for cracks – exchange if necessary
4	Check the fans for abnormal noise – exchange if necessary

Preventive maintenance, batteries

Please follow this procedure to carry out the preventive maintenance, which should not exceed 6 months. Batteries are optional equipment.

Step	Action
1	Check that the battery ventilation hoses are intact and in place. If damaged order a replacement degassing kit

Spare parts

MHX 35

This illustrates the spare parts for the MHX 35 heat exchanger:

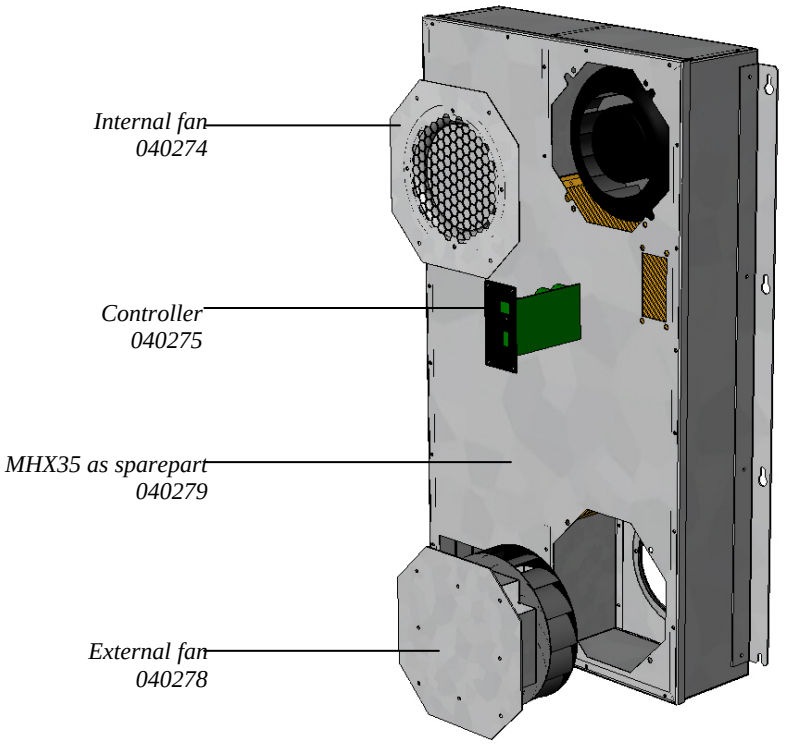


Fig. 1

How to replace the controller

Introduction

The controller is located on the front of the heat exchanger.

When to replace it

The controller must only be replaced when it is defective.

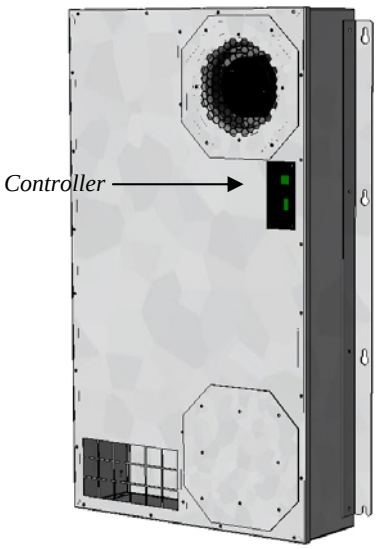
Before you start

Before you start to replace the controller, make sure that you have the following ready:

- A torx 25 screwdriver
- A new controller

Drawing

This drawing shows where the controller is placed:



Procedure

Follow these steps to replace the controller:

Step	Action
1	Switch off all power to the MTS 2-outdoor enclosure and to the MHX 35heat exchanger
2	Open the MTS 2-outdoor enclosure to get access to the MHX 35 heat exchanger
3	Remove the 4 torx screws to remove the controller
4	Pull out carefully the controller and disconnect the two cable plugs
5	Fit the two plugs to the new controller and tighten it with the 4 screws
6	Switch on the power again

How to replace the internal fan

Introduction

The fan is located at the top of the MHX 35 heat exchanger. It is a 48 Volt DC fan that is connected to the control board.

When to replace it

The fan must be replaced when it sounds unusual or is otherwise defective.

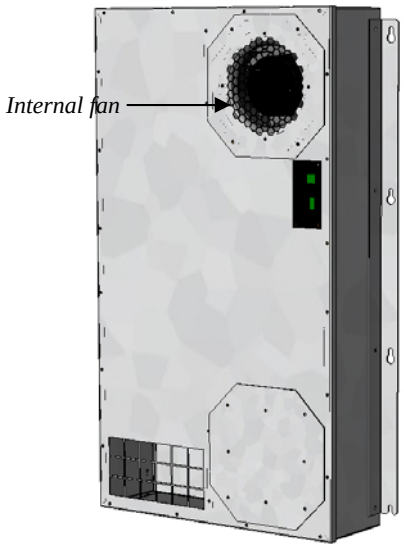
Before you start

Before you start to replace the fan, make sure that you have the following ready:

- A torx 25 screwdriver
- A new fan

Drawing

This drawing shows where the fan is placed:



Procedure

Follow these steps to replace the fan:

Step	Action
1	Switch off all power to the MTS 2-outdoor enclosure and to the MHX 35 heat exchanger
2	Open the MTS 2-outdoor enclosure to get access to the MHX 35 heat exchanger
3	Remove the 4 torx screws to remove the cover grating in front of the internal fan
4	Loosen (not remove) all four screws on the fan plate behind the fan
5	Pull out carefully the fan by lifting if free of the key holes and disconnect the cable plug
6	Fit the plug from the heat exchanger to the plug from the new fan
7	Put the fan in position (it can bee a little difficult) and fasten it with the 4 torx screws. Make sure that the fan plate catches all 4 screws on the fan plate
8	Make sure that the fan can rotate freely and then remount the fan cover
9	Switch on the power again

How to replace the external fan

Introduction

The fan is located at the bottom of the heat exchanger. It is a 48 Volt DC fan that is connected to the control board.

When to replace it

The fan must be replaced when it sounds unusual or is otherwise defective.

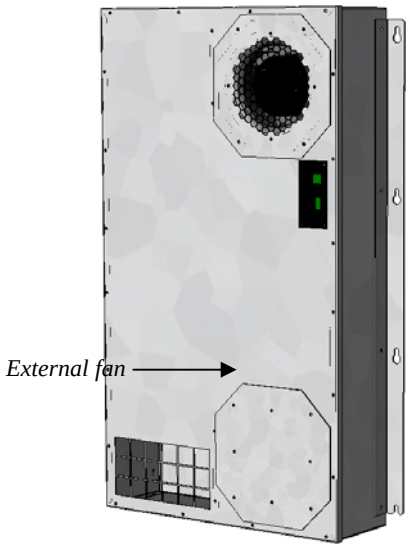
Before you start

Before you start to replace the fan, make sure that you have the following ready:

- A torx 25 screwdriver
- A new fan

Drawing

This drawing shows the where the fan is placed:



Procedure

Follow these steps to replace the fan:

Step	Action
1	Switch off all power to the MTS 2-outdoor enclosure and to the MHX 35 heat exchanger
2	Open the MTS 2-outdoor enclosure to get access to the MHX 35 heat exchanger
3	Remove the 4 torx screws to remove the fan cover with the external fan
4	Disconnect the cable plug and pull out carefully the fan assembly
5	Put in the new fan and fit the plug from the heat exchanger to the plug from the new fan
6	Put the fan in position (it can bee a little difficult) and fasten it with the 4 torx screws
7	Switch on the power again

How to replace the heat exchanger

Introduction

This instruction guides you through the exchange of the MHX 35 unit.

When to replace it

In many cases it is more effective to replace the whole unit in stead of just replacing the fans etc. This should be estimated from case to case.

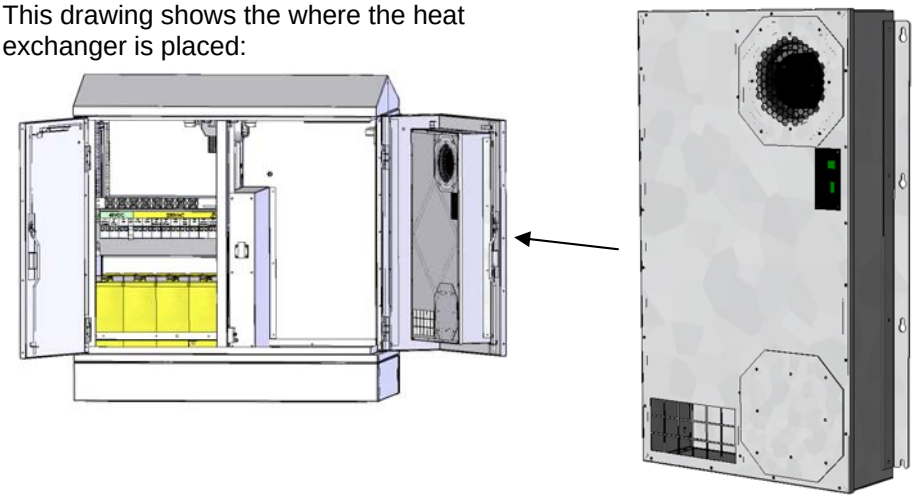
Before you start

Before you start to replace the fan, make sure that you have the following ready:

- A torx 25 screwdriver
- A new heat exchanger unit

Drawing

This drawing shows the where the heat exchanger is placed:



Procedure

Follow these steps to replace the fan:

Step	Action
1	Open the MTS 2-outdoor enclosure to get access to the MHX 35 heat exchanger
2	Switch off all power to the MTS 2-outdoor enclosure and to the MHX 35 heat exchanger
3	Unplug the controller and cut the wire strips Notice the placement of the wire and the strips
4	Loosen the 8 screws (do not unscrew them)
5	Lift the unit up and free of the key holes
6	Lift up the new heat exchanger and place the key holes over the 8 screws. Tighten the screws
7	Reconnect the plug for the controller and secure it with strips like before
8	Switch on the power again

How to replace battery pack (backup power)

Introduction

This instruction guides you through the replacement of a battery pack on the MTS2 outdoor enclosure.

There are 3 different 48 V DC backup power battery packs that fit and which are approved for use in the MTS2 outdoor enclosure (also for transport when installed).

Important. They are all VRLA type with approved ventilation kit installed in accordance with:

Type	Description	Id (label in cabinet
Small pack (Dantherm p/n 38406)	62 Ah approx. 4 hours of backup time	Enersys 4-12V62F
Medium pack (Dantherm p/n 38407)	105 A approx. 8 hours of backup time	Enersys 4-12V105F
Large pack (Dantherm p/n 38408)	155 Ah approx. 12 hours of backup time	155 Ah approx. 12 hours of backup time

When to replace it

It is necessary to replace if:

- required power backup time is not sufficient
- cell voltage is below manufactures recommendations after charging period
- recommended operational lifetime is exceeded
- any physical damage is found on the battery pack

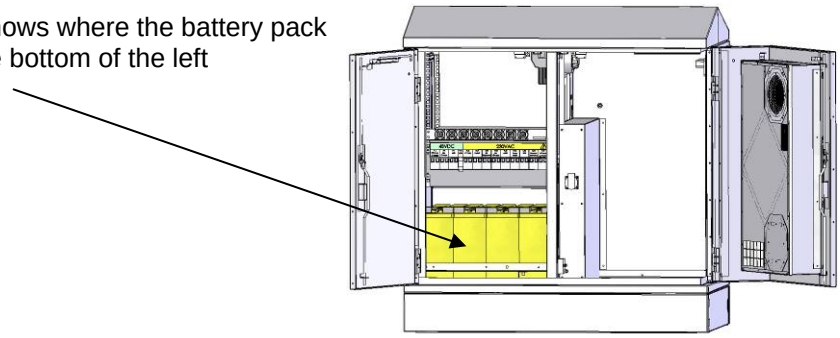
Before you start

Before you start to replace the batteries, make sure that you have the following ready:

- A replacement pack of batteries including degassing kit with hose, T-connectors etc., type label and manual
- The installation, Operations and Maintenance Instructions coming with the batteries READ THIS and follow the instructions
- A 10 mm and 13 mm spanner (isolated)
- Lifting aid for handling the battery cells. Each cell can have a weight of up to 57 kg (large pack)

Drawing

This drawing shows where the battery pack is located at the bottom of the left conpartment:

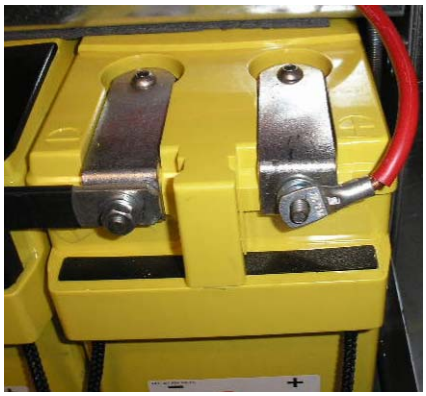


Continued overleaf

How to replace battery pack (backup power), *continued*

Procedure

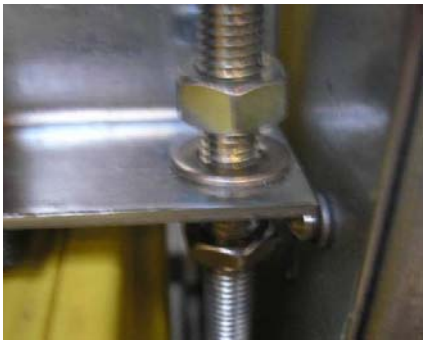
Follow these steps to replace the batteries:

Step	Action
1	READ the Installation, Operations and Maintenance Instructions, and follow these at any time
2	Switch off the DC mains circuit breaker
3	Remove the safety cap of the right battery (4) and disconnect the +terminal and secure the wire so it cannot get in contact with any metal part 
4	Remove and secure the thermal sensor for the charging temperature monitoring. This is installed on battery 4 and should be secured away from the battery area to avoid damaged to the sensor or cable.  The battery sensor cable is 6 m long. The connector housing is an AMP 2 pole plug: P/N 350777 with socket contacts P/N 350570-3 or 350689-3. The temperature sensor is moulded into a ring terminal with a 6.2 mm hole intended for mounting on the terminal of the back up battery connected. The temperature sensor is electrically isolated from the ring terminal.
5	Remove the cap on battery 3 and disconnect the jumper plate between battery 3 and 4 
6	Remove the cap on battery 2 and disconnect the jumper plate between battery 2 and 3
7	Remove the cab on battery 1 and disconnect the jumper plate between battery 1 and 2

Continued overleaf

How to replace battery pack (backup power), *continued*

Procedure, ***continued***

Step	Action	
8	Disconnect the – cable on battery 1 and secure the connector so it cannot touch any metal parts	
9	Disconnect all the degassing tubes from the batteries	
10	Dismount the front beam that secures the batteries by unscrewing the 2 screws	
11	Dismount the top beams by unscrewing the 2 screws on each beam The batteries are now be ready to be lifted out of the enclosure one at a time	
12	Lift out the batteries one by one **Warning** The batteries are very heavy. Each cell has a weight of up to 67 kg. Special precaution should be taken to ensure that no injury or damage takes place when uninstalling	
13	Do a cleaning of the area where the batteries were installed, if needed	
14	Install the new battery pack Same precaution and procedure as in step 11	
15	Install the front beam as it were (step 9)	
16	Install the degassing lids if not already fitted to the battery by removing the protection tape underneath the lid and check that the self adhesive is not damaged. Clean the top of the battery and place the degassing lid on top of the degassing valves (see pictures in the following steps)	

Continued overleaf

How to replace battery pack (backup power), *continued*

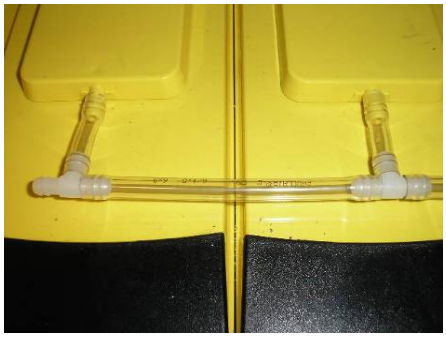
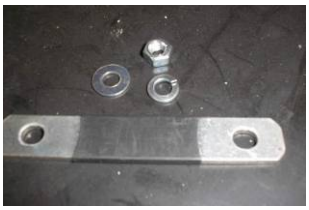
Procedure, ***continued***

Step	Action	
17	Install the tube on battery 4 As on the picture to the right Tube length: 105.5 mm	
18	Install the tube on battery 2 and 3 As on the picture to the right Tube length: 24.5 mm on both	
19	Install the tube on battery 1 As on the picture to the right Tube length: 80.5 mm	
20	Connect the tubes on battery 3 and 4 by using a T-connector	

Continued overleaf

How to replace battery pack (backup power), *continued*

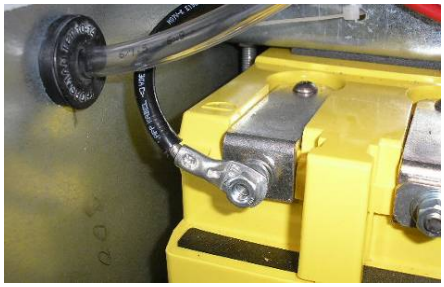
Procedure, ***continued***

Step	Action	
21	Connect battery 2 and 3 by using a T-connector and a tube Tube length: 101.5 mm	
22	Connect battery 1 and 2 by using a T- connector and a tube Tube length: 60 mm	
23	Connect the T-connector on battery 1 to the grommet on the left side innerskin. Tube length: 206 mm. **Important:** The tube should be push all the way through the grommet until it meets the outskin, and then pulled back a few mm. This enables the grommet to seal and secure the tube to be gas tight (IP67). If the seal is not intact replace the grommet	
24	Install the 3 jumper plates (follow step 3-7 in reverse order)	
25	Reinstall the thermal sensor for DC charger (battery 4, bind cap)	

Continued overleaf

How to replace battery pack (backup power), *continued*

Procedure, ***continued***

Step	Action	
26	Check that all nuts have been tightened in accordance with manufactures recommendation without any damages Put the safety cap back on battery 2, 3 and 4	
27	Disconnect the – cable on battery 1 and secure the connector so it cannot touch any metal parts	
28	Remount the 2 top beams as they were in step 10. (the picture is showing the rear top beam)	
29	Arrange all hoses and cables as they were; secure without risk of damages from sharp edges or being unintended trapped	
30	Replace the type label on the left innerskin with the new type label that comes with the battery pack, and check that the battery voltage is as specified before switching DC backup on	
31	Check again that the degassing kit of the batteries is intact with all hoses installed in accordance with this instruction	
32	Switch on the power again	

Fault finding

Fault finding, MHX 35

Use this table to identify and remedy a problem or fault:

Problem	Cause	Action
The red LED illuminates constantly	Too high temperature in the enclosure, above 70 °C or a fan failure	Replace the fan
The red LED is flashing	The on board sensor has been disconnected/shorted	Replace the controller
The internal fan runs at low speed	The temperature in the enclosure is below 22 °C	This is due to the control strategy – no fault
The external fan runs at low speed	The temperature in the enclosure is below 32 °C	This is due to the control strategy – no fault

Note

- Shut down the heat exchanger immediately, if it is not operating correctly!
- Wait one minute before starting to locate the fault as the electronic equipment may have switched off the unit for safety reasons

Service agreement

Introduction

The unit includes mechanical and electrical parts and the unit is often placed in a rough environment where the components are exposed to different climate conditions. Therefore the unit will need preventative maintenance on a regular basis.

Hotline

The After Sales Support Department of Dantherm Air Handling A/S is ready to help you in case of a problem.

To be able to offer quick and efficient help, please have the following information ready when contacting Dantherm Air Handling A/S:

- Name
- Company
- Country
- Phone no.
- Email
- Type (unit)
- Site/location (unit)
- Serial no/order no.
- Description of the problem

Contact Dantherm Air Handling A/S, ask for the After Sales Support department and help will be provided as soon as possible:

Phone: +45 96 14 37 00
Fax: +45 96 14 38 00
Email: service@dantherm.com

Preventive maintenance

Dantherm Air Handling A/S offers to do the preventive maintenance on the units so that they at all times will operate according to factory standards.

Corrective and emergency repair

In case of malfunctions of the product Dantherm Air Handling A/S offers to do emergency repair on the climate units. Agreements will be made with the customer on response time and price.

Setup

Dantherm Air Handling A/S has established a network of service partners to do the preventative maintenance. The partner is trained and certified on the actual climate units. The partner will also carry an adequate number of spare parts – so that any repairs can be made during the same visit.

The agreement will be made with Dantherm Air Handling A/S – and the overall responsibility for the agreement will be Dantherm Air Handling A/S's.

Further information

For further information about a service agreement in your country or region, please contact:

Henrik Hersted
After Sales Support Manager

Dantherm Air Handling A/S

Phone: +45 9614 4767
Mobile: +45 2399 4066
Email: heh@dantherm.com

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Technical information

Overview

Introduction

This section contains the technical data for the unit.

Contents

This section covers the following topics:

Technical data, MTS 2-outdoor enclosure

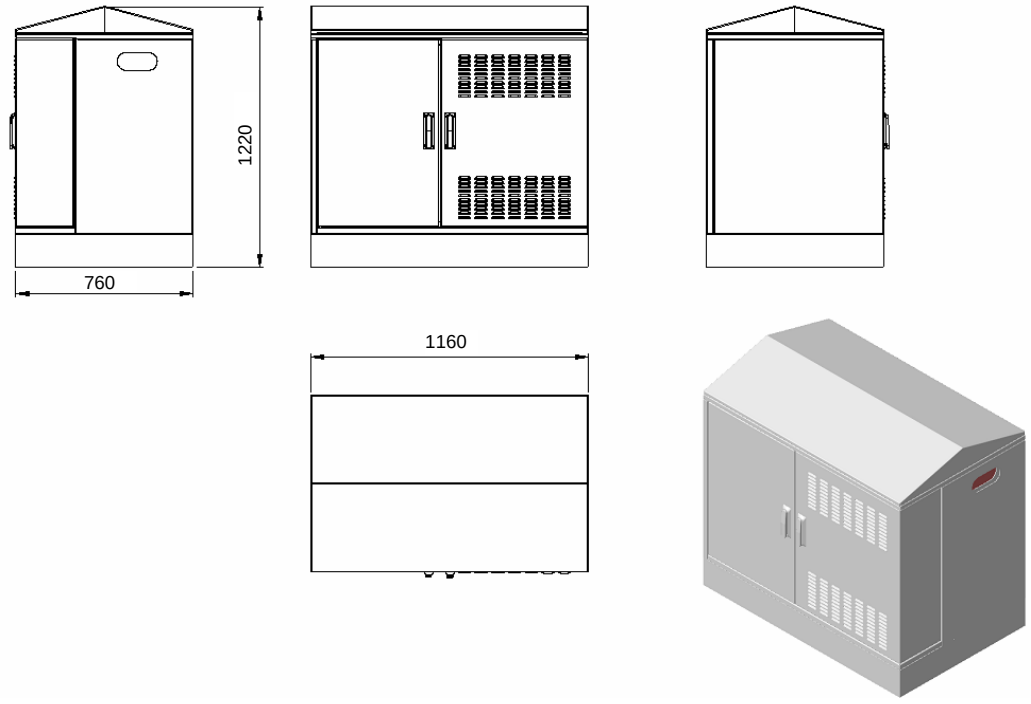
General data

The general technical data on the MTS 2-outdoor enclosure is shown in the following table:

		MTS 2
Operating range - humidity	%RF	5 – 100 condensing
Operating range – temperature	°C	÷ 33 – 40
Power supply	V AC	230
Max. current, main fuse	A	25
Max. cooling capacity	W	700
Temperature range	°C	max. 60 °C internal at 40 °C ambient
Sound level 1 m distance	dB(A)	61
Weight, excl. options	kg	220
Dimensions (W × D × H)	mm	1160 × 760 × 1220
Safety class	IP	55

Dimensions

This shows the dimensions of the MTS 2-outdoor enclosure:



Technical data, MHX 35 heat exchanger

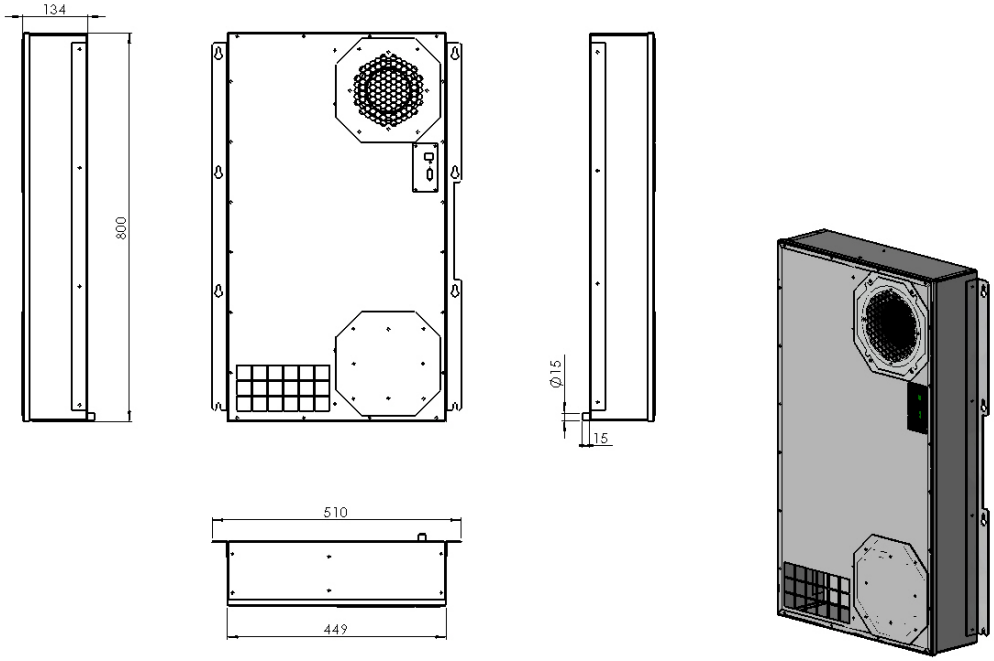
General data

The general technical data on the heat exchanger is shown in the following table:

		MHX 35
Operating range - humidity	%RF	5-99 non condensing environment
Operating range – temperature	°C	÷ 33 – 70
Power supply	V DC	40-60 Nominal 40
Power consumption	W	80
Performance	W/K	35
Air output	m^3/h	250
Capacity	W at 35 °C/35 °C	700
Weight	kg	20
Dimensions (W × D × H)	mm	800 × 450 × 155
Safety class, mounted on door	IP	55

Dimensions

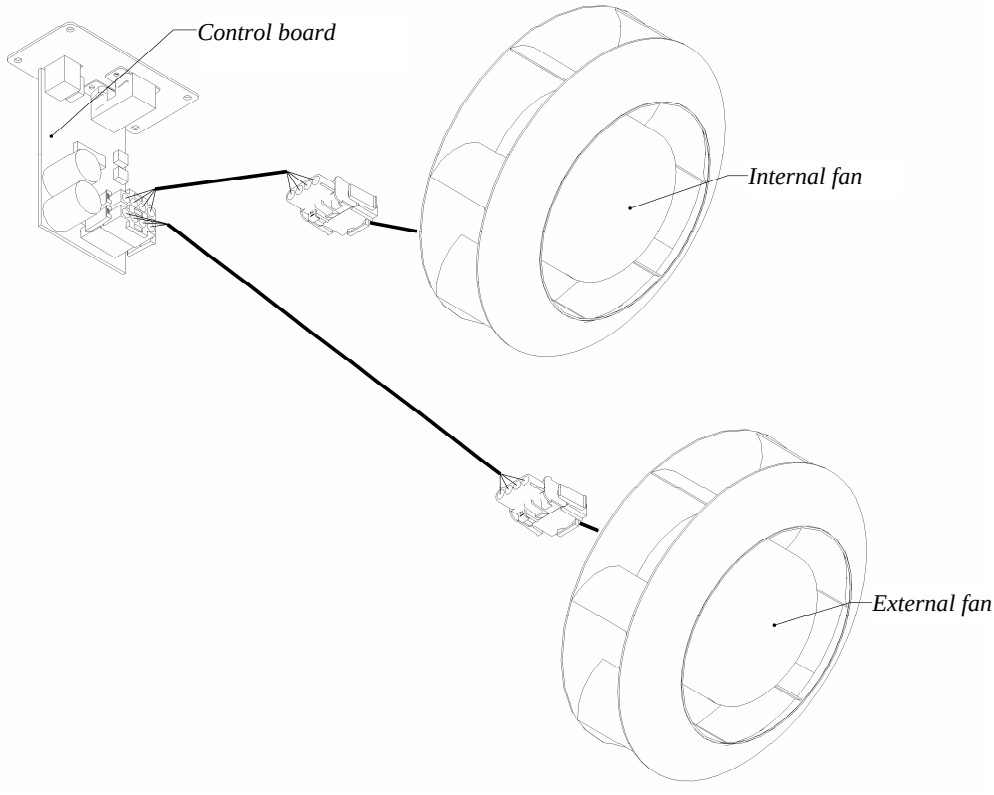
This shows the dimensions of the MHX 35 heat exchanger:

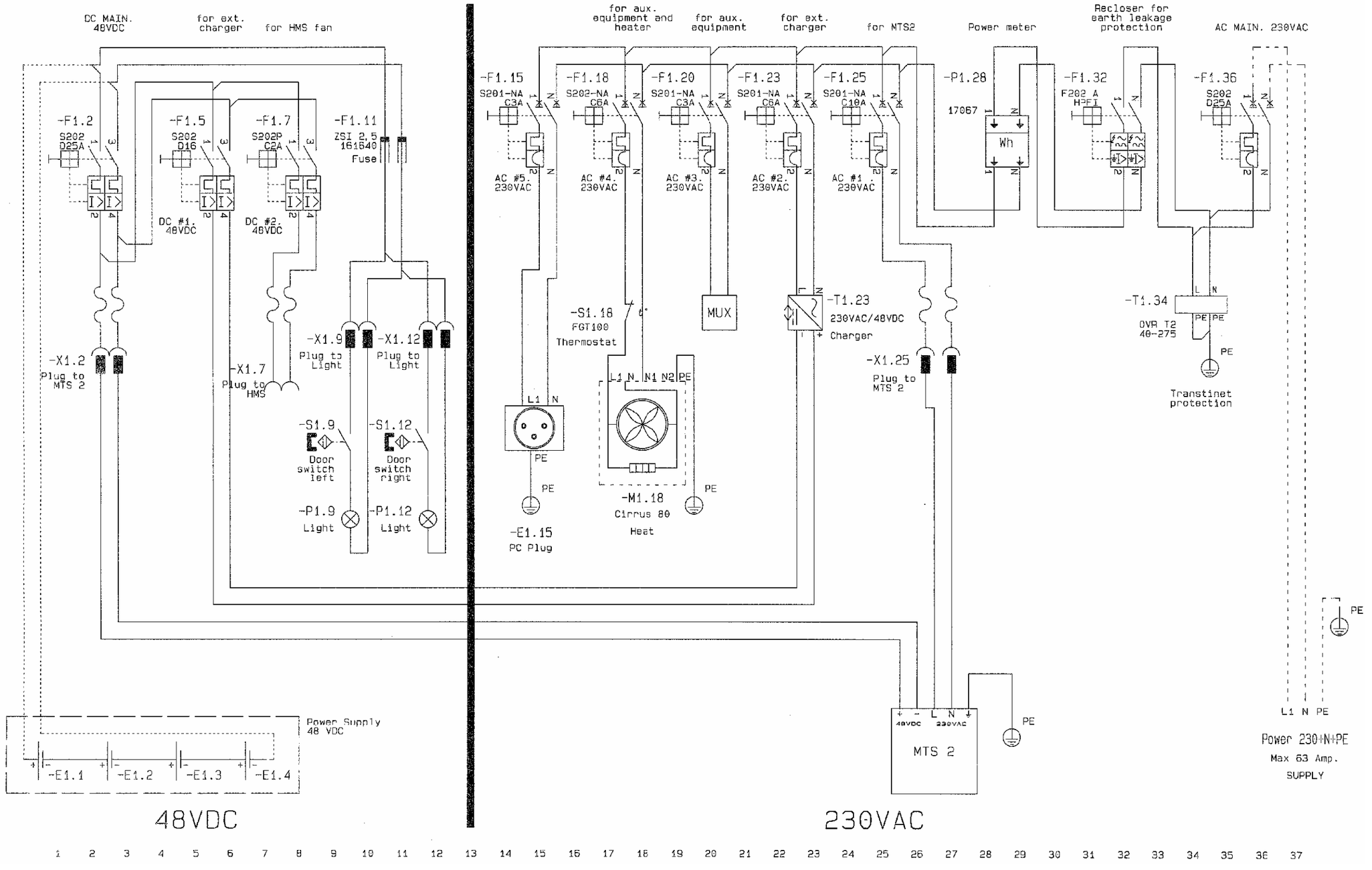


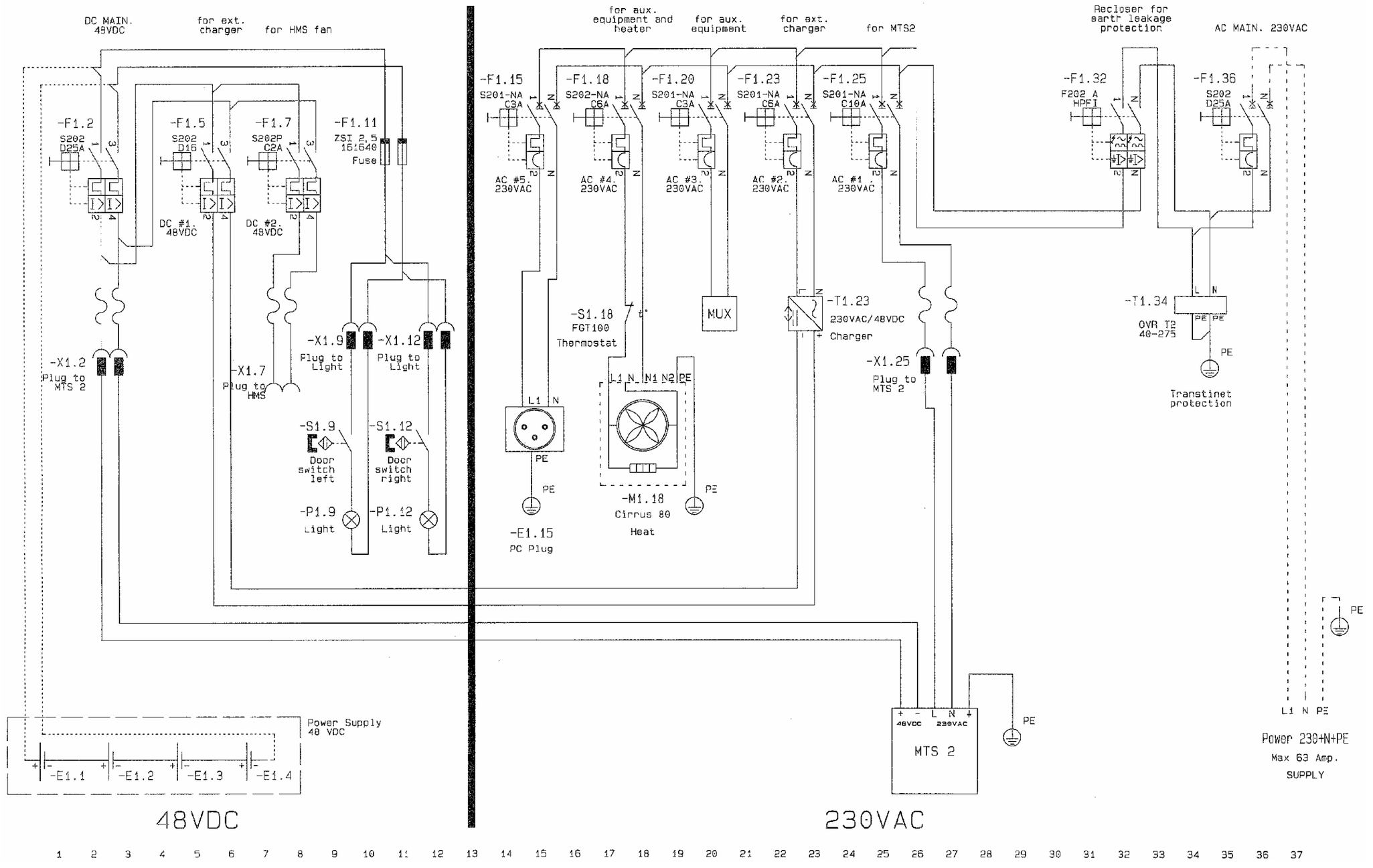
Wiring diagram, MHX 35 heat exchanger

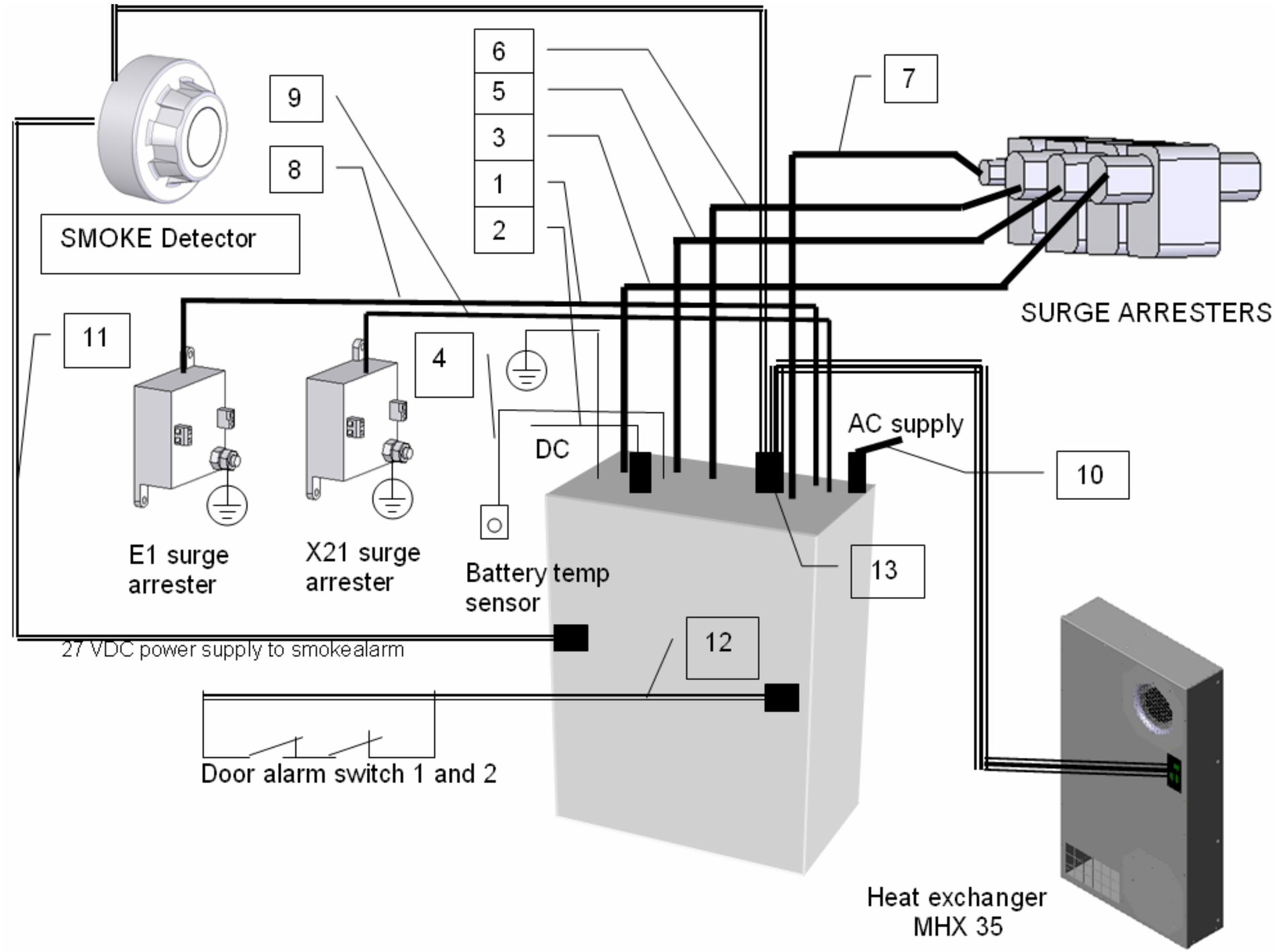
Diagram

This is the wiring diagram for the MHX 35 heat exchanger:




DC MAIN. 48VDC
for ext. charger
for HMS fan
for aux. equipment and heater
for aux. equipment
for ext. charger
for MTS2
Power meter
Recloser for earth leakage protection
AC MAIN. 230VAC
-F1.2 S202 D25A
-F1.5 S202 D16
-F1.7 S202P C2A
-F1.11 ZSI 2,5 161640 Fuse
-F1.15 S201-NA C3A
-F1.18 S202-NA C6A
-F1.20 S201-NA C3A
-F1.23 S201-NA C6A
-F1.25 S201-NA C10A
-P1.28 17067 Wh
-F1.32 F202 A HPFI
-F1.36 S202 D25A
AC #5. 230VAC
AC #4. 230VAC
AC #3. 230VAC
AC #2. 230VAC
AC #1. 230VAC
DC #1. 48VDC
DC #2. 48VDC
-X1.2 Plug to MTS 2
-X1.7 Plug to HMS
-X1.9 Plug to Light
-X1.12 Plug to Light
-S1.9 Door switch left
-S1.12 Door switch right
-P1.9 Light
-P1.12 Light
-S1.18 FGT100 Thermostat
MUX
-T1.23 230VAC/48VDC Charger
-X1.25 Plug to MTS 2
-T1.34 OVR T2 40-275
Transtinet protection
-E1.15 PC Plug
-M1.18 Cirrus 80 Heat
Power Supply 48 VDC
-E1.1
-E1.2
-E1.3
-E1.4
MTS 2
Power 230+N+PE Max 63 Amp. SUPPLY
PE
48VDC
230VAC
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37


DC MAIN. 48VDC
for ext. charger
for HMS fan
for aux. equipment and heater
for aux. equipment
for ext. charger
for MTS2
Recloser for earth leakage protection
AC MAIN. 230VAC
-F1.2
S202 D25A
-F1.5
S202 D16
-F1.7
S202P C2A
-F1.11
ZSI 2.5 16:640
Fuse
DC #1. 48VDC
DC #2. 48VDC
-X1.2
Plug to MTS 2
-X1.7
Plug to HMS
-X1.9
Plug to Light
-X1.12
Plug to Light
-S1.9
Door switch left
-S1.12
Door switch right
-P1.9
Light
-P1.12
Light
-F1.15
S201-NA C3A
-F1.18
S202-NA C6A
-F1.20
S201-NA C3A
-F1.23
S201-NA C6A
-F1.25
S201-NA C10A
AC #5. 230VAC
AC #4. 230VAC
AC #3. 230VAC
AC #2. 230VAC
AC #1. 230VAC
-S1.18
FGT100 Thermostat
MUX
-T1.23
230VAC/48VDC Charger
-X1.25
Plug to MTS 2
-F1.32
F202 A HPFI
-F1.36
S202 D25A
-T1.34
OVR T2 40-275
Transtinet protection
L1 N
PE
-E1.15
PC Plug
-M1.18
Cirrus 80 Heat
Power Supply 48 VDC
-E1.1
-E1.2
-E1.3
-E1.4
MTS 2
46VDC
230VAC
Power 230+N+PE
Max 63 Amp.
SUPPLY
48VDC
230VAC
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37


6
5
3
1
2
9
8
7
SMOKE Detector
SURGE ARRESTERS
11
4
AC supply
DC
10
13
E1 surge arrester
X21 surge arrester
Battery temp sensor
12
27 VDC power supply to smokealarm
Door alarm switch 1 and 2
Heat exchanger MHX 35

References for the wiring diagrams

Information

For further details please see the MTS2 service and installation manual.

References, diagram 1 and 2

The table shows references that corresponds to wiring diagram 1 and 2:

Reference	Dantherm Air Handling No.	Configuration
-F1.36	038427	AC Main MCB 25A-D curve
-F1.32	038419	AC Surge arrestor
-F1.32	038418	AC HPFI relay manual
-P1.28	038420	AC Power meter (optional)
-F1.25	038421	AC Distribution MCB #1- 10 A for MTS2
-F1.23	038423	AC Distribution MCB #3- 6 A for external charger
-F1.20	038417	AC Distribution MCB #4- 3 A for aux. equipment
-F1.18	038423	AC Distribution MCB #2- 6 A for heater
-F1.15	038417	AC Distribution MCB #4a- 3 A for PC plug
-F1.11	038424	Fuse terminal block ZSI 2.5
-F1.11	038429	Quickblow fuse 200 mA 5 × 20 mm
-F1.5	038417	DC Distribution MCB #3- 3 A for HMS fan
-F1.7	038422	DC Distribution MCB #2- 16 A for external charger
-F1.2	038427	DC main MCB – 25A-D curve

References, diagram 3

The table shows references that corresponds to the wiring diagram 3:

Reference	Text	Plug/pin designation
1	GND	M10 in backpanel of enclosure
2	DC power	See power distribution schematics
3	ANT 1	Motorola p/n 3066568B01
4	Batt temp	2 pole mate n lok
5	ANT 2	Motorola p/n 3066568B01
6	ANT 3	Motorola p/n 3066568B01
7	GPS	N connector
8	E1	Motorola p/n 3066570B01
9	X21	Motorola p/n 3066571B01
10	AC in	See power distribution schematics

Continued overleaf

References for the wiring diagrams, *continued*

References, diagram 3, ***continued***

Reference	Text	Plug/pin designation
11	Smoke detector power	Molex 50-57-9403 Pin 1: GND Pin 3:28,5VDC
12	Door alarm	Molex MX SL 2pol
13	User alarms	25 pin D-SUB:
-	Smoke alarm	Pin 21,3
-	MHX 35 minor alarm	Pin 23,1
-	MHX 35, major alarm	Pin 22,2

Options

Introduction

The MTS 2-outdoor enclosure might be equipped with different options, shown in the following list. If you need further information about the options, please contact Dantherm Air Handling A/S.

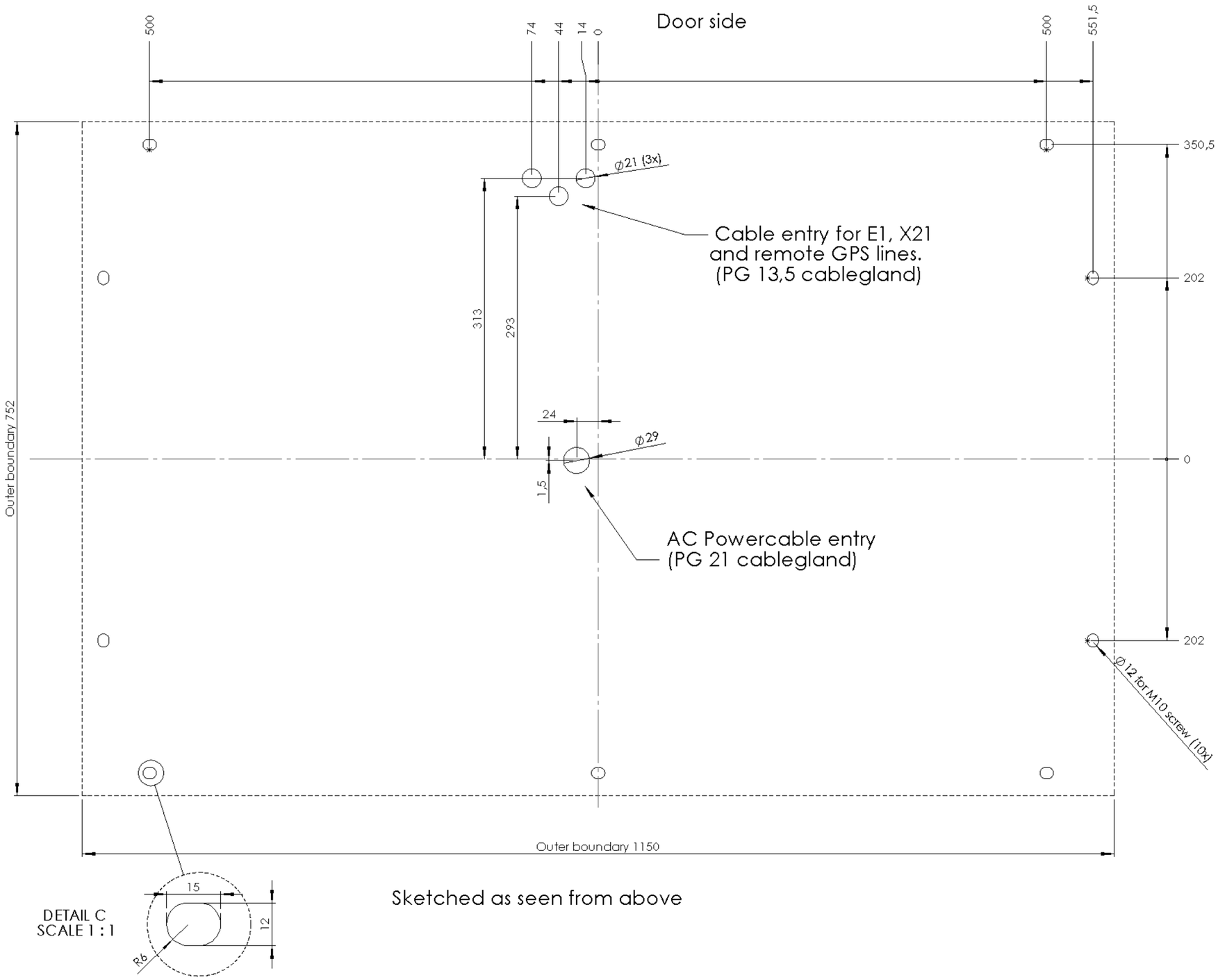
Illustration	Description	Article number
	4 batteries 62 Ahr/4 hr backup incl. degassing kit, internal connecting kit, manual and label. EnerSys, PowerSafe, 12V62F	038406
	4 batteries 105 Ahr/8 hr backup incl. degassing kit, internal connecting kit, manual and label EnerSys, PowerSafe, 12V105F	038407
	4 batteries 155 Ahr/12 hr backup incl. degassing kit, internal connecting kit, manual and label EnerSys, PowerSafe, 12V155FS	038408
	GPS surge arrestor DGXZ + 06NFNF-A Incl. jumper cables	038410
	Antenna 1 to 3 surge arrestor VHF50HD	038409
	Dataline surge arrestor NX2-05	038411
	Internal light with connector	038416
	Heater with thermostat	039118

Continued overleaf

Options, *continued*

Introduction, ***continued***

Illustration	Description	Article number
	Smoke detector w. cable up to 60°	038415
	AC power meter	038420
	External battery charger including thermal battery temperature sensor	038431


Door side
500
74
44
14
0
500
551,5
ϕ21 (3x)
Cable entry for E1, X21
and remote GPS lines.
(PG 13,5 cablegland)
350,5
202
313
293
24
ϕ29
1,5
0
AC Powercable entry
(PG 21 cablegland)
202
Ø12 for M10 screw (10x)
Outer boundary 752
Outer boundary 1150
15
12
R6
DETAIL C
SCALE 1 : 1
Sketched as seen from above