Instruction manual
Control cabinet cooling unit

CONTROL CABINET COOLING UNIT OC-4540E 3586.4355.00

EG – Declaration of conformity MRL 2006/42/EC Annex II A

The undersigned manufacturer – especially the company authorized person – the company

Seifert mtm System GmbH
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hereby certifies that the following installation

Model:	Control Cabinet Cooling Unit
Type:	OC-4540E
Year of manufacture:	_____ (see data label)
Serial number:	_____ (see data label)

described in the documentation attached here to conforms to the applicable directives as are:

EU Machinery Directive	2006/42/EC
EU Electro magnetic directive	2004/108/EC
EU Pressure equipment directive	97/23/EC, Art.3 (3)
EU Low voltage equipment directive	2006/95/EC

National Standard Specifications:
EN ISO 12100; EN 294; DIN 3168 <4.5>; EN 14511-4 <4.6>
EN 378; ENV 50205.
EN 60335-1; EN 60335-2-40;
EN50081-1; EN61000-6-2, -4-2, -4-3, -4-4, -4-6.

Note:
The above installation is not subject to the requirements set forth in Appendix IV applicable to machines embodying Special Risks and Dangers as defined in the EU Mechanical Engineering Directive 89/392/EEC, following which relevant documentation will remain in the custody of the manufacturer.

Malta, 28.07.2010

……	……..
Location, Date	Signature Marco Seifert, QA
	…….. Signature Keith Zammit, R&D

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1. Introduction

1.1 Seifert mtm Systems GmbH

Seifert mtm Systems GmbH designs and manufactures control cabinet air-conditioners and heat exchangers:

- Filterless units.
- Units with filter.
- Air/Water heat exchangers.
- Air/Air heat exchangers.

1.2 Control cabinet air conditioning unit

1.2.1 Type of unit

The unit is a control cabinet air conditioner.

- Year of manufacture (see data label)
- Model (siehe Typenschild)
- CE- Certification
- UL-Recognition, SA32278

Manufacturer:
Seifert mtm Systems GmbH
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1.2.2 Conditions of use

The unit is to be used exclusively for the dissipation of heat from control cabinets and enclosures in order to protect temperature sensitive components in an industrial environment. To meet the conditions of use all the information and instructions in the instruction manual must be adhered to.

1.2.3 Misuse

The unit must only be used as described under
"Conditions of use." Any other utilisation will be considered as misuse.

Examples of misuse are:
- Household use.
- Air-conditioning other domestic areas.

Misuse can lead to:
- Death or personal injury.
- Damage to the unit
- Other material damage

1.3 Legal regulations

1.3.1 Liability

The information, data and instructions contained in this instruction manual are current at the time of going to press. We reserve the right to make technical changes to the unit in the course of its development. Therefore no claims can be accepted for previously delivered units based on the information, diagrams or descriptions contained in this manual. No liability can be accepted for damage and production disruption caused by:

- Disregard of the instruction manual.
- Operator errors.
- Inappropriate work on or with the unit.
- The use of non-specified spares and accessories.
- Unauthorized modifications or changes to the unit by the user or his personnel.

Seifert mtm Systems GmbH is only liable for errors and omissions as outlined in the guarantee conditions contained in the main contractual agreement.
Claims for damages on any grounds are excluded.

1.3.3 Copyright

This manual and all enclosed documents are protected by copyright. Copies of the manual, in whole or part, or information as to the utilization of its contents must not be passed on to third parties without the express permission of Seifert mtm Systems GmbH. Litigation for damages can be made in cases of contravention. We reserve all rights for the full exercise of industrial copyright protection.

1.4. Instruction manual

This instruction manual contains information and instructions to enable the user to work safely, correctly and economically with and on the unit. Only when the manual is understood and adhered to can:

- Danger be avoided,
- Repair costs and stoppages reduced.
- Reliability and working life of the unit can be improved and extended.

1.4.1 Definitions

The main vocabulary used in this manual can be defined as follows:

Unit: Refers to the control cabinet cooler

User: is every actual or legally entitled person who uses the unit or who can entitle others to it.

Specialist personnel: a specialist is someone who due to training, knowledge and experience has the judgment necessary to carry out his work in a safe and correct manner. Specialist personnel are fully acquainted with safety regulations, standards, relevant regulations and working conditions.

Residual danger: refers to danger or risks which are not apparent when using the unit. For example:

- High electric voltage within the cabinet.

- Burns from hot components after the unit has been switched off.

- The cooling circuit is pressurized.

- There are moving parts inside the unit.

1.4.2. Pictograms and symbols contained in the text

In order to emphasize important information the following symbols and pictograms have been used in this manual.

Symbols:

- indicates specific points in a list
- ➢ indicates separate maintenance and operating steps

Pictograms:

General danger
Indicates compulsory safety regulations which are not covered by a specific pictogram such as one of the following.

High electric voltage
Indicates electric shock danger.

Important safety instruction
Indicates instructions for safe maintenance and operation of the unit.

Attention
Indicates possible burns from hot components.

Attention
Indicates possible damages to the unit.

Instruction
Indicates possible danger to the environment.

1.4.3. Structure and formation of the safety instructions

All safety instructions in this manual have a standardized structure. A safety instruction is made up of several parts:

- A pictogram.
- A signal word denoting the degree of danger.
- An instruction denoting the type of danger.
- An instruction for defence against the danger

The following signal words indicate the degree of danger:

Danger: Indicates an imminent danger for persons. Possible consequences: death or serious injury

Attention: Indicates possible personal or material danger.

Instruction (notice): Indicates a situation which could lead to damage to property or the environment. Possible consequences: damage of the unit itself, adjacent plant or the environment.

2. Safety instructions

2.1. Primary safety instructions

When delivered the unit meets current technical standards and can be safely taken into operation.

However, danger could emanate from the unit when:

- Unauthorised or untrained personnel work on or with the unit.
- The unit is misused.
- This could result in danger to persons, the unit and other property or material of the user.

2.1.1. Instruction manual

The submitted instruction manual serves to enable the user to work safely and correctly with and on the unit. It contains safety instructions which must be adhered to. In addition to the primary safety instructions contained in this chapter there are specific safety instructions in the other chapters. These instructions warn of dangers concerned with specific operations and must also be followed. The instruction manual must:

- Be read and understood by everyone working on or with the unit before the work commences.
- Always be held available in a specific location on the unit.
- Be complete and in a readable condition.

If the operator does not fully understand the instruction manual advice must be obtained from a specialist before work commences either ;

- In the works where the unit is located or,
- At Seifert mtm Systems GmbH.

before a dangerous situation develops.

2.1.2. User obligations

The user has many obligations to fulfil on behalf of his personnel.

The user is obliged:

- To update the manual with instructions contained in national safety and environmental regulations.
- To inform the personnel of all relevant instructions, regulations and laws.
- To ensure that all relevant instructions, regulations and laws are observed.
- To clearly delegate responsibility for operation, maintenance, cleaning and repair of the unit.
- To ensure that the delegated duties are carried out.
- To ensure that the personnel have read and understood the instruction manual especially the chapter on safety.

2.1.3 Personnel

Only specialists are allowed to work on the unit. Unauthorised personnel must be prohibited from working on the unit.

Operating personnel must inform their superiors immediately any malfunction of the unit becomes apparent.

2.1.4 The Control cabinet cooling unit

When working on or with the unit the following must be observed:

- The current specific regulations (e.g. VDE-regulations, etc.)
- The current accident prevention regulations (BGV)
- Related regulations
- The current environmental conservation regulations

The unit must only be used when in perfect working condition. When malfunctions or errors become apparent the unit must be immediately taken out of operation and the responsible personnel informed. The unit can only be taken back into operation when its perfect working condition has been restored.

2.1.5. Safety instructions

Please note that before starting work on or with the unit certain procedures must be carried out inside the cabinet on which the unit is mounted. These are among others mounting and taking the unit in or out of operation.

Before commencing work inside the cabinet the control cabinet manufacturer's instruction manual must be read with regard to:

- Safety instructions
- Instructions on taking the cabinet out of operation
- Instructions on the prevention of unauthorised cabinet reconnection.

2.1.6. General safety instructions

The electric equipment meets the valid VDE- and accident prevention and safety regulations. Dangerous voltage exists (above 50 V AC or above 100 V DC)

- Behind the control cabinet doors
- On the power supply in the unit housing.

The units have to be fused according to the type plate and the wiring diagram.

Switch the unit off immediately, if the electric power supply is interrupted.

Danger:
Danger from electrical voltage.
Only specialised personnel are allowed to maintain and clean the unit. The personnel must ensure that for the duration of the maintenance and cleaning the unit is disconnected from the electrical supply. The unit must therefore be taken out of operation according to instructions before work commences.

Danger
Danger through incorrect work on the unit.
Only specialised personnel are allowed to maintain and clean the unit. Regular maintenance and cleaning intervals must be kept to in order to ensure that the unit remains in perfect working condition and has a long working life.

Attention
Damage to the unit through the use of inappropriate cleaning materials.
Please do not use aggressive cleaning materials.

Instruction
Damage to the environment through unauthorised disposal.
All spare parts and associated materials must be disposed of with due regard for the environment.
The relevant environmental laws and regulations must be adhered to.

3. Technical information

3.1. Concise unit description

The air conditioner is used where heat needs to be dissipated from electrical control cabinets or similar enclosures in order to protect heat sensitive components. The unit has two completely separate air circuits which ensure that the clean cabinet air does not come into contact with the ambient air which may well be dirty or polluted. Control cabinet air conditioners can dissipate large quantities of heat from sealed enclosures such as control cabinets into the ambient air and at the same time reduce the cabinet internal temperature to below that of the ambient air.

The control cabinet air conditioner can function without problems in extreme ambient conditions (e.g. dusty and oily air or high air temperatures between -30°C and 55°C).

The control cabinet air conditioner can also heat the control cabinet when the temperature without any heating function would fall below an allowed temperature range.

3.2. Functional principles

The unit functions on the principle of the compression refrigerator. The main components are: refrigerant compressor, condenser, expansion valve and evaporator. These four components of the refrigerant plant are connected with each other by pipes to form a hermetically sealed system in which the refrigerant (R134a) circulates. R134a ($C_2H_2F_4$) is chlorine-free and has an ozone destruction potential (ODP) of 0.

3.3. Description of operation

When the unit is in operation the compressor draws in refrigerant vapour from the evaporator. The necessary energy needed to vaporize the refrigerant is taken from the cabinet air which flows through the evaporator. This cools the cabinet air which is then blown back into the cabinet by a fan. The refrigerant vapour, which has been drawn in by the compressor, is pumped under high pressure into the condenser. There the heat which has been taken from the evaporator and compressor, is dissipated in the ambient air which flows through the condenser. This condenses the refrigerant and the resulting heat is again passed on to the atmosphere. The expansion valve reduces the refrigerant to the necessary evaporator pressure. The introduction of heat evaporates the refrigerant. The evaporator is designed to fully evaporate the refrigerant. The refrigerant circuit is then complete.

3.3.1 Condensation drain

The condensed water, that forms in the evaporator, is led off directly to the condensation drain in the side of the unit.

3.3.3 Unit controls

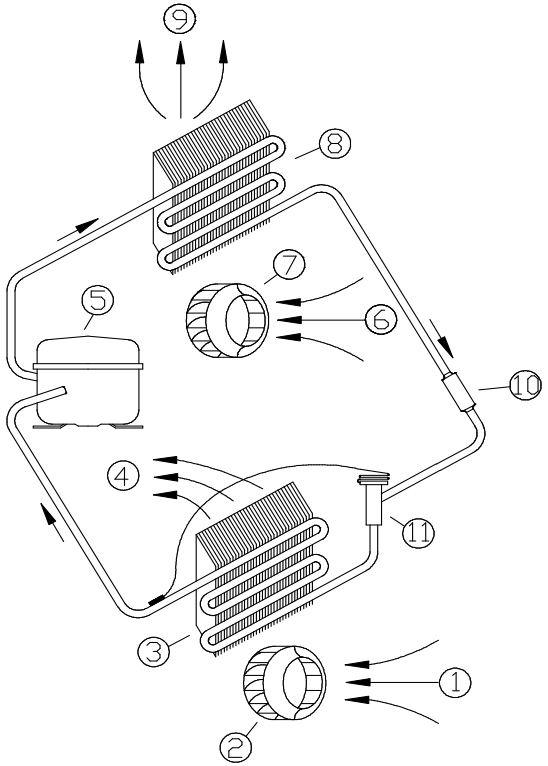
When the cabinet temperature is higher than the cabinet temperature set point, the refrigeration circuit is operated. The compressor speed is varied in order to maintain the required enclosure temperature. The ambient air fans (condenser) switch on and off together with the compressor. At low compressor speeds only one fan operates to conserve energy. Both fans operate at higher compressor speeds.

The variable speed functionality of the compressor allows for control of the temperature inside the cabinet within a tight range, which reduces component stress, reduces the starting and switching off of the compressor and allows for energy savings of up to 30% over a conventional system.

When the cabinet temperature is lower than the cabinet temperature heating set point, the heating circuit is operated. The heater is powered until the cabinet temperature has reached the set point. The refrigeration circuit does not operate in this case.

3.4. Pictorial description

The pictorial description shows the main components of the control cabinet air conditioner in pictorial form to aid recognition and orientation. The individual components are numbered.



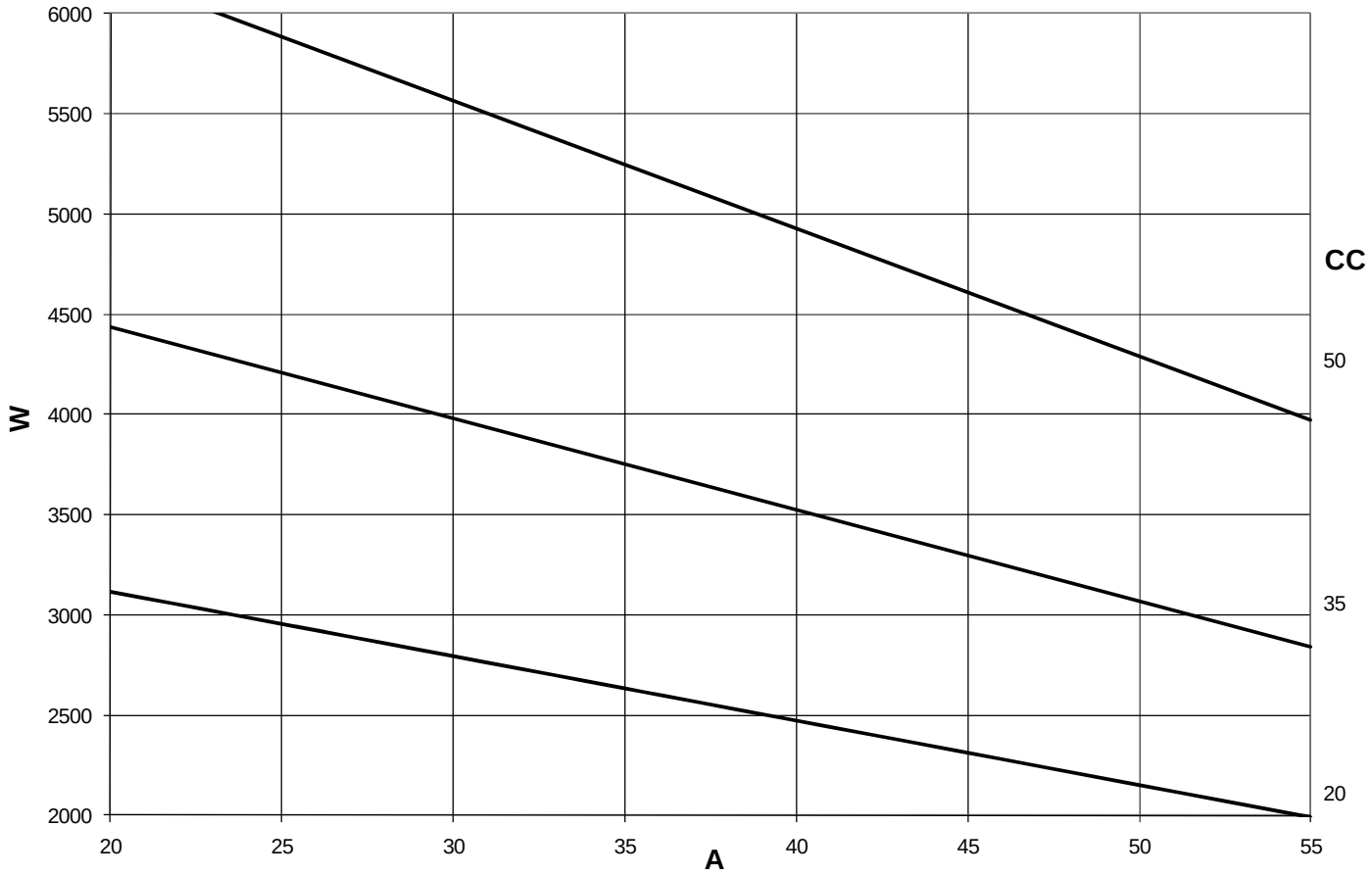
1. Air intake cabinet side.
2. Radial fan cabinet side.
3. Evaporator.
4. Air outlet cabinet side.
5. Compressor.
6. Air intake ambient side.
7. Radial fan ambient side.
8. Condenser.
9. Air outlet ambient side.
10. Filter dryer.
11. Expansion valve.

Fig: pictogram of control cabinet air conditioner

4.

	Technical data
	GL SCHALTSCHRANK-KÜHLGERÄT OC-4540E
Part No. (R&S) Part No. (SEIFERT)	3586.4355.00 4540012
Housing material	Stainless Steel, Powder coated RAL7047
Housing dimensions	880 x 613 x 614mm (air conditioner) – 1000 x 700 x 658 (hood)
Weight	63 kg (air conditioner)
Operational temperature range	-30°C – +55°C
Protection rating	NEMA 4X
Cooling performance to DIN 3168	
Cooling capacity	800 – 3750 W
Compressor	Rotary piston, variable speed
Refrigerant	R 134 a
Refrigerant load	1520 g
Max. working Pressure	PS 40 / PO 37 bar
Heating performance	
Heating capacity	1000 W
Elektrische Anschlussdaten – electrical data	
Voltage	230 V
Frequency	50/60 Hz
Max. Rated current	9.1 A
Max. start-up current	10 A
Power consumption (L35L35)	2000 W
Power consumption (max)	2750 W
Fuse rating - (T)	12 A

4.1.	Performance characteristics



W = Actual cooling capacity [W]
A = Condenser air intake temperature [°C]
CC = Enclosure air intake temperature [°C]

Fig: Performance characteristics at maximum compressor speed

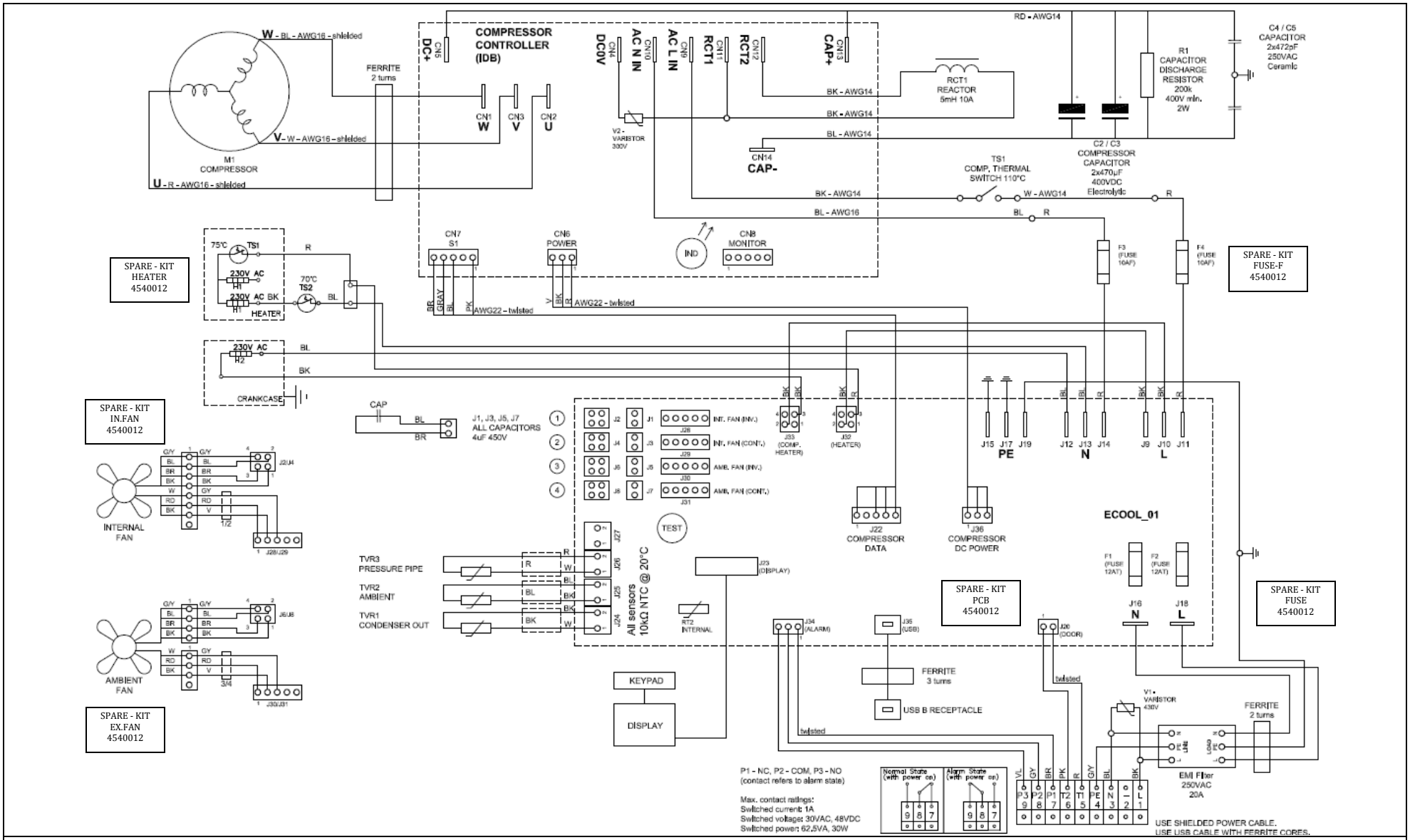
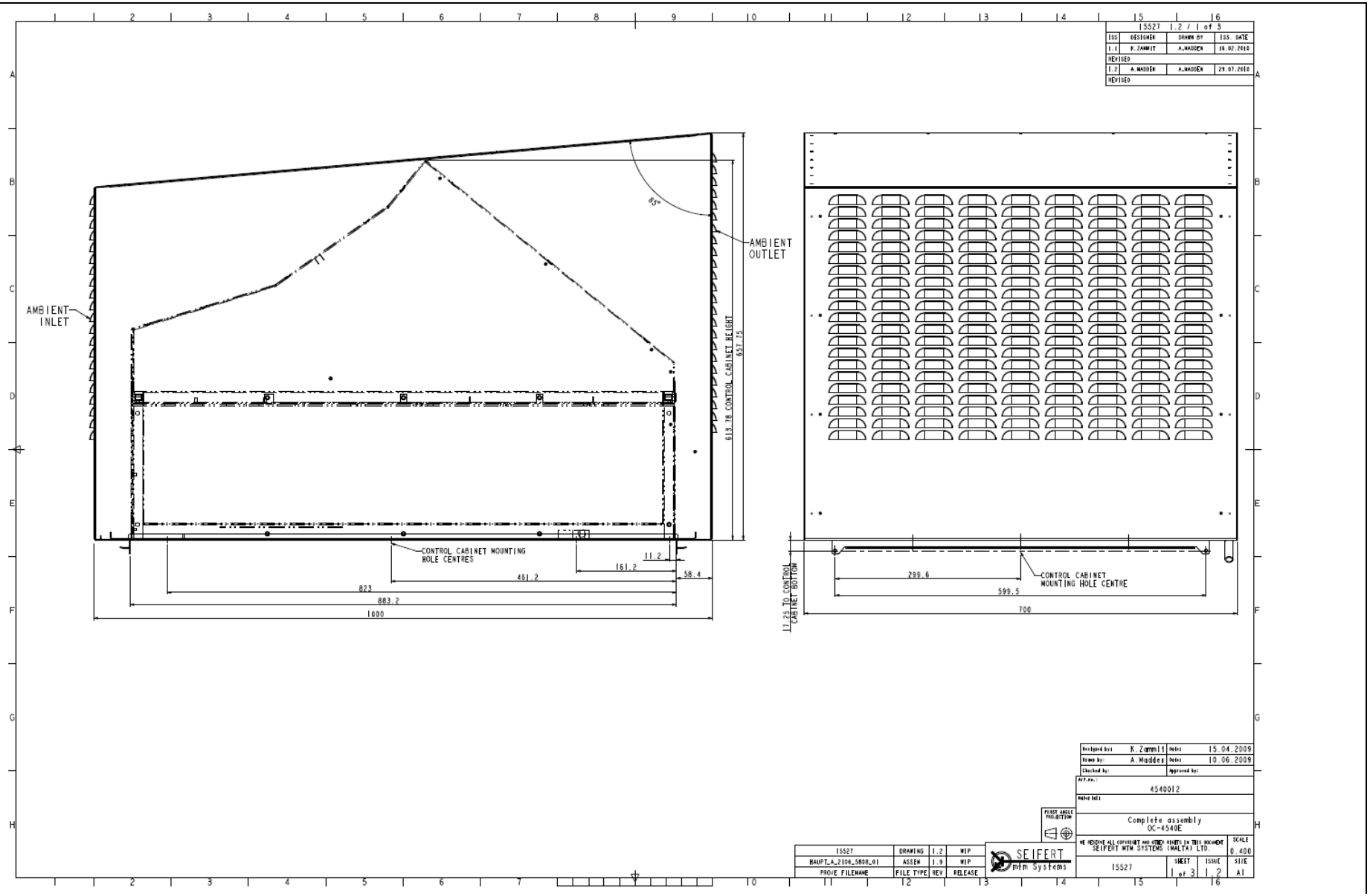


Fig: Circuit diagram


AMBIENT INLET
AMBIENT OUTLET
45°
613.78 CONTROL CABINET HEIGHT
657.75
CONTROL CABINET MOUNTING HOLE CENTRES
11.2
161.2
58.4
461.2
823
883.2
1000
11.24 TO CONTROL CABINET BOTTOM
299.6
599.5
700
CONTROL CABINET MOUNTING HOLE CENTRE
15527 1.2 / 1 of 3
ISS DESIGNER DRAWN BY ISS. DATE
1.1 K.ZAMMIT A.MADDEN 16.02.2010
REVISED
1.2 A.MADDEN A.MADDEN 29.07.2010
REVISED
Designed by: K.Zammit Date: 15.04.2009
Drawn by: A.Maddeo Date: 10.06.2009
Checked by: Approved by:
Art.no.: 4540012
Complete assembly OC-4540E
SEIFERT mtm Systems
15527 DRAWING 1.2 WIP
HAUPT_A_2106_5808_01 ASSEM 1.9 WIP
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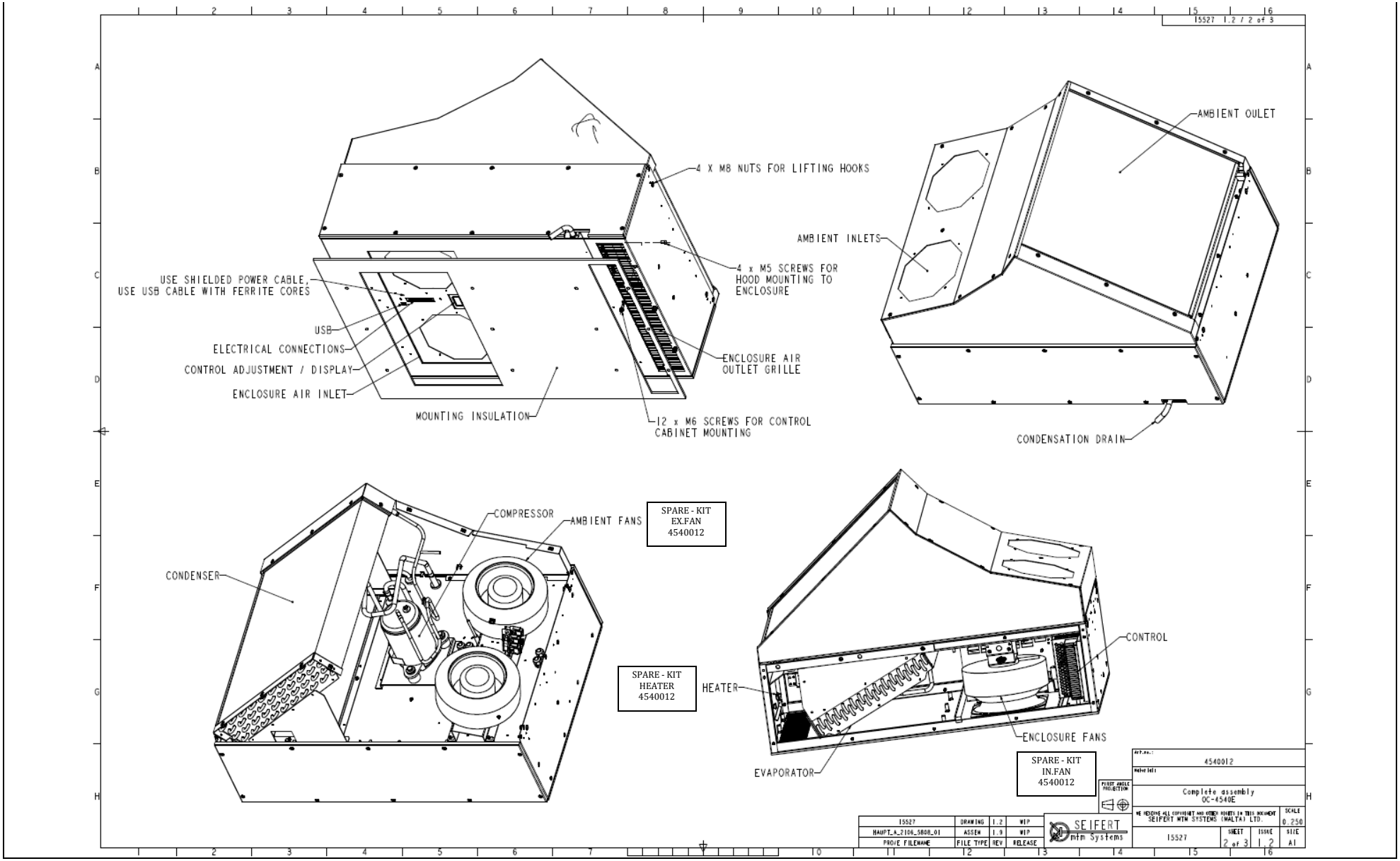
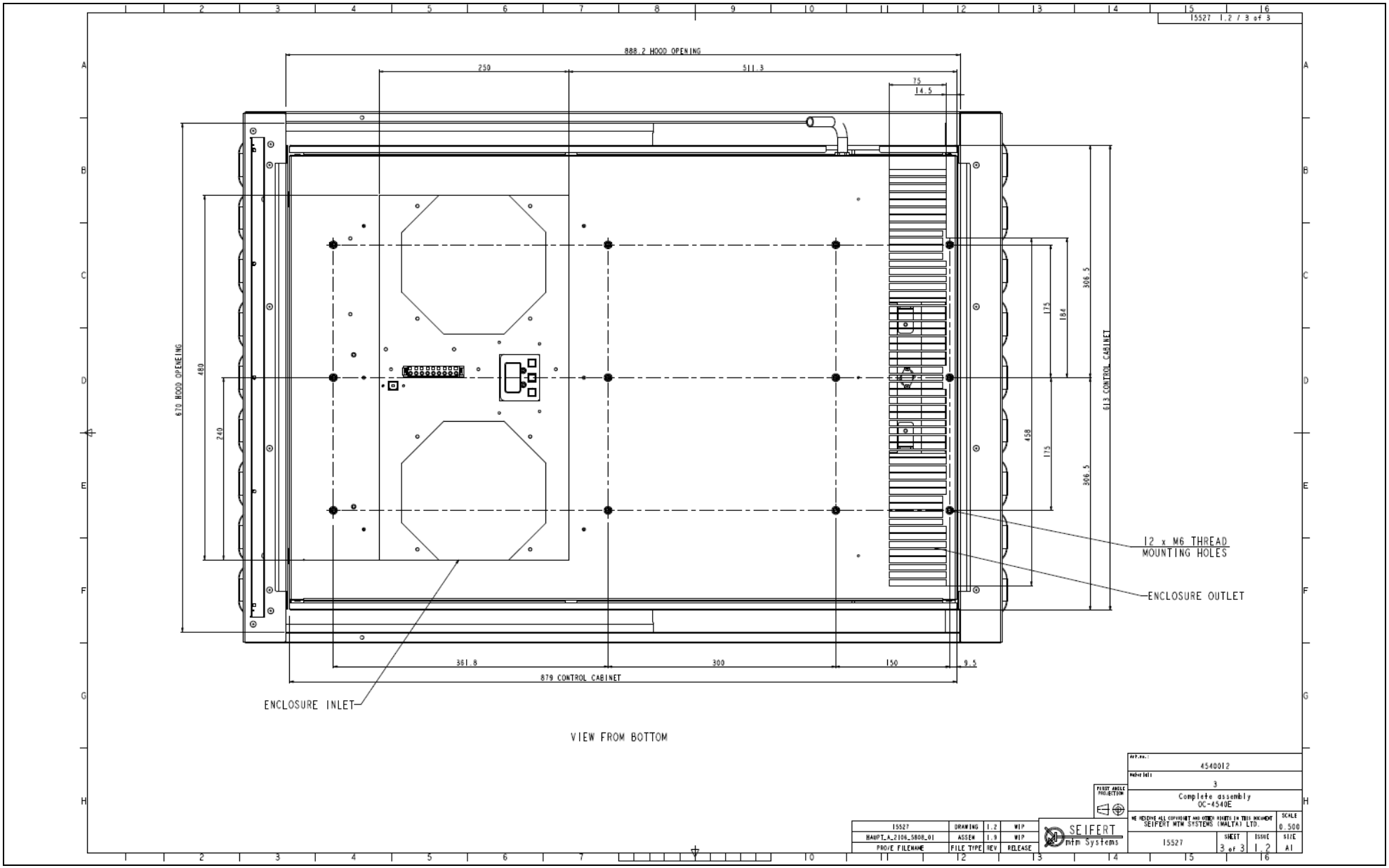
SHEET 1 of 3
ISSUE 1.2
SIZE A1


15527 1.2 / 2 of 3
4 X M8 NUTS FOR LIFTING HOOKS
4 x M5 SCREWS FOR HOOD MOUNTING TO ENCLOSURE
USE SHIELDED POWER CABLE, USE USB CABLE WITH FERRITE CORES
USB
ELECTRICAL CONNECTIONS
CONTROL ADJUSTMENT / DISPLAY
ENCLOSURE AIR INLET
MOUNTING INSULATION
ENCLOSURE AIR OUTLET GRILLE
12 x M6 SCREWS FOR CONTROL CABINET MOUNTING
AMBIENT OULET
AMBIENT INLETS
CONDENSATION DRAIN
COMPRESSOR
AMBIENT FANS
CONDENSER
SPARE - KIT EX.FAN 4540012
SPARE - KIT HEATER 4540012
HEATER
CONTROL
ENCLOSURE FANS
EVAPORATOR
SPARE - KIT IN.FAN 4540012
4540012
Complete assembly OC-4540E
SEIFERT mtm Systems
15527
SHEET 2 of 3
ISSUE 1.2
SIZE A1
SCALE 0.250


888.2 HOOD OPENING
250
511.3
75
14.5
670 HOOD OPENING
480
240
306.5
175
184
613 CONTROL CABINET
458
175
306.5
12 x M6 THREAD
MOUNTING HOLES
ENCLOSURE OUTLET
361.8
300
150
9.5
879 CONTROL CABINET
ENCLOSURE INLET
VIEW FROM BOTTOM
15527 1.2 / 3 of 3
4540012
3
Complete assembly
OC-4540E
SEIFERT mtm Systems
15527
SHEET 3 of 3
ISSUE 1.2
SIZE A1
SCALE 0.500

5. Mounting and operational start-up

Danger:
Danger from electrical voltage.
The unit must be mounted by specialist personnel (qualified electricians). The personnel must ensure that the cabinet is disconnected from the electrical supply for the duration of the mounting operation. Therefore take the cabinet out of operation, following the relevant instructions before mounting work commences.

Attention:
Danger through incorrect work on the unit.
Only specialists are allowed to put the unit into operation.

5.1. Mounting preparations

Several points must be checked before the unit can be mounted. These checks must be made to ensure safety and the trouble-free operation of the unit.

These checks must be carried out with absolute thoroughness to ensure that the unit works perfectly.

5.1.1. Transport damage check

On delivery the carton containing the unit must be examined for signs of transport damage. Any transport damage to the carton could indicate that the unit itself has been damaged in transit which in the worst case could mean that the unit will not function.

5.1.2. Location and space requirements

The location of the cabinet must allow for sufficient air circulation to and from the unit.

Attention
Damage to the unit through incorrect mounting.
The unit must be mounted vertically. It is therefore also important to check, with the help of a spirit-level , that the cabinet is in a horizontal position. The max. deviation from the vertical or horizontal is 1 degree.

5.1.3. Air apertures

To provide adequate air circulation and avoid temperature layers from forming, ensure that:

- air inlet, and
- air outlet

are not partially or completely blocked by obstructions in the cabinet.

5.1.4. Sealing

To guarantee that the unit works perfectly ensure that:

- the control cabinet is completely sealed (to NEMA 4X).
- a good seal exists between the control cabinet and the unit.

If necessary the cabinet mounting surface should be reinforced.

5.2. Mounting instructions

Danger
Danger from electrical voltage.
Ensure that for the duration of the mounting operation the cabinet is disconnected from the electrical supply. Therefore take the cabinet out of operation, following the relevant instructions, before mounting work begins and take all precautions to prevent premature reconnection of the cabinet.

When all mounting preparations are complete the actual mounting operation can commence.

5.2.1. Mounting the unit

Only use the enclosed material to mount the unit on the cabinet.

Proceed as follows to secure the unit on the cabinet:

- Screw the M6 slotted set screws into the threaded rivets in the base of the unit.
- The mounting gasket is already fixed to the air conditioner surface as shown in 4.1.
- Place the air conditioner onto the enclosure roof and ensure that the screws pass through the appropriate mounting holes. If necessary, M8 lifting hooks can be installed on the air conditioner sides (4 off) to allow lifting by mechanical means.
- Screw the locknuts and washers onto the slotted set screws and tighten.
- If used, remove the lifting hooks.
- Connect the condensate drain connection.
- Place the hood over the air conditioner and ensure that it is located correctly.
- Screw the M5 screws into the threaded rivets in the sides of the enclosure, thus securing the hood.

The resistance of the earth connection between cabinet and cooling unit must be <0.1Ω.

5.2.2. Condensation drain pipe connection

The condensation drain is located on the front side of the unit (see 4.1). The condensation drain pipe should be attached. This is to be done before the hood is fitted.

- Attach the flexible hose provided to the drain connection and secure it with a tie wrap.
- Route the pipe into the nearest slot in the enclosure wall.
- Ensure that the pipe is continuously tilted downwards. If necessary retain the pipe to the enclosure.

5.3. Electrical connection

Danger
Danger from electrical voltage
The unit should only be connected by qualified electricians. The personnel must ensure that the unit is disconnected form the electrical supply for the duration of connection work and is protected against unauthorised reconnection.

Instruction
Check that the available voltage, frequency and fuse rating are the same as those stated on the unit data label.

5.3.1. Connection to the main electrical supply

The mains connection is made via a connection terminal block. Use shielded cables. To connect the unit to the mains proceed as follows:

- Take the control cabinet out of operation in the prescribed manner
- See the connection details on the wiring label
- Note the connections on the nine pole terminal block from the table below

1	**L1**	Live / Phase, 230VAC
2	**-**	Not used
3	**N**	Neutral
4	**PE**	Protection-Earth
5	**T1**	Door contact (bridged with T2)
6	**T2**	Door contact (bridged with T1)
7	**P1**	Excess temperature warning (NC)
8	**P2**	Excess temperature warning (Common)
9	**P3**	Excess temperature warning (NO)

- Pre-wire the nine pole terminal block
- Connect the terminal block to the air conditioner and to the mains. The air conditioner connection is located within the air intake on the enclosure side.
- Put the control cabinet back into operation

Power consumption and start-up current are stated on the data label and under technical data.

5.3.2. Fault warning connection

A fault warning contact for temperatures in excess of the pre-set high cabinet temperature or lower than the pre-set low cabinet temperature is available and can be connected as required. The operating current for this function must be less than 1A, 48VDC/30VAC. Switched power is to be less than 62.5VA or 30W.

The fault warning is connected via terminals P1, P2 and P3 on the connection terminal block.

P1	NC, closed contacts when no alarm, open contacts in alarm condition
P2	Common
P3	NO, open contacts when no alarm, closed contacts in alarm condition

The high temperature adjustment range is between 25°C and 55°C. The alarm temperature is pre-set in our works at 50°C.
The low temperature adjustment range is between -10°C and 10°C. The alarm temperature is pre-set in our works at 0°C.
The alarm temperatures can be adjusted by using the digital display.

5.3.3. Door contact switch connection

If required the unit can be switched on or off via a door contact switch (terminals T1 & T2). When delivered the door contact terminals are bridged.

To connect the door contact switch:

- Remove the bridge from terminals T1 and T2.
- Connect the door contact switch to terminals T1 and T2.
- For the air conditioner to operate the contact must be closed when the cabinet door is closed.

6. Taking into operation

Attention
The unit can be damaged by lack of lubricant.

To ensure that the compressor is adequately lubricated the oil, which has been displaced during transport, must be allowed to flow back into it. The unit must therefore be allowed to stand for at least 15 min. after mounting before being connected to the mains and taken into operation.

The unit is controlled in relation to the cabinet internal temperature. A temperature sensor continuously measures the temperature of the air which is drawn into the unit from the cabinet. The required cabinet temperature can be set by using the display. The temp. adjustment range is between 20°C and 50°C. The value target temperature is pre-set in our works at 35°C.

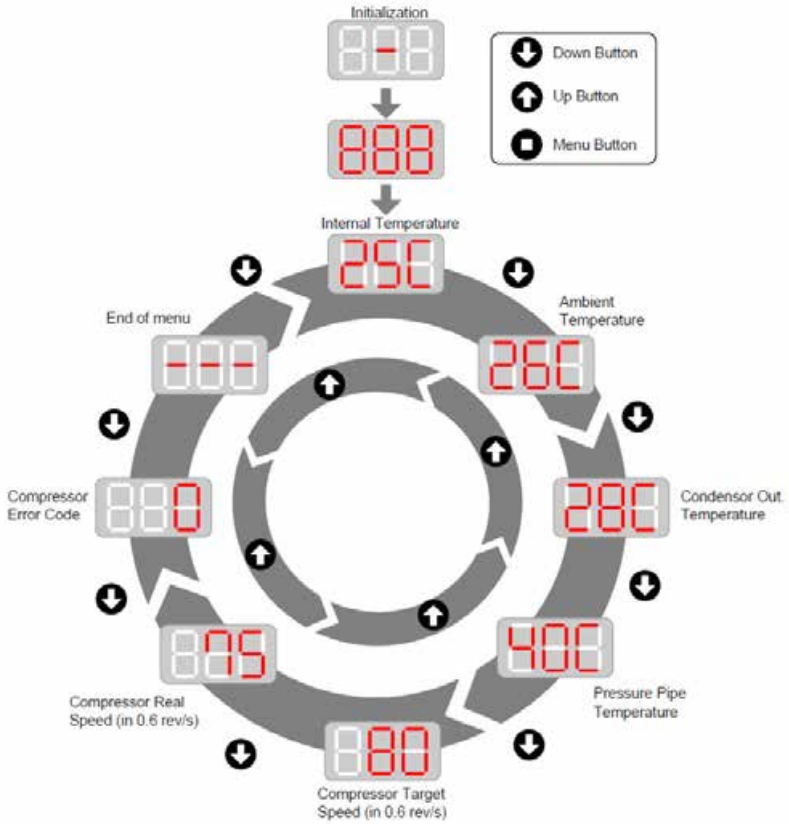
The compressor is speed regulated depending on the cabinet air temperature. The compressor start-up delay is ca. 1-2 minutes. The compressor will operate for a minimum time of 2-3 minutes. The ambient air fans (condenser) switch on with the compressor in order to save energy. At low compressor speeds, only one fan is used. Both fans are used at higher speeds. The ambient fans switch off 30 seconds after the compressor to ensure a faster pressure equalisation. The operating time of the ambient fans are monitored and the fans are switched so that both fans will operate for an approximately equal time.

If the temperature of the enclosure falls and heating operation is required, the heater is switched on. During this function the compressor and ambient fans do not operate. The required cabinet temperature for heating operation can be set by using the display. The temp. adjustment range is between -10°C and 15°C. The value target temperature is pre-set in our works at 5°C.

In cold ambient temperatures (<10°C), the compressor crankcase heater is used when the compressor is off. This protects the system from excessive refrigerant migration and damage. The ambient fans will also operate only when the condenser is sufficiently warm.

6.1. Digital Display and Keypad

The unit is provided with a digital display and keypad that can be used to monitor the operation of the unit. The display is located inside the enclosure air intake area. The monitoring function is shown below.



After the initialization period that lasts approximately 30 seconds, the internal temperature is displayed. By pressing the ⬆ or ⬇ buttons, the display will show the different parameters. No adjustments can be made and the values are for information purposes only.

During normal mode, the internal temperature only is displayed. The 2 green LEDs below the digits will be on. If no buttons are pressed for a period of time, the display will return to showing the internal temperature.

6.2. Digital Display and Keypad – Adjustment

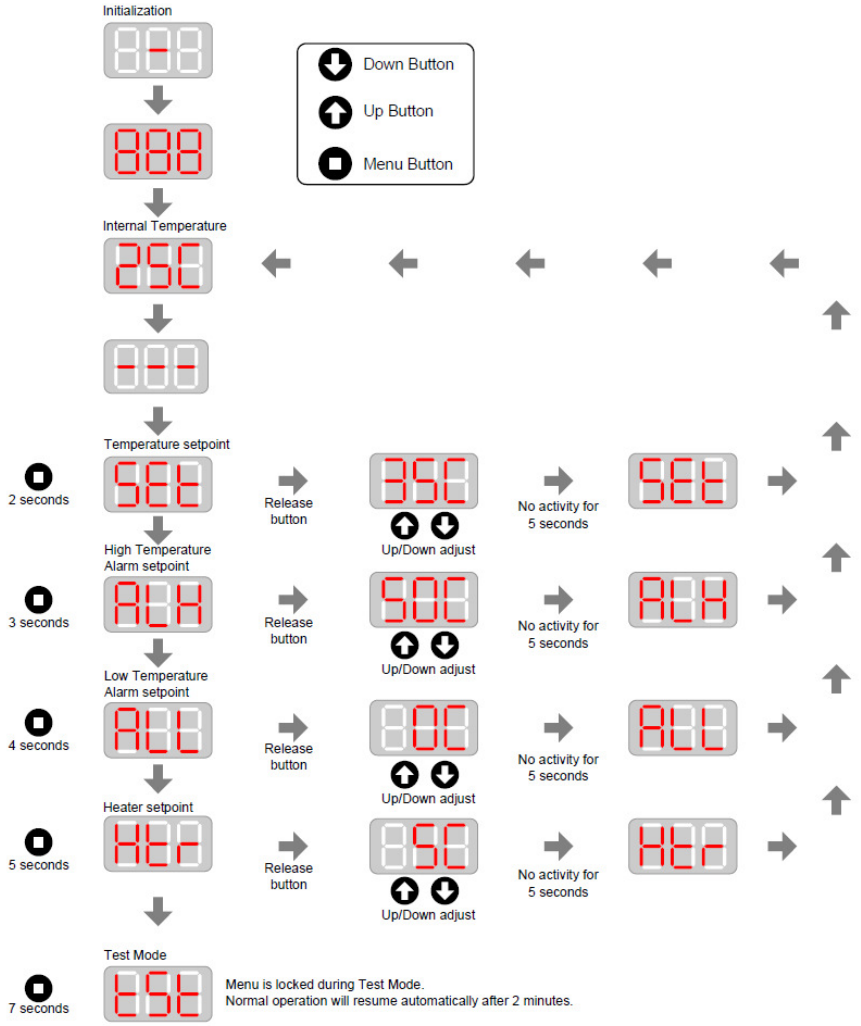
The unit is provided with a digital display and keypad that can be used to adjust the operation of the unit. The adjustment function is shown to the right.

After the initialization period that lasts approximately 30 seconds, the internal temperature is displayed. By holding the button, the parameter to be adjusted can be selected and modified. The new value will be adjusted after no activity on the keypad is registered for 5 seconds. The parameter code will be displayed and normal operation will then be resumed with the new setting.

From the adjustment mode it is possible to enter test mode. By holding the button for 7 seconds, "tSt" is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans.

Record the actual set values in the table below.

Setpoint	Default setting	My setting
Temperature	*35°C*	
High temperature alarm	*50°C*	
Low temperature alarm	*0°C*	
Heater	*5°C*	



6.3. Display of Alarm Conditions

If an alarm condition is present, this is displayed as a code on the display and the 2 green LEDs below the digits will be turned off. The error code is displayed alternately to the internal temperature. If more than one error code exists, the codes are displayed in sequence. The possible error codes are:

AL1	**Compressor failure**	The compressor is not operating correctly
AL2	**High pressure pipe temperature**	The pressure pipe temperature is too high. This can be an indication of a blocked ambient air filter, blocked ambient air flow, very high ambient temperature or very high enclosure temperature.
AL3	**High temperature**	High temperature alarm
AL4	**Sensor fail, onboard**	Enclosure temperature sensor has failed
AL5	**Sensor fail, pressure pipe**	Pressure pipe temperature sensor has failed
AL6	**Sensor fail, condenser**	Condenser outlet temperature sensor has failed
AL7	**Sensor fail, ambient**	Ambient temperature sensor has failed
AL8	**Low temperature**	Low temperature alarm
AL9	**Fan failure**	A fan has failed. Fan speed < 1500rpm
AL10	**Fan low speed alarm**	The speed of a fan has fallen below 2000rpm. It can be about to fail.

7. Fault finding

In case of failure, the air conditioner operation can be investigated in a number of ways. It is recommended that as a first action, the unit power is removed and reinstated, after which a self test mode is run.

From the adjustment mode it is possible to enter test mode. By holding the ⏻ button for 7 seconds, "tSt" is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans. Cold air should blow out of the internal air outlet.

Note also any alarm that may be displayed on the display. The causes of the errors are given in section 6.3. Further possible sources of failure are described below.

Problem	Cause	Corrective Measure
Unit does not function	Voltage too low or not present	Consult qualified electrical personnel. Check the rating of the air conditioner. Check the fuses (spare KIT FUSE 4540012) and/or controller (spare KIT PCB 4540012)
Inner circuit fans operates but outer fans and compressor do not	Controller has switched unit off	Check the desired temperature setting (display setting) and readjust if necessary.
	Winding protector of the compressor or fans has switched off	Check the compressor and / or fans. Allow unit to cool.
	Ambient air temperature and / or internal cabinet temperature is too high	See application range and allow unit to cool.
Inner and outer circuit fans operate, but the compressor does not	Compressor motor protector and protection devices have switched off the compressor.	Check if ambient temperature is too high. Compressor should restart automatically when operating conditions are restored. Check the fuses (spare KIT FUSE-F 4540012)
	Ambient temperature is too high, causing compressor to overload	See application range and allow unit to cool. Compressor should restart automatically when operating conditions are restored.
Both fans and the compressor are operating but no or little cooling.	Coolant circuit or compressor faulty	Check coolant circuit for leakage
	Filter clogged	Clean or replace filter (spare 501910100)
Only the inner fan/s are not operating	Fan motor is faulty	Replace fan motor (spare KIT IN.FAN 4540012)
Only the outer fan/s are not operating	Fan motor is faulty	Replace fan motor (spare KIT EX.FAN 4540012)
Alarm contact gives a signal / alarm on display	Check error code	Action as error
Unit does not heat	Controller has switched heater off	Check the desired temperature setting (display setting) and readjust if necessary.
	Heater is faulty	Replace heater (spare KIT HEATER 4540012)

In case of a fault that cannot be identified please call us on the Customer Support contacts in this manual.

ATTENTION:
It would be of great help in locating the fault if, before calling us, the test operation was entered (as described above), as this should activate all the fans and the compressor, independent of the cabinet temperature. Please note the alarm code indicated on the display (see also section 6.3).

8. Maintenance and cleaning

Danger
Danger from electrical voltage.
Maintenance and cleaning must be carried out by specialists (electricians). The personnel must ensure that for the duration of this work the unit and the cabinet are disconnected from the electrical supply and protected against unauthorised reactivation.

Danger
Danger through incorrect work on the unit.
The instructions in the cabinet manufacturer's manual must be adhered to.

Attention
Damage to the unit through incorrect maintenance and repair.
Maintenance and repair of the refrigerant circuit must be carried out by the manufacturer or another specialist.

8.1. Unit service and cleaning

The following points must be taken into account:

Danger from electrical voltage.
The service and cleaning of the unit must be undertaken by specialists. The personnel must ensure that for the duration of the cleaning work the unit and the cabinet are disconnected from the electrical supply and protected against unauthorized reconnection. The connections T1/ T2 and P1/ P2/ P3 are not low voltage (<50V).

- Regularly check the ambient air filter for dirt.

The standard filter maintenance interval is 6 months when used in a low pollution environment (PM10 <20µg/m^3). In environment pollution levels of PM10 50µg/m^3, the maintenance interval is 3 months, and in high pollution levels of PM10 100µg/m^3, the maintenance interval is 1.5 months

Should the ambient air filter need removal and cleaning:

- Open the enclosure door on the ambient air inlet side (lower part of hood).
- Remove the air filter from its retaining slot by pulling it downwards.
- Check the filter for cleanliness.
- Any dust or other dirt inside the filter should be removed by shaking or knocking it against a hard surface.
- If necessary the filter can be cleaned with compressed air or washed.
- Refit the filter into its slot.
- Close the enclosure door.

If the air conditioner hood is removed, the ambient areas of the air conditioner should be cleaned.

- Disconnect the air conditioner from the electrical supply.
- Clean the mesh on the air intake to the ambient fans.
- Clean the air outlet surface of the condenser.
- If excessive dirt is noticed, remove the air intake panel by unscrewing the retaining fasteners.
- Clean the fan, compressor and condenser areas.
- Refit the air intake panel.

8.2. Maintenance Schedule and Record

The following maintenance schedule must be followed:

Every 6 months	Clean or replace filter, error read-out (via USB interface, on instruction from manufacturer), update firmware (if newer version available, on instruction from manufacturer). For low pollution area. Earlier if pollution level is higher.
Additionally, every 1 year	Inspect ambient area and clean. For low pollution area. Earlier if pollution level is higher.
Additionally, every 2 years	Replace ambient fans. Earlier if pollution level is higher or pre-failure warning alarm given. Later if uses in lower ambient conditions (<35°C).
Additionally, every 4 years	Replace internal fans. Earlier if pre-failure warning alarm given

DATE	OPERATION	DONE BY:

9. Repairs

Danger
Danger from electrical voltage.
Repairs must be carried out by specialists (electricians). The personnel must ensure that for the duration of this work the unit and the cabinet are disconnected from the electrical supply and protected against unauthorised reactivation.

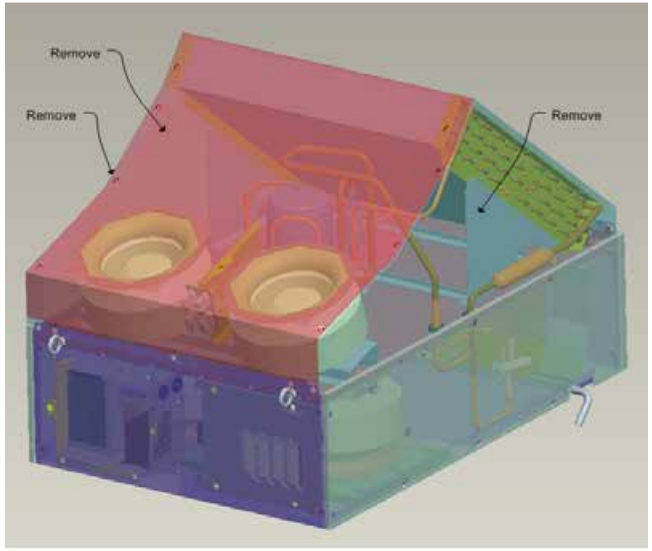
Danger
Danger through incorrect work on the unit.
The instructions in the cabinet manufacturer's manual must be adhered to.

Attention
Damage to the unit through incorrect maintenance and repair.
Maintenance and repair of the refrigerant circuit must be carried out by the manufacturer or another specialist.

9.1. Replacement of ambient fans (use KIT EX. FAN 4540012)

The following steps must be followed:

- Remove the air conditioner hood
- Remove the top panels around the ambient fans (top picture)
- Disconnect the fan connectors (bottom picture)
- Remove the retainers for the cables to the compressor
- Loosen the 8 nuts retaining the fan bracket to the housing (bottom picture)
- Remove the fan assembly by sliding it towards the condenser and lifting it out (bottom picture)
- Clean the area around the fan assembly
- Fix the new fan bracket and tighten the 8 nuts
- Connect the fan connectors. The left connectors must connect to the left fan connectors. The right connectors must connect to the right fan connectors.
- Fix the retainers for the cables to the compressor
- Fix the top panels around the ambient fans
- Perform functional tests
- Fix the air conditioner hood

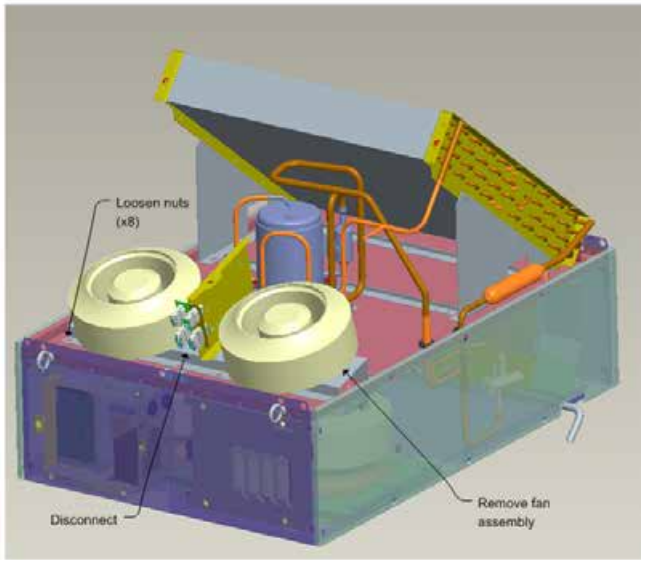


Functional tests:

After repairs, the electrical safety must be checked according to DIN VDE 0701 / DIN VDE 702 and R&S Hausvorschrift TVR502.

Hold the ⏻ button on the display for 7 seconds, “tSt” is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans. Cold air should blow out of the internal air outlet.

During the test operation, confirm that the replaced ambient fans operate correctly and there is not rubbing of the fans against other parts or other abnormal mechanical noises.

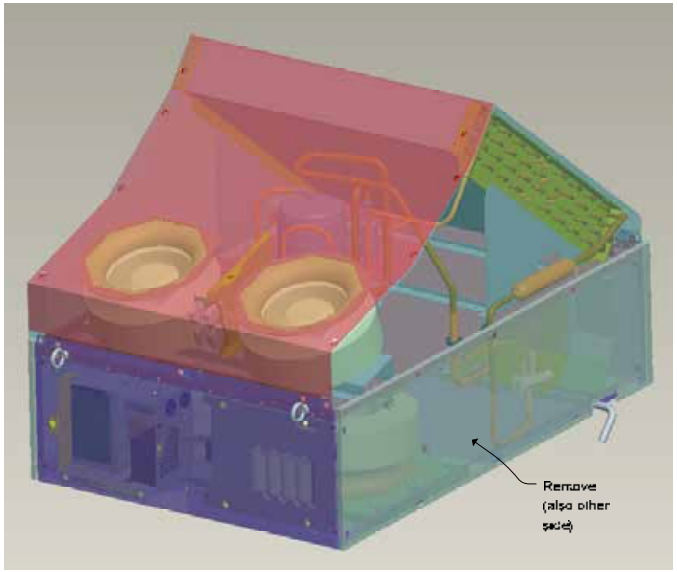


9.2. Replacement of internal fans (use KIT IN. FAN 4540012)

It is recommended to replace both internal fans even if only one has failed. The spare part no. delivers 2 fan modules.

The following steps must be followed:

- Remove the air conditioner hood
- Remove the lower side panel giving access on the side of the fan to replace
- Disconnect the fan connector
- Remove the 2 front screws
- Using a long Phillips screw driver (>200mm), loosen the screw retaining the fan bracket to the housing on the inner side
- Remove the fan assembly by lifting it out of the rear screw and moving it towards the evaporator until it can be removed from the side
- Fix the new fan bracket and tighten the rear screw. Replace the 2 front screws.
- Connect the fan connector
- Repeat the instructions to replace the other fan.
- Fix the lower side panels
- Perform functional tests
- Fix the air conditioner hood

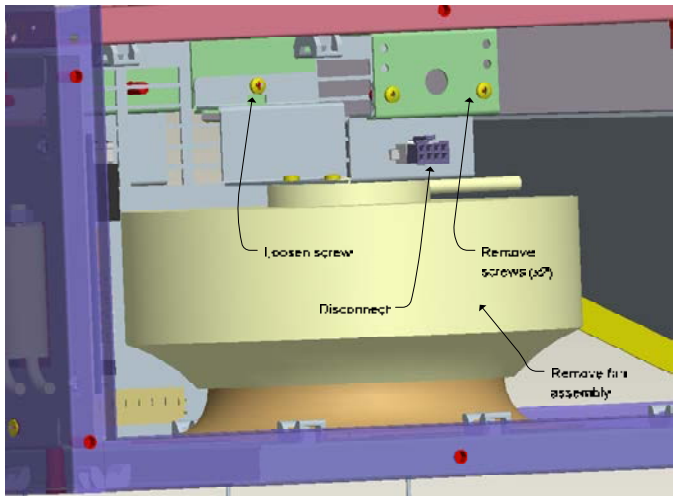


Functional tests:

After repairs, the electrical safety must be checked according to DIN VDE 0701 / DIN VDE 702 and R&S Hausvorschrift TVR502.

Hold the button on the display for 7 seconds, “tSt” is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans. Cold air should blow out of the internal air outlet.

During the test operation, confirm that the replaced internal fans operate correctly and there is not rubbing of the fans against other parts or other abnormal mechanical noises.

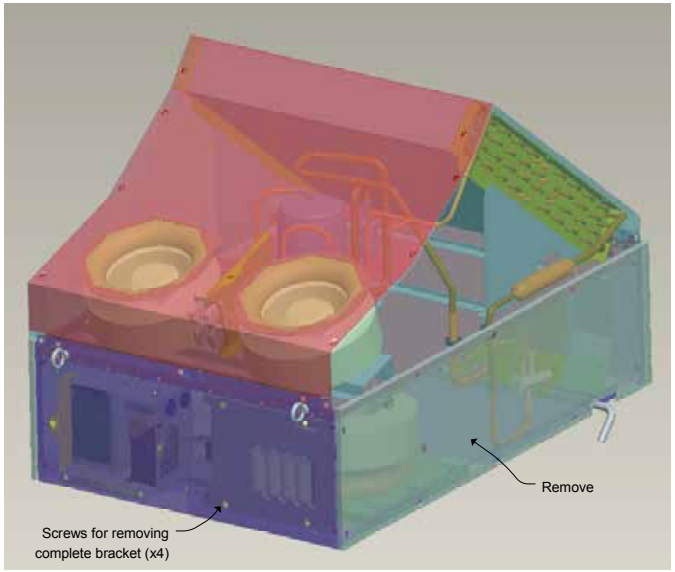


9.3. Replacement of controller (use KIT PCB 4540012)

NOTE: After replacing the PCB, the default settings will be applied. If alternative settings are required, set them as described in section 6.2.

The following steps must be followed:

- Remove the air conditioner hood
- Remove the lower side panel giving access on the side of the controller (side with the ambient fans on the left and condenser on the right)
- Remove the internal fan as described in 9.2 above.
- Disconnect all the connectors to the control board.
- Slide the controller retaining clips (x6) and remove the controller by pulling it out of the clips. Alternatively, the complete retaining bracket can be removed by removing the 4 retaining screws from outside the unit.
- Fix the new controller ensuring that the clips are well secured.
- Reconnect all the connectors to the control board ensuring the correct connections. Use the circuit diagram for guidance (fixed to unit and section 4.1).
- Fix the lower side panel
- Perform functional tests
- Set the required settings (as described in section 6.2 if required)
- Fix the air conditioner hood

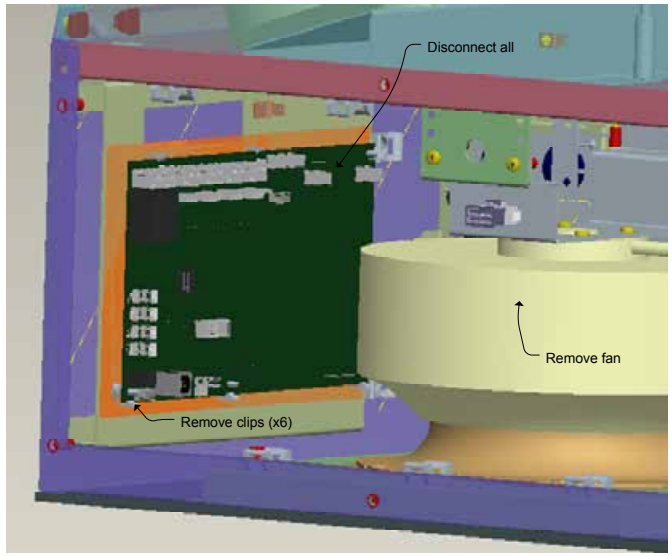


Functional tests:

After repairs, the electrical safety must be checked according to DIN VDE 0701 / DIN VDE 702 and R&S Hausvorschrift TVR502.

Hold the ⏻ button on the display for 7 seconds, "tSt" is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans. Cold air should blow out of the internal air outlet.

During the test operation, confirm that the fans and compressor operate correctly and that the display operates correctly.



9.4. Replacement of heater (use KIT HEATER 4540012)

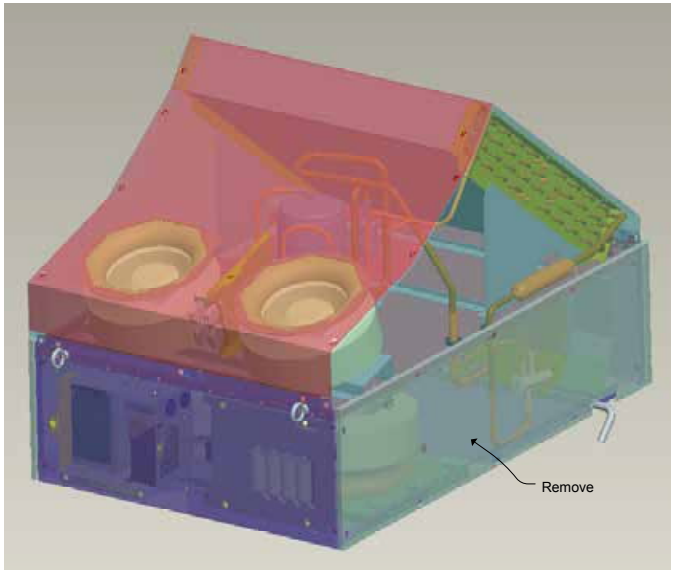
The following steps must be followed:

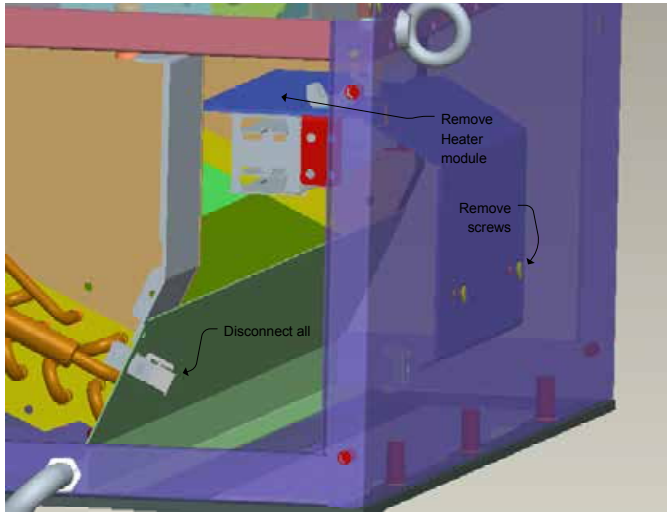
- Remove the air conditioner hood
- Remove the lower side panel giving access on the side of the controller (side with the ambient fans on the left and condenser on the right)
- Disconnect the heater module connector.
- Remove the 2 heater retaining screws from outside the unit.
- Remove the heater assembly
- Fix the new heater assembly and reconnect the connector.
- Fix the lower side panel
- Perform functional tests
- Fix the air conditioner hood

Functional tests:

After repairs, the electrical safety must be checked according to DIN VDE 0701 / DIN VDE 702 and R&S Hausvorschrift TVR502.

Heater operation can be checked by simulating a cold temperature at the air intake to the air conditioner. It is possible to set the heater setting to operate at a temperature of 15°C max. (as described in section 6.2 if required). When the heater setting is at 15°C and the temperature at the air intake to the air conditioner is colder, the heater will function and warm air will blow out of the air conditioner air outlet.





9.5. Replacement of fuses (use KIT FUSE 4540012 or KIT FUSE-F 4540012)

The following steps must be followed:

- Remove the air conditioner hood
- Remove the lower side panel giving access on the side of the controller (side with the ambient fans on the left and condenser on the right)

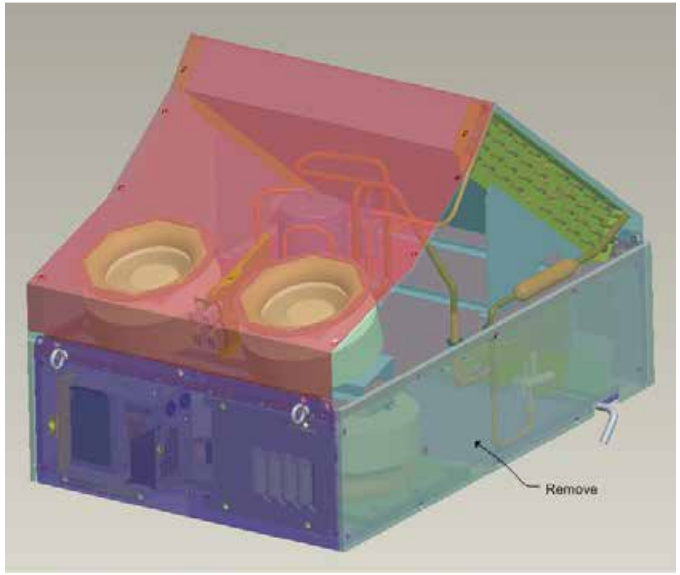
KIT FUSE 4540012

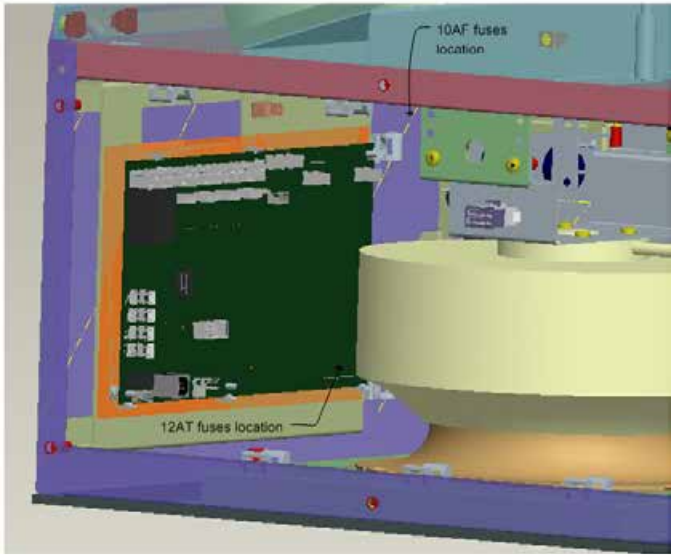
- The fuses are located on the main control board.
- Remove the old fuses and fit the new fuses ensuring that they are securely fixed in place.

KIT FUSE-F 4540012

- The fuses are located in fuse holders secured to the top surface between the main controller and the compressor controller.
- It may be more convenient to remove the internal fan as described in 9.2 above.
- Open the fuse holder by rotating it and separating the 2 halves.
- Remove the old fuse and fit the new one.
- Reclose the fuse holder and check that the fuse is secured correctly and that the spring action is maintained (pull lightly on the wire).
- Replace both fuses

- Fix the lower side panel
- Perform functional tests
- Fix the air conditioner hood





Functional tests:

After repairs, the electrical safety must be checked according to DIN VDE 0701 / DIN VDE 702 and R&S Hausvorschrift TVR502.

Hold the ⏻ button on the display for 7 seconds, “tSt” is displayed and a test cycle runs for approximately 2 minutes. During the test, no adjustment is possible. The compressor will run at approximately 67% speed, together with all fans. Cold air should blow out of the internal air outlet.

During the test operation, confirm that the fans and compressor operate correctly and that the display operates correctly.

10. Transport and storage

Attention
Malfunction due to transport damage
On delivery the carton containing the unit must be examined for signs of transport damage. Any transport damage to the carton could indicate that the unit itself has been damaged in transit which in the worst case could mean that the unit will not function.

10.1. Storage conditions

The unit can only be stored in locations which meet the following conditions:

- temperature range: **- 40°C to + 70°C**
- Relative humidity (at 25°C): **max. 95 %**

10.2. Returning the unit

Attention
Damage to the unit through incorrect transport.
To avoid transport damage the unit should be returned in the original packing or in a packing case and must be strapped to a pallet.

If the unit cannot be returned in the original packing please ensure that:

- A space of at least 30 mm. must be maintained at all points between the unit and the external packing.
- The unit must be firmly fixed in the packing.
- The unit must be protected by shock -resistant padding (hard foam corner pieces, strips or cardboard corner pieces).

11. Parts supplied

1	Control cabinet air conditioner
1	Hood
1	Filter
1	Instruction manual
1	Test protocol
1	Unit seals (fixed to air conditioner)
12	Slotted Studs M6 * 25 DIN 551
12	Washers A6.4 DIN 125
12	Lock nuts M6 DIN 985
4	Screw M5 * 12 DIN 7985
4	Toothed washer A5.3 DIN 6797
4	Lifting hook M8x12 DIN 580 ZP
1000mm	Drain pipe Ø9
1	9-pole electrical connection block

12. Spares List

Manufacturer Part No.	*R&S Part No.*		*See replacement instructions in section:*
4540 900	2106.5608.00	Hood (1 per unit)	-
501 910 100	2106.5614.00	Filter (1 per unit)	8.1
KIT EX.FAN 4540012	2106.5620.00	Ambient fan module (1 per unit)	9.1
KIT IN.FAN 4540012	2106.5637.00	Internal fan module (2 per unit)	9.2
KIT PCB 4540012	2106.5643.00	AC Controller (1 per unit)	9.3
KIT HEATER 4540012	2106.5650.00	Heater module (1 per unit)	9.4
KIT FUSE 4540012	2106.5666.00	Fuse 12A T, 6.3x32mm (2 per unit)	9.5
KIT FUSE-F 4540012	2106.5672.00	Fuse 10A F, 6.3x32mm (2 per unit)	9.5

13. Customer Support

Technical support – where and when you need it
For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades
To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

USA & Canada
Monday to Friday (except US public holidays)
8:00 AM – 8:00 PM Eastern Standard Time (EST)

Tel. from USA:	888-test-rsa (888-837-8772) (opt 2)
From outside USA:	+1 410 910 7800 (opt 2)
Fax :	+1 410 910 7801
E-mail:	CustomerSupport@rohde-schwarz.com

Rest of the World
Monday to Friday (except German public holidays)
08:00 – 17:00 Central European Time (CET)

Tel.:	+49 89 4129 13774
Fax:	+49 (0) 89 41 29 637 78
E-mail:	CustomerSupport@rohde-schwarz.com

East Asia
Monday to Friday (except Singaporean public holidays)
8:30 AM – 6:00 PM Singapore Time (SGT)

Tel.:	+65 6 513 0488
Fax:	+65 6 846 1090
E-mail:	CustomerSupport@rohde-schwarz.com

The company reserves the right to make technical changes.

Art.no.: 596104540 / Version i / 23.03.2011

MATERIAL SAFETY DATA SHEET

Product: **HARP ® 134a** Page: 1/5

Revision: 1.06 Date: 04/08

01 - IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

PRODUCT NAME HARP® 134a

SUPPLIER

Harp International Limited
Gellihirion Industrial Estate
Pontypridd
Rhondda Cynon Taff
CF37 5SX
United Kingdom

Telephone: +44 (0) 1443 842255
Fax: +44 (0) 1443 841805
Email: cjharries@harpintl.com

EMERGENCY TELEPHONE NUMBER: +44 (0) 1865 407333 (24 HOUR)

02 - HAZARDS IDENTIFICATION

Low acute toxicity. Very high atmospheric concentrations may cause an abnormal heart rhythm anaesthetic effects and asphyxiation. Liquid splashes or spray may cause freeze burns to skin and eyes.

03 - COMPOSITION/INFORMATION ON INGREDIENTS

EEC No.: 212-377-0
CAS No.: 000811-97-2

HAZARDOUS INGREDIENT(S)	CAS No.	Symbol	R Phrases
1,1,1,2-tetrafluoroethane (HFC 134a) Not classified as dangerous according to EC Directive 67/548/EEC.	000811-97-2		

04 - FIRST AID MEASURES

The first aid advice given for skin contact, eye contact and ingestion is applicable following exposures to the liquid or spray. See also Section 11.

Inhalation:	Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In the event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.
Skin Contact:	Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur obtain medical attention.
Eye Contact:	Immediately irrigate with eye wash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.
Ingestion:	Unlikely route of exposure. Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200–300 ml (half pint) of water to drink. Obtain immediate medical attention.

Further Medical Treatment
Symptomatic treatment and supportive therapy as indicated. Adrenalin an similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

MATERIAL SAFETY DATA SHEET

05 - FIRE-FIGHTING MEASURES

This refrigerant is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of this refrigerant when under pressure may be flammable. Mixtures of this refrigerant and air under pressure should be avoided. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Thermal decomposition will evolve very toxic and corrosive vapours (hydrogen fluoride)

Extinguishing Media:	As appropriate for surrounding fire. Water spray should be used to cool containers.
Fire Fighting Protective Equipment:	A self contained breathing apparatus and full protective clothing must be worn in fire conditions. See also Section 8.

06 - ACCIDENTAL RELEASE MEASURES

Ensure personal protection (including respiratory protection) during removal of spillages. See also Section 8.
Provided it is safe to o so, isolate the source of the leak. Allow small spillages to evaporate provide there is adequate ventilation.
Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbent material. Prevent liquid from entering drains, sewers, basements and work pits since the vapour may create a suffocating atmosphere.

07 - HANDLING AND STORAGE

Handling
Avoid inhalation of high concentrations of vapours. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice.
The vapour is heavier than air, high concentrations may be produced at low levels where general ventilation is poor, in such cases provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply.
Avoid contact with naked flames an hot surfaces as corrosive and very toxic decomposition products can be formed.
Avoid contact between the liquid and skin and eyes.

Process Hazards
Liquid transfers between refrigerant containers and to and from systems can result in static generation. Ensure adequate earthing.
Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.

Storage
Keep in a well ventilated place. Keep in a cool place away from fire risk, direct sunlight and all sources of heat such as electric and steam radiators.
Avoid storing near to the intake of air conditioning units, boiler units and open drains.
Cylinders and drums:
Keep container dry.
Storage temperature <45°C.

08 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases. In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used.

MATERIAL SAFETY DATA SHEET

Occupational Exposure Limits

HAZARDOUS INGREDIENT(S)	LTEL 8hr TWA ppm	LTEL 8hr TWA mg/m³	STEL ppm	STEL mg/m³	Notes
1,1,1,2-Tetrafluoroethane (HFC 134a)	1000	4240	-	-	OES

09 - PHYSICAL AND CHEMICAL PROPERTIES

Form:	liquefied gas
Colour:	colourless
Odour:	ether-like (slightly)
Boiling point:	-26.2°C
Melting point:	-101.0°C
Vapour Pressure	4270 mm Hg at 20°C
Solubility (Water):	slightly soluble
Solubility (Other):	Soluble in chlorinated solvents, esters, polyethylene glycol and alcohols
Specific gravity:	1.22 at 20°C
Vapour Density (Air = 1):	3.66 at normal boiling point

10 - STABILITY AND REACTIVITY

Hazardous Reactions:	Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Incompatible materials: finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals, alkaline earth metals- sodium, potassium, barium.
Hazardous Decomposition Products:	hydrogen chloride, hydrogen fluoride by decomposition and hydrolysis.

11 - TOXICOLOGICAL INFORMATION

Inhalation
High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Skin Contact
Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption.

Eye Contact
Liquid splashes or spray may cause freeze burns.

Ingestion
Highly unlikely - but should this occur freeze burns will result.

Long Term Exposure
A lifetime inhalation study in rats has shown that exposure to 50,000ppm resulted in benign tumours of the testes. The increased tumour incidence was observed only after prolonged exposure to high levels and is considered not to be of relevance to humans occupationally exposed to HFC 134a at or below the occupational exposure limit.

MATERIAL SAFETY DATA SHEET

Product:	HARP® 134a	Page: 4/5
	Revision: 1.06	Date: 04/08

12 - ECOLOGICAL INFORMATION

Environmental Fate and Distribution
High tonnage material produced in wholly systems. High tonnage material used in open systems. Vapour.

Persistence and Degradation
Decomposed comparatively rapidly in the lower atmosphere (tropssphere). Atmospheric lifetime is 13.6 year(s). Products of decomposition will be highly dispersed and hence will have a very low concentration. Does not influence photochemical smog (i.e. is not a VOC under the terms of the UNECE agreement). Does not deplete ozone. Has a Global Warming Potential (GWP) of 1300 (relative to a value of 1 for carbon dioxide at 100 years).

Effect on Effluent Treatment
Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

13 - DISPOSAL CONSIDERATIONS

Best to recover and recycle. If this is not possible, destruction is to be in an approved facility, which is equipped to absorb and neutralise acid gases and other toxic processing products.

14 - TRANSPORT INFORMATION

UN No:	3159
AIR	
ICAO/IATA	
-primary:	2. 2
SEA	
IMDG	
-primary:	2.2
Proper Shipping Name:	1,1,1,2-TETRAFLUOROETHANE
ROAD/RAIL	
ADR/RID Class:	2
ADR Sin:	3159

15 - REGULATORY INFORMATION

Not classified as harmful to users.

MATERIAL SAFETY DATA SHEET

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16 – OTHER INFORMATION

This data sheet was prepared in accordance with Directive 2001/58/EC.
This information contained within this safety data sheet applies only to the Harp International Limited product to which it relates. The information provided is based upon our best knowledge at the time that this safety data sheet was published.
The information is believed to be accurate and is given in all good faith.
When used in other preparations, in formulations or in mixtures, it is necessary to ascertain if the classification of the hazards have changed.
The attention of users is drawn to the possibility of creating other hazards when the product is used for purposes other than that for which it is recommended. In such cases a complete reassessment should be made by user.
This safety data sheet should only be used and reproduced in order that the necessary measures may be taken relating to the protection of health and safety at work and relating to the protection of environment.
The reference to the legislative, regulatory and codes of practice documents must not be considered as exhaustive.
It is the responsibility of handlers of the product to pass on the totality of the information contained within this document to any subsequent persons who will come into contact with, handle or use the product in any way.
They should check the adequacy of the information contained in the safety data sheet received before passing it onto their customers.

End of document