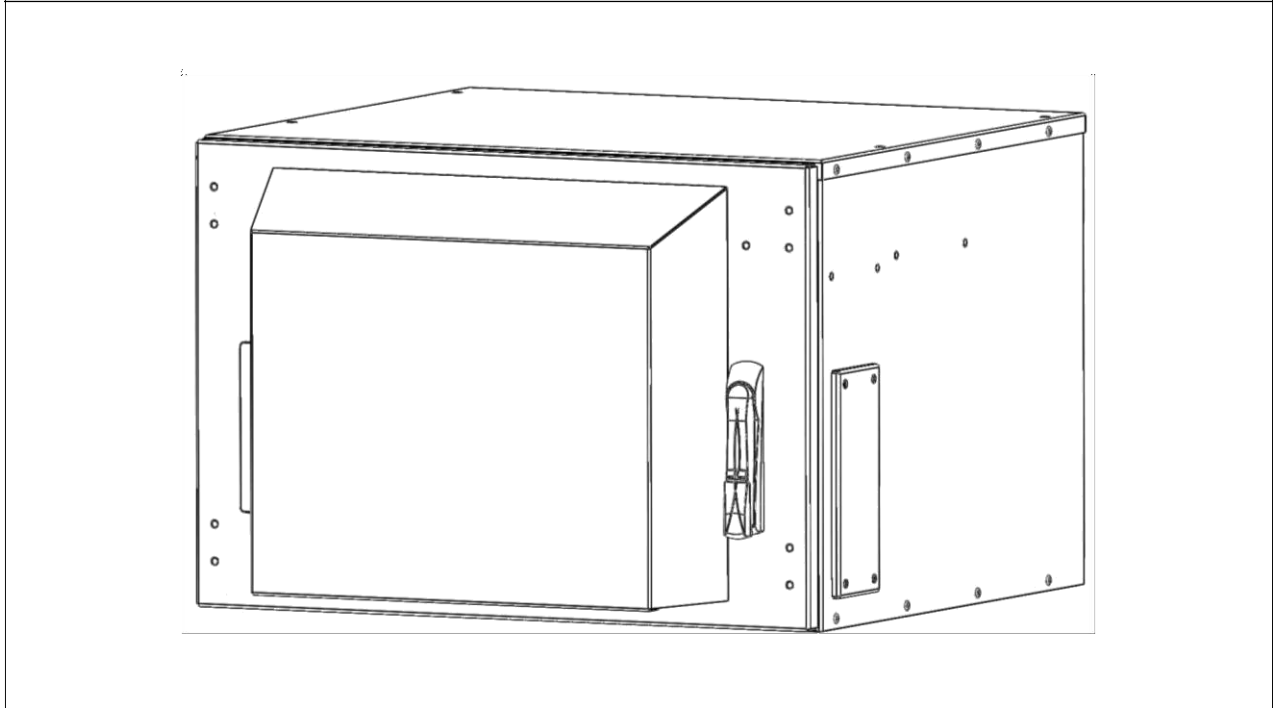




SITESTAR ELECTRONICS CABINET DESCRIPTION



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1 INTRODUCTION

This document describes the SiteStar Electronics Cabinet (SSEC), an electronics cabinet for -48VDC in the SiteStar family. The SSEC can be used standalone or connected to a SiteStar Tall or Small. The main purpose of the cabinet is to house electronics equipment.

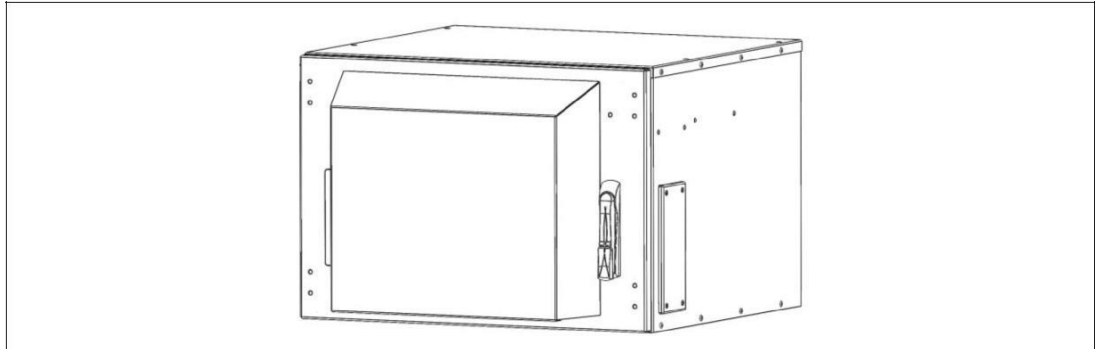


FIGURE 1 SITESTAR ELECTRONICS CABINETS

1.1 TARGET GROUP

The target group for this document is the personnel involved in the site installation engineering process and those responsible for the installation, integration and maintenance of the site.

1.2 DOCUMENTS

The following documents are available to provide detailed information on the SiteStar Cabinet and its handling:

- INS-0126, SiteStar Electronics Cabinet Installation
- INS-0127, SiteStar Electronics Cabinet Maintenance

1.3 ILLUSTRATIONS

Illustrations in this document can show alternative designs.

1.4 PREREQUISITES

All performance statement in this document relies on the following:

- Only approved hardware are used
- Proper hardware handling
- Installation and maintenance instructions as well as documentation for external equipment are followed

1.5 ABBREVIATIONS

Abbreviations used in this document.

AC	Alternating Current
DC	Direct Current
EN	European Norm
EMC	ElectroMagnetic Compatibility
LED	Light Emitting Diode
LVD	Low Voltage Disconnect
LVD	Low Voltage Directive
PCBA	Printed Circuit Board Assembly
POP	Persistent Organic Pollutant
RoHS	Restriction of Hazardous Substances
WEEE	Waste Electrical and Electronic Equipment

2 DESCRIPTION

This section describes the SiteStar Electronics Cabinet.

2.1 PRODUCT OVERVIEW

The SiteStar Electronics Cabinet is intended for housing electronics equipment. It can be mounted stand-alone on a plinth, pole or wall. Two cabinets can be mounted together on top of each other. The SSEC can also be used together with a SiteStar battery back-up.

The cooling system in the SSEC is a fan filter solution and is designed for both indoor and outdoor environments.

If extra capacity is needed an extension with a second or more cabinets can easily be made.

The system is approved for operation throughout the world.

2.1.1 MAIN FEATURES

The SiteStar Electronics Cabinet:

- Is an energy efficient free air cooling system
- Has 19" sub-rack, 9U (23" sub-rack, 7U as an option)
- Is light weight
- Has several mounting options
- Supports mounting of FLEXI modules (optional hardware required)
- Is IP55 compliant
- Has long life



2.1.2 PRODUCT APPROVALS

The SiteStar Electronics Cabinet complies with the following standards:

Transport	ETSI EN 300 019-1-2	Class 2.3
Storage	ETSI EN 300 019-1-1	Class 1.2
Operation	ETSI EN 300 019-1-4	Class 4.1, extended temperature range
Chemical and mechanical substances	ETSI EN 300 019-1-4	Class 4.1
EMC:	EMC directive 2004/108/EC	Class B
	ETSI EN 300 386 v. 1.6.1	
	FCC CFR 47 part 15	Class B
	ICES-003	
Safety: CB, CE	IEC 60 950-1:2006 ed.1	
	IEC 60 950-1:2006 + A11:2009	
	IEC 60 950-1:2005	
	IEC 60 950-22:2006	
	IEC 60 529 ed. 2.1	IP55
	Low voltage directive LVD 2006/95/CE	
ETL:	UL 60 950-1 ed. 2 2007	
	CSA-C22.2 No. 60950-1-07 ed. 2	
	UL 60 950-22	

	UL 50E, ed. 1 2007	NEMA 3R
	CSA-C22.2 No.94.2-07, ed. 1 2007	NEMA 3R
Other directives	WEEE 2012/19/EU	
	RoHS 2011/65/EU	
	REACH 1907/2006/EU	
	POP 2004/850/CE	

2.2 UNITS IN THE SYSTEM

This section contains descriptions of the units in the system.

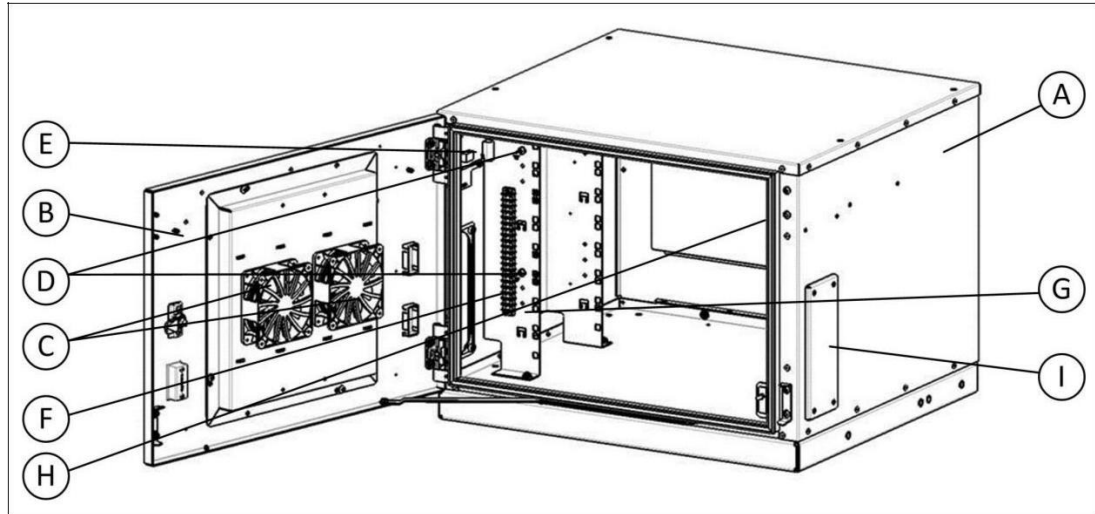


FIGURE 2 SITESTAR ELECTRONICS CABINET

Key to Figure 2

A	Cabinet	See section 2.2.1
B	Door	See section 2.2.2
C	Fans	See section 2.2.2.2
D	Earth Grounding	See section 2.2.3
E	RAFT PCBA	See section 2.2.4
F	Terminal	See section 2.2.5
G	Sub-rack	See section 2.2.6
H	DIN Rail	See section 2.2.7
I	Cable Entries	See section 2.2.8

2.2.1 CABINET

The cabinet structure is made of powder coated aluminum.

The top of the cabinet is provided with four M8 threaded holes that are provided for the usage of lifting eye bolts.

The cabinet has several mounting options, such as:

- Stand-alone on plinth (optional hardware needed)
- Wall mount (optional hardware needed)
- Pole mount (optional hardware needed)
- On top of another cabinet (for example SSEC, SiteStar Tall or Small)

The cabinet is also designed so that the optional rails can be fitted to support FLEXI modules.

2.2.2 DOOR

The door is made of powder coated aluminum.

The SiteStar Electronics Cabinet Door contains a F5/M5 filter, two fans and locking system.

To protect the filter from wind driven rain there are no louvers in the door. The air intake is through the bottom of the air duct on the door, Figure 3.

The door is also designed to house the optional heater, see 2.5.1.2.

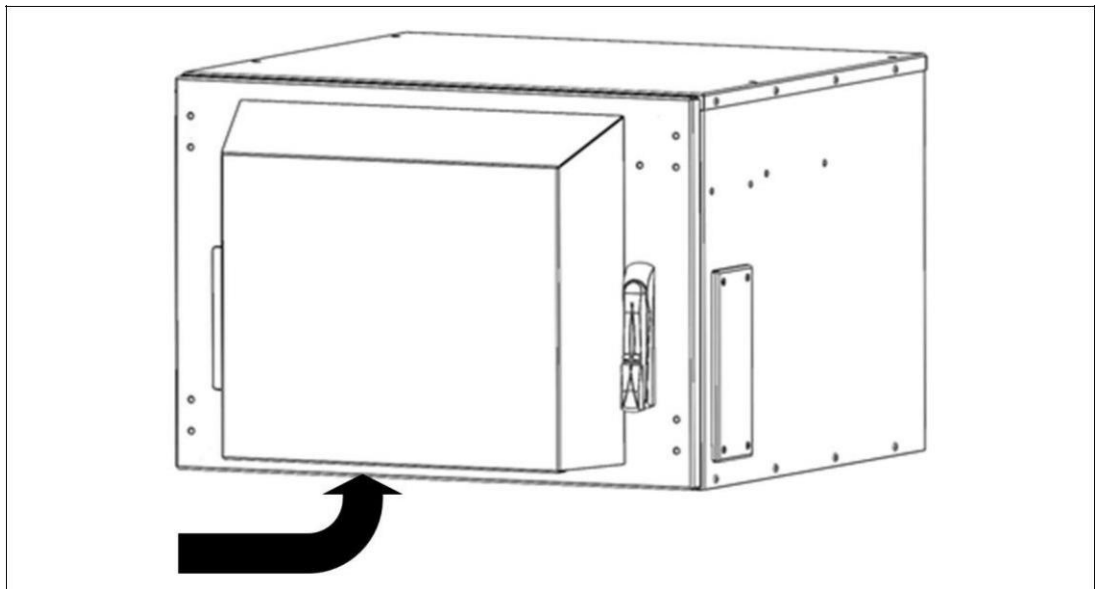


FIGURE 3 AIR INTAKE IN DOOR

2.2.2.1 FILTER

The door is equipped with a F5/M5 filter to ensure the environment in the cabinet. The filter is exchangeable and will need maintenance to maintain the cooling performance in the cabinet. See *INS-0127, SiteStar Electronic Cabinet Maintenance*, for more information.

2.2.2.2 FANS

There are two fans located in the door. The fans are supervised by the Tacho signal. When the fan speed is below 500 RPM at temperatures above 20°C an alarm will be sent.

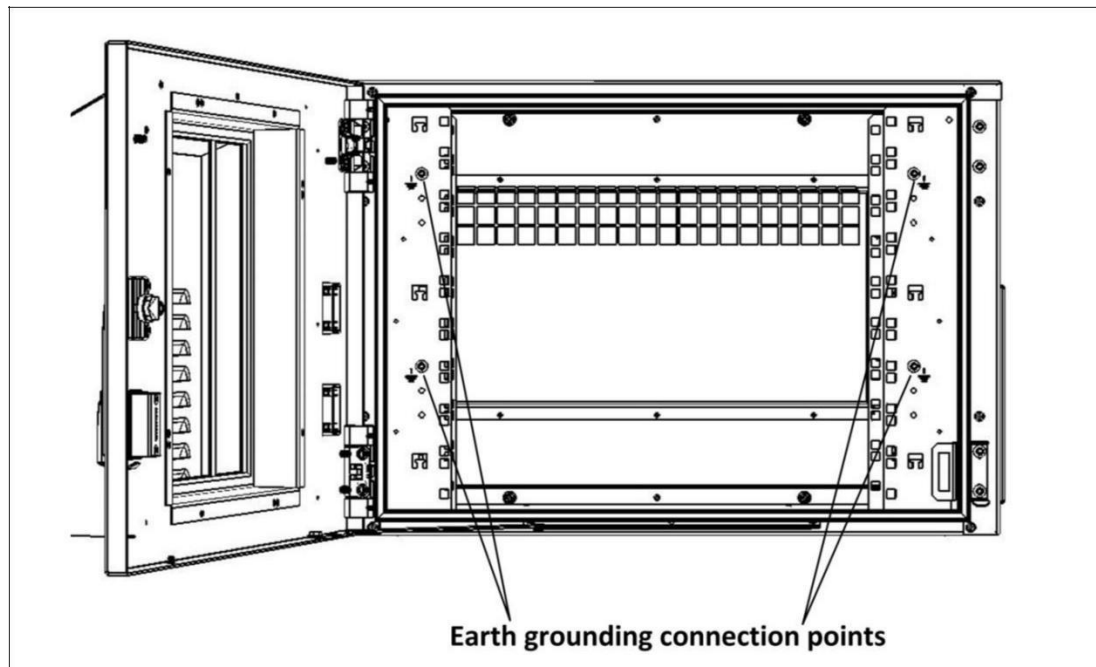
Fan life time: L10 = 65000 hrs

2.2.2.3 LOCKING SYSTEM

The doors are equipped with a locking system. The locking system is the same type as in other SiteStar products. As default, the locking system is factory installed at the right side of the door. It is possible to shift the locking installation to right hanging door. See *INS-0126, SiteStar Electronic Cabinet Installation*, for how to do.

2.2.3 EARTH GROUNDING

The cabinet is equipped with two double M6 earth points at each side of the sub-rack for connection to site earth grounding point.



2.2.4 RAFT PCBA

The RAFT PCBA is monitoring the temperature inside the cabinet and regulates the fans. It also has a Low Voltage Disconnect, LVD, function to protect batteries connected to the cabinet, see 2.2.4.2

The RAFT PCBA has one LED to indicate function of the board.

The external alarm interface on the RAFT PCBA is wired to the terminal, which includes the interface for the outgoing external alarm cables.

The RAFT PCBA is located on the upper left side of the cabinet.

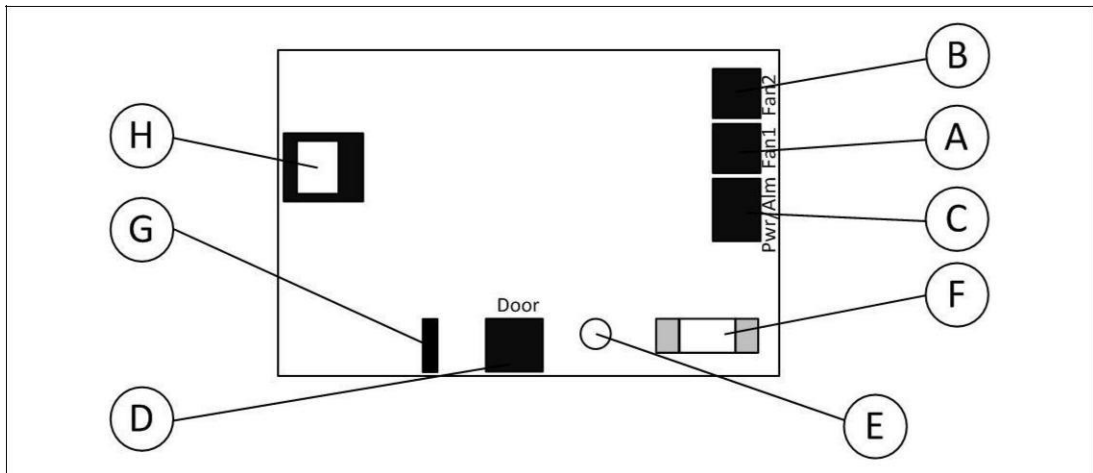


FIGURE 4 RAFT PCBA

Key to Figure 4

A	Connector for Fan 1
B	Connector for Fan 2
C	Connector for Power and Alarms
D	Connector for Door Alarm
E	LED
F	Fuse, 3.15A
G	Connector for test
H	Connector for programming

2.2.4.1 FAN REGULATION

The fan speed is regulated to avoid unnecessary noise.

In the table below is the fan control curve and the related acoustical noise level.

Temperature range [°C]	Fan speed [%]	Acoustical noise [dBA]	Power consumption [W]
< 20	0	0	<3
20 - 30	60	5.4	6
30 - 35	70	5.5	8
35 - 45	80	5.8	10
45 - 50	90	6.2	14
>50	100	6.5	20

2.2.4.2 LOW VOLTAGE DISCONNECT – LVD

The LVD function will shut down the system to protect batteries connected to the system.

- Disconnect: -43.2 ± 0.2 VDC
- Reconnect: -45.9 ± 0.2 VDC

It highly recommended connecting the SSEC via a fuse of 5A that is controlled by the power system LVD.

2.2.5 TERMINAL/CONNECTION FIELD

The terminal is the connection point for power to the cabinet and external alarms.

The system supports sending 3 external alarms. The alarms are sent by relays, connected as normally closed (NC). The external alarms will be triggered by:

- High temperature: Internal temperature $T > 65^{\circ}\text{C}$ or fan speed < 500 RPM (the alarm is inactive at $T_a \leq 20^{\circ}\text{C}$)
- Door switch open
- Optional Filter guard: Pressure drop over filter too high

The terminal also serves as the connection point for the power to the RAFT PCBA. The power connection should be made through a fuse rated

5A. It is also recommended that the fuse has a low voltage disconnect, LVD. The SSEC has a LVD function, see 2.2.4.2.

Note that in addition to the above mentioned alarms there is one LED on the board indicating that the board is functioning.

- LED on – RAFT PCBA is operating
- LED off – RAFT PCBA is off

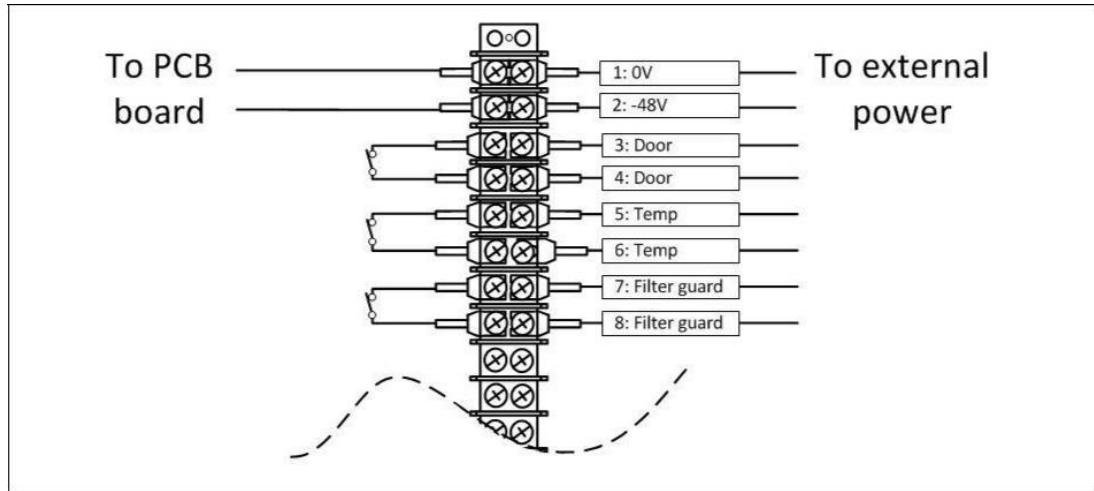


FIGURE 5 TERMINAL CONNECTIONS

Terminal Markings

Terminal Number	Marking	Max. values
1	0V	--
2	-48V	--
3	Door	60VDC, 0,3A
4	Door	
5	Temp	60VDC, 0,3A
6	Temp	
7	Filter guard	60VDC, 0,3A
8	Filter guard	

2.2.6 SUB-RACK

The cabinet is equipped with a 19" sub-rack, 9U high. The sub-rack is suitable for any electronics equipment. The airflow through the sub-rack is front to back. The maximum heat load in the cabinet is 700W.

The cabinet is delivered with a plastic cover. The plastic cover is intended to cover empty slots in the sub-rack. This is important to ensure the cooling air is passing through the equipment. The plastic cover is easily cut into the correct size with a knife, Figure 6.

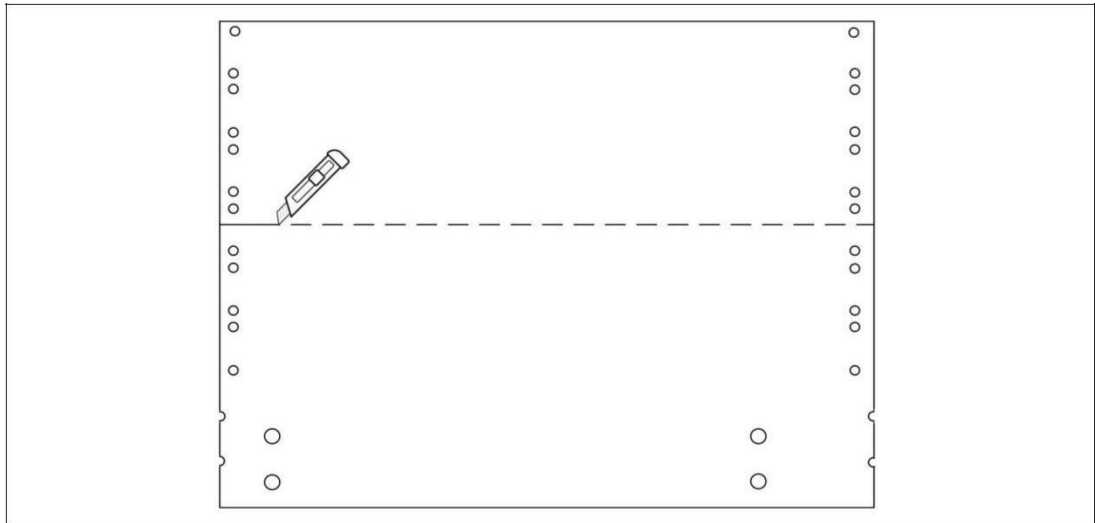


FIGURE 6 CUTTING OF COVER PLATE

2.2.7 DIN RAIL

A DIN rail is available for convenient installation of additional electrical terminals. The DIN rail is 125mm long and width 35mm. The DIN rail is positioned close to the cable inlet to facilitate easy cabling.

2.2.8 CABLE ENTRIES

The cabinet is prepared for installation of cable entries at both sides of the cabinet. The cable entries are designed according to FL21 standard, see Figure 7 below.

At delivery one entry is equipped with cover and the other is left open. The cable inlet is delivered bi-packed in the cabinet for installation on site. The standard cable inlet delivered with the cabinet is MC10/30 Multigate.

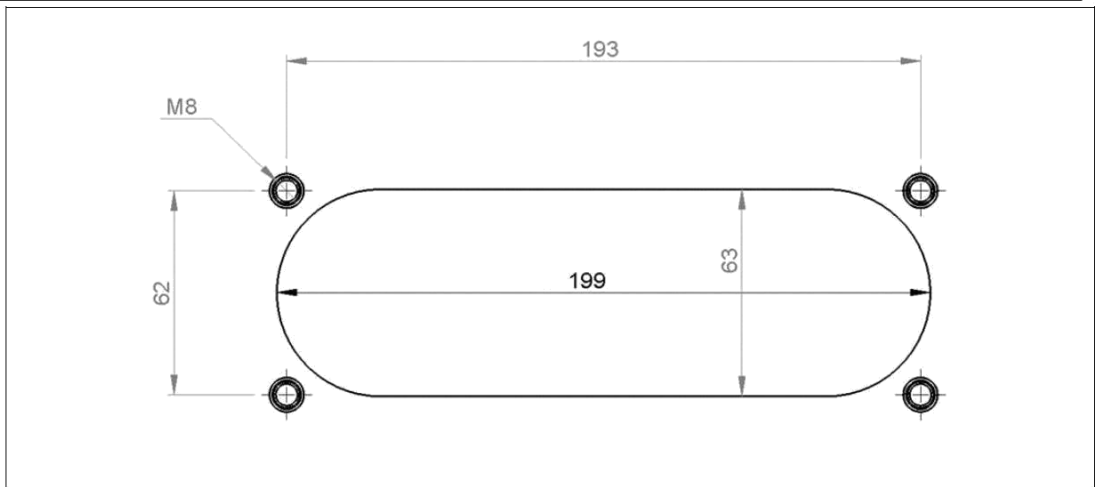


FIGURE 7 FL21 CABLE ENTRY (CABINET)

2.3 SIZE AND WEIGHT

Area Standard	Cabinet	Units
Size (l*w*h) Standard Cabinet	712*660*456	mm
Weight: Standard Cabinet Complete	20.6	Kg
Internal load handling	50	Kg
Options		
Weight: Mounting Plinth D001233	6.5	Kg
Weight: Cable duct, KIT0221	1.8	Kg
Heater kit, KIT0219	0.5	Kg

2.4 SPACE REQUIREMENTS

Figure 8 shows the clearance between the cabinet and walls.

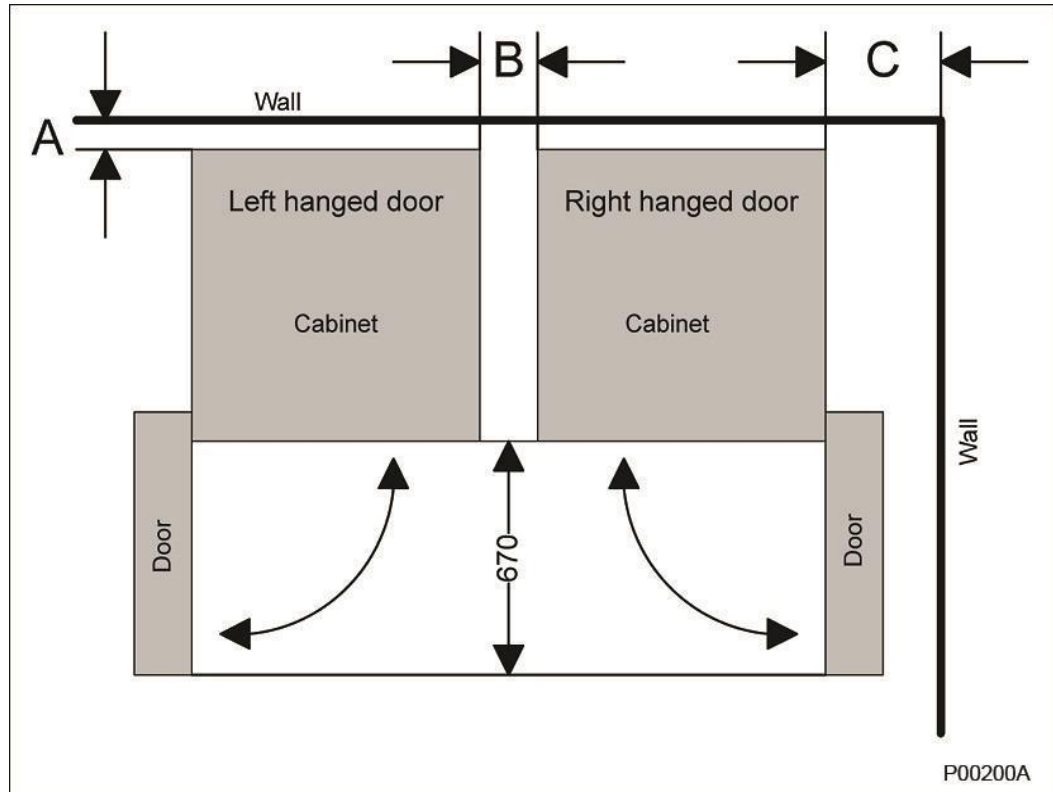


FIGURE 8 CABINET CLEARANCE TO WALL

	Minimum	Recommended
A	100 mm	500 mm
B	20 mm	200 mm
C	210 mm	450 mm

Figure 9 shows the clearance to the ceiling when the cabinet is standing up.

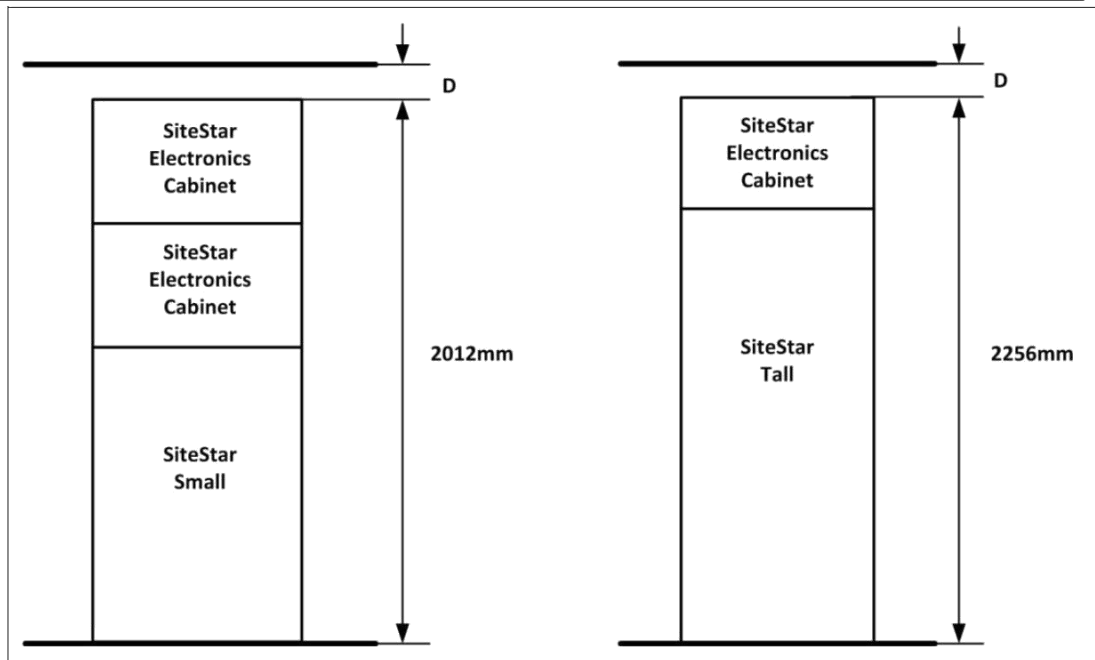


FIGURE 9 CABINET CLEARANCE TO CEILING

	Minimum	Recommended
D	50 mm	200 mm

It is important that the air inlet and outlet is not blocked. No material should be left around the cabinet that can be moved by the wind and cause blocking.

2.5 CLIMATE SYSTEM

This section describes the climate system.

2.5.1 GENERAL

The cabinet features a climate system consisting of two fans and a filter for heat removal in the cabinet. The filter is easy to replace without any major disassembly.

For cold areas an optional heater can be installed.

At start-up of the cabinet a self-test will be performed.



2.5.1.1 COOLING CAPACITY

The cooling capacity is 700W at $T=7K$ inside the cabinet.

2.5.1.2 OPTIONAL HEATER

There is an optional heater available to maintain a suitable climate within the cabinet in cold weather. For more information see chapter 2.8.8.

2.5.1.3 SELF-TEST

A test of the function of fans is performed at start-up of the system. The fans will run for 3s at half speed. If the fan speed is below 500 RPM an alarm will be sent.

2.6 OPERATING ENVIRONMENT

Operating Environment	Cabinet	Units
Highest ambient temperature	+55	°C
Lowest ambient temp. (optional heater)	-40	°C
Humidity	8 - 100%	RH
Air pressure	55 - 106	kPa

2.7 ELECTRICAL

2.7.1 ELECTRICAL PERFORMANCE

General	Cabinet	Units
Alarm connection	Individual; temperature, door and optional filter guard	
Power consumption, max at cooling Note 1)	20	W
Power consumption, max at heating	150	W
DC connection	-42 to -56	V DC

Note 1: For more detailed power consumption see 2.2.4.1.

2.7.2 ELECTRICAL RATING

General	Cabinet	Units
Normal service	-42 - -56	VDC
Safe function	0 - -42 -56 - -60	VDC

2.8 OPTIONS

2.8.1 BASE FRAME

Product Number	Product Name
KIT0249	Cabinet Frame

Description

The base frame is to be used when the cabinet is installed directly on a foundation. The base frame is the same as for other SiteStar products.

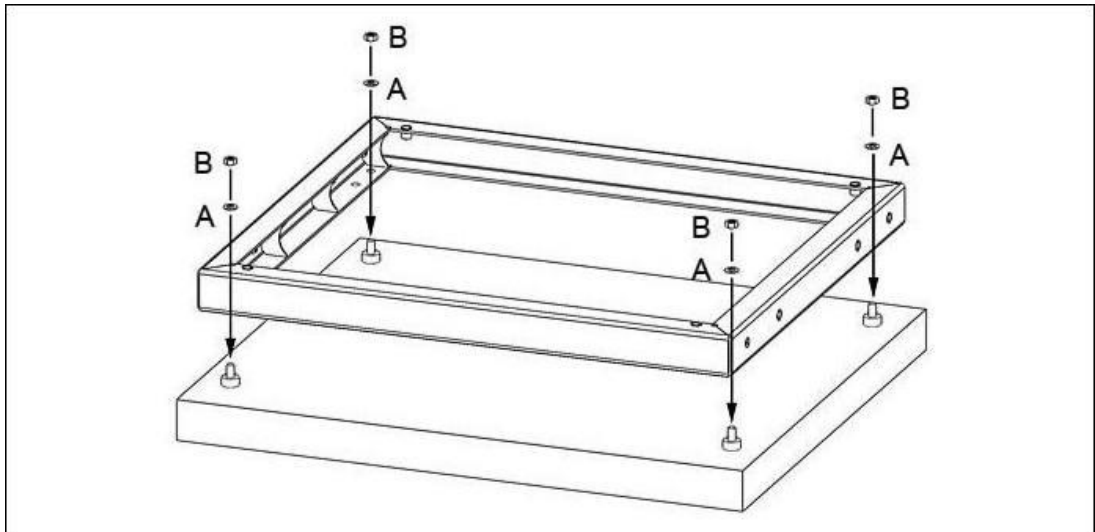


FIGURE 10 BASE FRAME

2.8.2 POLE MOUNT

Product Number	Product Name
KIT0XXX	

Description

The kit is including the mechanical parts needed for installation on a pole or a mast.

2.8.3 WALL MOUNT

Product Number	Product Name
KIT0XXX	

Description

The kit is including the mechanical parts needed for installation on a wall.

2.8.4 MARCON MULTIGATE

Product Number	Product Name
KIT0250	MC Multigate

Description

The Marcon multigate cable inlet facilitates easy cable access to the cabinet. The cones in the inlet are easy to adapt to the correct size for the cable by using a knife or scissors. The multigate fits the FL21 flange.



FIGURE 11 MULTIGATE – CABLE INLET

2.8.5 ROXTEC

Product Number	Product Name
KIT0251	Roxtec

Description

Roxtec is an alternative cable inlet that can be used. Roxtec is easy to install and will give a high protection against dust and water. Roxtec fits the FL21 flange.

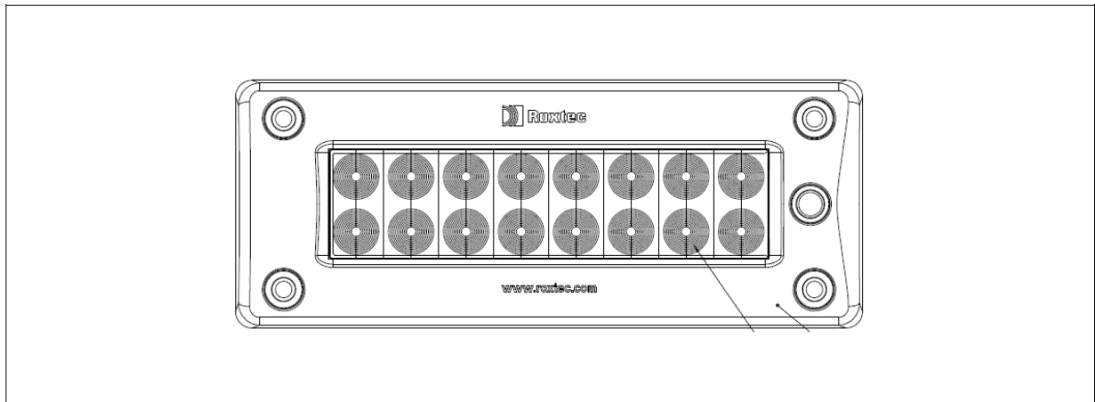


FIGURE 12 ROXTEC – CABLE INLET

2.8.6 CABLE DUCT

Product Number	Product Name
KIT0237	KIT, Cable Duct

Description

The cable duct can be used when installing a SSEC on top of another cabinet. The routing of cables will then be in a weather tight tube. The cable duct is connected to an adapted FL21 side plate.

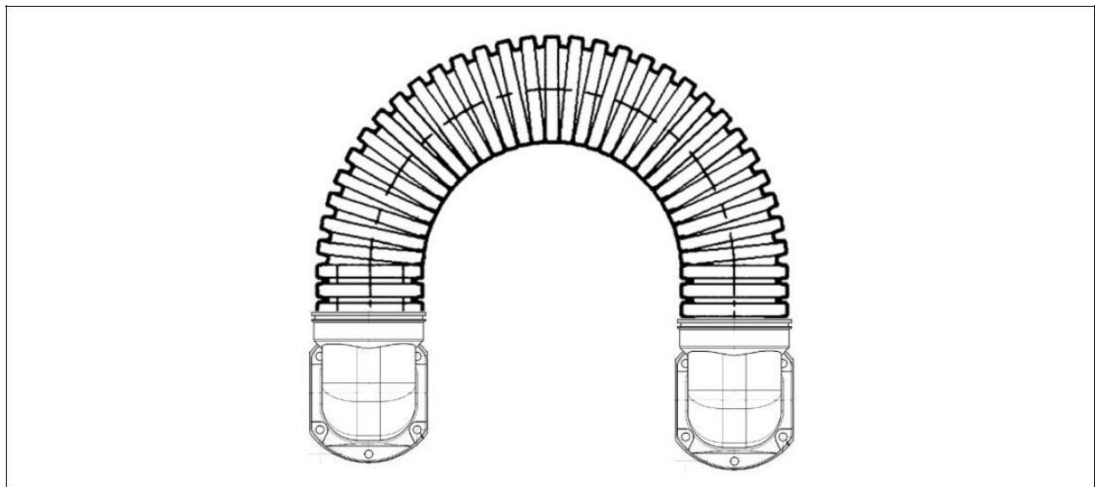


FIGURE 13 CABLE DUCT

2.8.7 FILTER GUARD

Product Number	Product Name
KIT0253	Kit; Filter Guard

Description

The filter guard measures the pressure drop over the filter. When the filter is filled with dust and debris and needs to be exchanged an alarm is sent.



FIGURE 14 FILTER GUARD

2.8.8 HEATER KIT

Product Number	Product Name
KIT0238	KIT, Heater

Description

The optional heater is to maintain a suitable climate within the cabinet in cold weather. The heater is run on AC.

Rating:

- 230V \pm 10%
- 50-60Hz

Max. heat dissipation:

- 150W.

The heater is equipped with a thermostat to control the heating of the cabinet. The heater function is according to the following:

- Heater on: +7°C ± 3K
- Heater off: +15°C ± 3K

The heater is delivered with cables with open end for connection to mains.

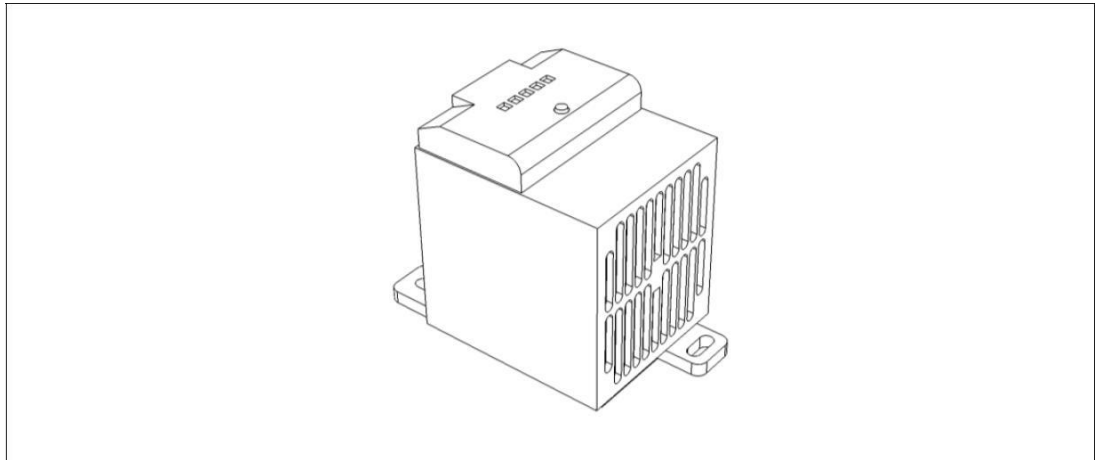


FIGURE 15 HEATER KIT

2.8.9 **HARDWARE MOUNTING KIT**

Product Number	Product Name
KIT0228	KIT, Hardware mounting

Description

The hardware mounting kit includes fasteners for mounting equipment in the sub-rack. It also includes brackets to be used when installing heavy equipment.

2.8.10 **23" RACK, 7U**

Product Number	Product Name
KIT0252	KIT, 23" Rack, 7U

Description

As an option a 23" rack with 7U can be mounted in the cabinet. This is available only as a factory installed option.

2.8.11 EQ4 KIT

Product Number	Product Name
TBD	

Description

For areas with high risk of earthquake a kit to secure the structure of the cabinet to withstand the seismic stress.

2.9 SPARE PARTS

2.9.1 FILTER

Product Number	Product Name
KIT0257	Filter F5/M5 (Note: set of 5 filters)
KIT0255	Spare part sealing (Note: This sealing can be used if the sealing for the filter is damaged and needs to be replaced.)

Description

The filter needs to be exchanged regularly. In the spare part kit 5 filters is delivered.

As an addition it is suggested to also use the spare part sealing kit to facilitate change of damaged sealing around the filter.



FIGURE 16 FILTER

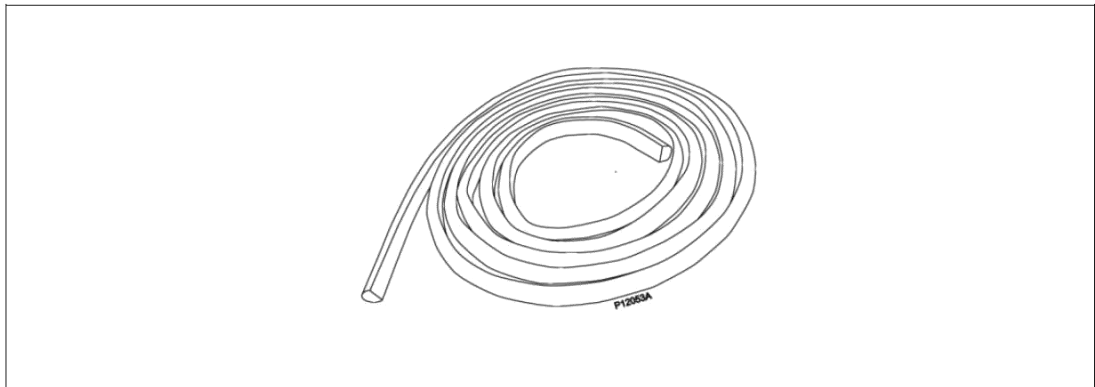


FIGURE 17 SEALING

2.9.2 CABINET DOOR

Product Number	Product Name
TBD	

Description

A complete door with fans and filter is available as a spare part. Included in the kit is also the complete lock including the parts mounted on the cabinet and the sealing.

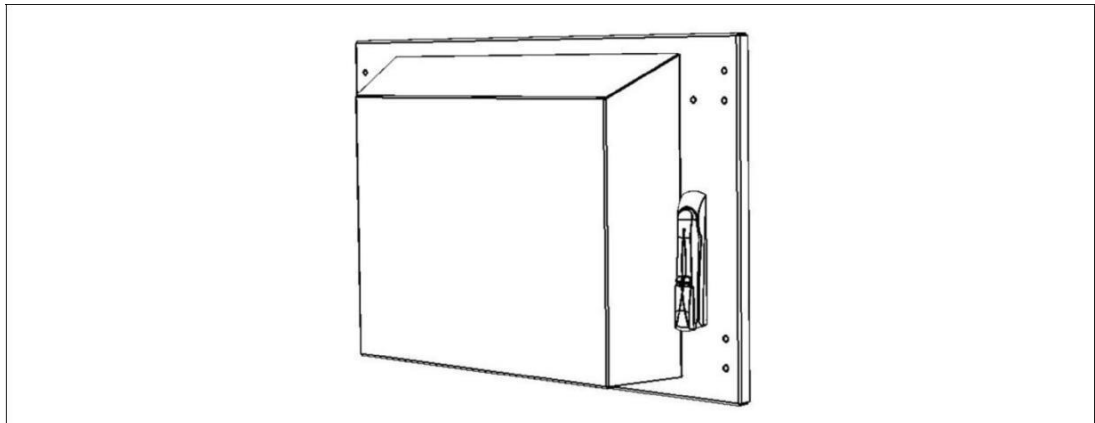


FIGURE 18 DOOR

2.9.3 RAFT PCBA

Product Number	Product Name
KIT0256	Spare Part, RAFT PCBA

Description

The RAFT PCBA is available as a spare part.

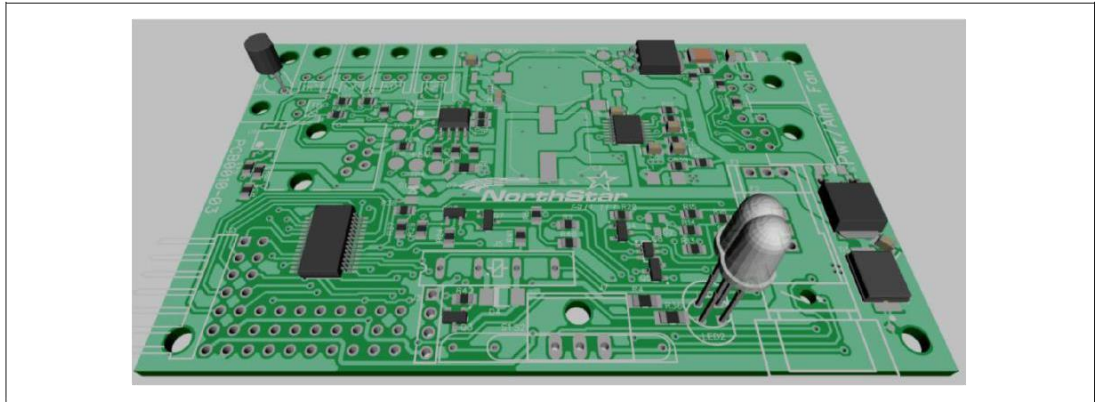


FIGURE 19 PCBA

2.9.4 FAN

Product Number	Product Name
KIT0254	Kit; Spare Part Fans

Description

The kit consists of two fans with their cables.

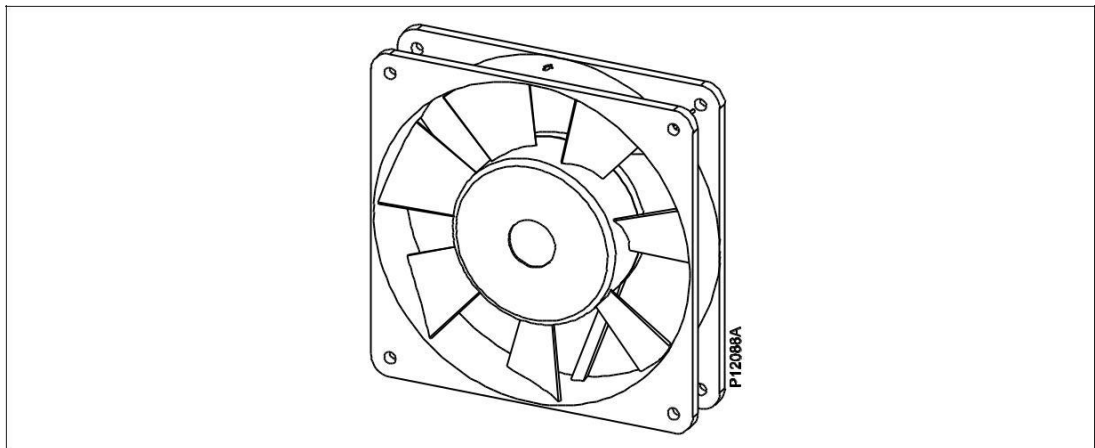


FIGURE 20 FAN