



- PROJECT: AVANTE 2200
- SHIPYARD: NAVANTIA S.A.
- SYSTEM: HVAC



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Navantia

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NBC FILTER UNIT

REF.: D-MO5462-003

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Annex A. Item List.

Annex B. Technical information and drawings

Annex A. Item List.

<u>TAG</u>	<u>MODEL</u>	<u>VOLTAGE</u>	<u>POWER (kW)</u>	<u>AMPS</u>	<u>IP (motor)</u>
UFN-NBC01001	NBC 1200	3X440V/60Hz	6,5	10,2	IP55
UFN-NBC01002	NBC 1200	3X440V/60Hz	6,5	10,2	IP55
UFN-NBC02003	NBC 1200	3X440V/60Hz	6,5	10,2	IP55
UFN-NBC02004	NBC 900	3X440V/60Hz	6,5	10,2	IP55

<u>TAG</u>	<u>MAKER</u>	<u>WEIGHT (Kg)</u>	<u>SIZE (LXWXD) mm</u>	<u>LOCATION</u>
UFN-NBC01001	VAN HALTEREN	880	2150 x 930 x 1390	LEVEL 01 (Nº1 FAN ROOM)
UFN-NBC01002	VAN HALTEREN	880	2150 x 930 x 1390	LEVEL 01 (Nº1 FAN ROOM)
UFN-NBC02003	VAN HALTEREN	880	2150 x 930 x 1390	LEVEL 01 (Nº4 FAN ROOM)
UFN-NBC02004	VAN HALTEREN	880	2150 x 930 x 1390	LEVEL 01 (Nº4 FAN ROOM)

<u>TAG</u>	<u>MOTOR MODEL</u>	<u>RPM MOTOR</u>	<u>FAN MODEL</u>	<u>RPM FAN</u>
UFN-NBC01001	ABB 90L2	3450	HAE3-140-II	3450
UFN-NBC01002	ABB 90L2	3450	HAE3-140-II	3450
UFN-NBC02003	ABB 90L2	3450	HAE3-140-II	3450
UFN-NBC02004	ABB 90L2	3450	HAE3-140-II	3450

Note: no significative heat dissipation to surroundings in applicable to this equipment



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Annex B. Technical information.

NBC 1200

Air Filtration Unit



Preface

IMPORTANT NOTICE

Prior to operation and maintenance to the installation it is essential to read and understand this manual.

Operation and maintenance to the installation **must** be carried out by qualified personnel.

Van Halteren Special Products B.V. does not accept the responsibility of damage of the installation or other property or **injury to persons** due to failure to observe the proper procedures and instructions contained in this manual.

Introduction

This manual is valid for the NBC 1200 unit as supplied by the manufacturer. The manufacturer accepts no liability for any damage resulting from incorrect use of the NBC 1200 unit, or resulting from modifications which have not been authorized by the manufacturer. The manufacturer also excepts no liability for damage, caused by malfunctioning of the NBC 1200 unit.

This manual gives relevant information for installation, operation and maintenance of the NBC 1200 unit.

The installation and maintenance instructions are only applicable for authorized, suitable trained, personnel.

Warranty conditions, as stated in the delivery documents, being in your possession, are valid for the NBC 1200 unit.

The warranty for the NBC 1200 unit is void when:

- the unit is used for other purposes as described in this manual;
- installation or maintenance is performed by unauthorized personnel;
- modifications to the unit have been carried out without written permission of Van Halteren Special Products B.V.;
- non-original components have been used for replacement.

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1 Safety

This chapter provides instructions for a safe installation, operation and maintenance of the NBC 1200 unit.

Keep this manual near the unit, as it is available at all times.

1.1 General

For all work on the unit (transport, installation, operation and maintenance), the safety instructions of the manufacturer must be obeyed. This is also applicable for local regulations concerning prevention of accidents and protection of the environment.

1.2 Responsibility

The manufacturer is not responsible for damage or injury caused by ignoring the instructions in this manual or not complying to the safety regulations in this manual and to the local regulations.

1.3 Safety data sheets

Obey the actual safety instructions of the safety data sheets when you work with consumables (cleaning agents). These safety data sheets can be obtained by the manufacturer of the consumables.

1.4 Description of safety symbols

Notes, attention points and warnings will be shown in this manual, in the following way:



This symbol indicates a point of attention or a note, to give additional information.



This symbol indicates a general warning. The instruction must be obeyed to ensure a safe situation.



This symbol indicates a warning for electrical equipment. The instruction must be obeyed to ensure a safe situation.

1.5 Safety regulations

- Only use the NBC 1200 unit for applications mentioned in this manual.
- Remove the power from the NBC 1200 unit when you are going to work on electrical components inside of the NBC 1200 unit. Make sure the power cannot be switched on unintentionally.
- Operation of the NBC 1200 unit may only be performed by suitable trained personnel.
- Installation and maintenance of the unit may only be performed by authorized personnel.
- Take care when you work near the electrical heater element. This element can be hot, even when it is switched off.
- Use hoisting equipment with sufficient capacity to hoist the NBC 1200 unit. Refer to the technical specifications in chapter 3 for the weight of the unit.
- Obey the manufacturers safety instructions on the safety data sheet when you work with consumables.
- Do not use aggressive cleaning or abrasive agents to clean the NBC 1200 unit.
- Do not change the settings of the safety control devices. This can cause damage to the unit or injury to personnel.
- Do not disconnect or override the safety control devices. This can cause damage to the unit or injury to personnel.
- Make sure all filters are installed when the unit is used in combat situations.
- Be very careful when you replace the filters after an attack. The filters may contain harmful particles.



The HEPA part of the NBC filter only is monitored by the differential pressure indicator. The carbon part of the NBC filters could be saturated with contamination while the pressure drop is still less than 1600 Pa.

1.6 Safety provisions on the unit

The NBC 1200 unit is equipped with safety provisions which ensure a safe operation. The following provisions are available:

- A blast valve in the air inlet protects the unit against a pressure wave due to a hit.
- The electrical motor is protected against overload.
- The electrical heater is protected against overload.
- The unit generates an alarm and will not start when the NBC filters are not loaded and the unit is in NBC mode.

1.7 Environment



Products which you dispose, may contain valuable materials. Contact the appropriate authority for possible re-use of the material or an environmental friendly disposal of the material.

2 Description of the NBC 1200 unit

2.1 General

The NBC 1200 unit is designed to supply clean air to the citadel. The unit provides an amount of 1200 m³ cleaned air per hour. The unit is able to filter and de-contaminate the air during a NBC attack in a combat situation. During peace operation, the NBC 1200 unit can operate without the NBC filters to prevent saturation of these filters and maximize service life. The cleaned air from the NBC 1200 unit can be used directly or be treated in separate air handling units. The unit is able to supply air at a maximum overpressure of 500 Pa. This pressure can only be controlled by valves in the ships citadel. The unit is equipped with two outlets, which make Left Hand (LH) or Right Hand (RH) use possible. The NBC 1200 unit consists of the following main components:

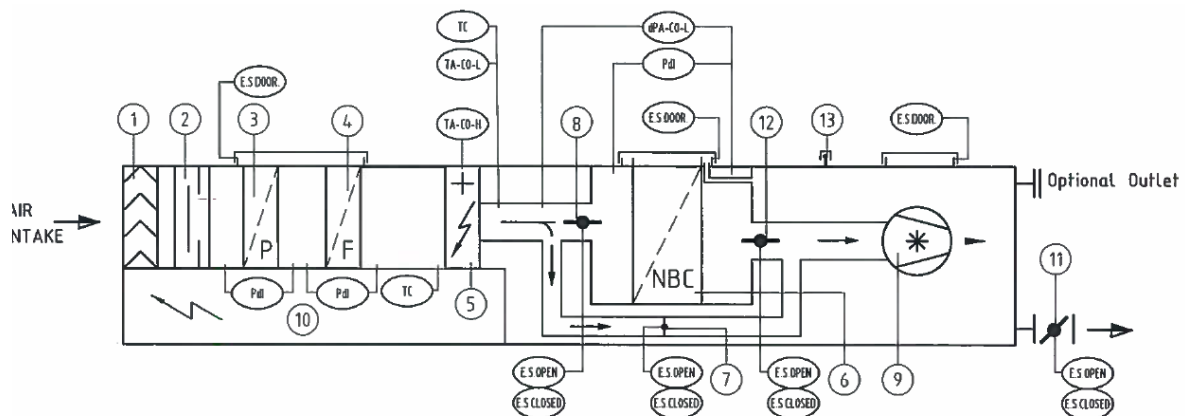


Figure 2.1 Flow diagram

Item	Position no. on drawing
– Water separator	1
– Blast valves	2
– Pre-filter	3
– Fine filter	4
– Electrical heater	5
– Nuclear, Biological, Chemical (NBC) filter	6
– By-pass valve	7
– NBC valve (air in)	8
– High pressure fan	9
– Control panel	10
– Main valve (delivery third party)	11
– NBC valve (air out)	12
– Pressure differential indicator	Pdi
– Temperature controller	TC
– Low temperature alarm	TA-CO-L
– High temperature alarm	TA-CO-H
– Low differential pressure alarm	dPa-CO-L
– End switch open position	E.S.open
– End switch closed position	E.S.closed

2.2 Description of components of the NBC 1200 unit

2.2.1 Casing

The NBC 1200 unit has a stainless steel casing which is mounted into the bulkhead. In the casing all components are mounted. The casing has several doors and hatches to get access to the following components inside the casing.

- One door for access to the pre-filter and the fine filter.
- One door to get access to the NBC filters.
- One door to get access to the fan.
- One door to get access to the control panel.
- One hatch to get access to the gastight valves and the heater.

The access doors to the pre- and fine filter, the NBC filters and the fan are equipped with end switches. These switches generate an alarm in the PLC when a door is opened during operation, and the unit is automatically switched off. When a door is open, the unit can not be started.

2.2.2 Water separator

Refer to item 1 on figure 2.1 and to divider 5 in section 9 of this manual.

The water separator is located at the inlet side of the unit. The water separator ensures that water (droplets) is removed from the air before entering the unit. The water separator drains off the water onto the deck.

2.2.3 Blast valves

Refer to item 2 on figure 2.1 and to divider 6 in section 9 of this manual.

The blast valves are located on the inlet side of the unit behind the water separator. The blast valves protect the components in the unit against an overpressure situation as a result of a pressure wave after an explosion. The blast valve is a spring loaded valve which closes when pressure wave exceeds 6.5 kPa. When the blast valve is closed, the unit is isolated at the inlet side.

2.2.4 Pre-filter

Refer to item 3 on figure 2.1 and to divider 7 in section 9 of this manual.

The pre-filter is located behind the blast valves. The pre-filter is a washable filter and filters the air on large particles. In this way the lifetime of the fine filter will be increased.

2.2.5 Fine filter

Refer to item 4 on figure 2.1 and to divider 8 in section 9 of this manual.

The fine filter is located behind the pre-filter and filters the air from small particles. This filter increases the lifetime of the High Efficiency Particles (HEPA) part of the NBC filters. The fine filter is a non-washable filter which must be replaced when clogged.

2.2.6 Electrical heater

Refer to item 5 on figure 2.1 and to divider 1 in section 9 of this manual.

The electrical heater is a heating element which is located behind the pre-filter, inside the unit. The electrical heater consist of one heating element. Dependent of the required heating capacity, the heater will be activated.

For the description of the control refer to 2.3.2 "Humidity control".

2.2.7 Fan

Refer to item 8 on figure 2.1 and to divider 2 in section 9 of this manual.

The fan is a centrifugal type fan and takes care of an airflow through the unit, thus supplying the citadel with fresh, decontaminated air. The fan is suitable to supply 1200 m³/h air with an over-pressure of 500 Pa in the citadel and a pressure loss of 500 Pa in the ducting to the citadel. The fan is directly driven by an electrical motor. The electrical motor is equipped with two sets of thermistors connected in serie. When one set fails, the other set of thermistors can be connected. To prevent overheat of the heating elements, the fan will stop after a cooldown period of 1 minute. During the cooldown period, the green pilot light "Fan on" will be flickering.

2.2.8 Gastight valve

Refer to item 7 and 10 on figure 2.1 and to divider 4 in section 9 of this manual.

The gastight valves are butterfly valves. The unit is equipped with three butterfly valves:

- By-pass valve (item 7),
- NBC valve air in (item 8),
- Main valve (item 11) (delivery third party).
- NBC valve (air out (item 12).

The NBC valves can be used to block in the NBC filters. The lifetime of the NBC filters will be enlarged when there is no flow over the filters when they are not used.

The NBC valve air in is located downstream the fan and can be manually controlled.

The NBC valve air out is located downstream the NBC filters and can be manually controlled.

The unit can only be started when the NBC valves are open and the By-pass valve is closed, or when the NBC valves are closed and the bypass valve is open. This is controlled by end-switches on the valve which give a signal of the open or closed position of the valve.

When the unit is in operation, it will automatically be switched off when the end switch of the NBC valve is de-activated, due to turning of the handwheel.

The main valve can be used to isolate the unit from the ship's system.

The NBC valves and bypass valve are manually operated, with a handwheel.

The main valve is motor operated.

2.2.9 Pressure differential indicators (Pdi)

All filters are equipped with pressure differential indicators. These pressure differential indicators indicate the pressure drop over the filter. When the pressure drop over a filter is too high, the filter is clogged and should be replaced.



The HEPA part of the NBC filter only is monitored by the differential pressure indicator. The carbon part of the NBC filters could be saturated with contamination while the pressure drop is still less than 1600 Pa.



All the filters should be replaced after an NBC challenge, disregarding the differential pressure.

2.2.10 Pressure differential switch (dPa)

The NBC filter is equipped with a pressure differential switch. When the pressure drop is lower than a set value the unit is switched off when running in NBC mode, also an alarm is generated. This alarm indicates that the filter is not, or not correct, installed.

2.2.11 NBC filter

Refer to item 6 on figure 2.1 and to divider 9 in section 9 of this manual.

The NBC filters are according STANAG 4447. The NBC filters are located between the NBC valves. These filters will de-contaminate the air to the citadel, when the unit is running in NBC mode. The unit is equipped with four NBC filters. Each filter is able to de-contaminate 300m³/h. The filters are able to remove nuclear, biological and chemical warfare agents from the air. The inner part is the carbon section and the outer part in the HEPA section.

2.3 Description of the control system

2.3.1 Fan control

In general the fan may only start at a safe situation. This means that first the main valve has to be in the open position, the NBC valves or the by-pass valve inside the unit must be in the open position and all doors must be closed. If one of the above conditions is not available or the thermal protection of the fan motor trips the fan will stop directly.

When the fan is stopped locally or remote, the fan will remain running for 1 minute to allow the heating elements to cool down.

2.3.2 Humidity control

To ensure an optimal efficiency of the NBC filters, the humidity of the air to the NBC filter may not exceed 60%. This is controlled by heating the incoming air by an electrical heater. This electrical heater heats up the air at least 10°C to ensure that the relative humidity does not exceed the given limit.

The electrical heater consist of one heating element. The required heating capacity is controlled by the PLC, by switching on or off the heater.

The heaters will heat up the temperature to max. 45°C.

The heater control is based on the outside and supply temperature. Depending on the outside temperature the set point for the supply temperature is determined. The heater is controlled with a thermostat and protected by the max heater thermostat.

- T outside lower 40° C
- T max heater 70° C

2.3.2.1 Auto mode

In Auto mode, the heater elements are controlled by operating hours. The heating element with the highest operating hours will turn off first. At NBC loaded mode the heaters are running 5 steps;

- Step 1- select 0 : heaters off
- Step 2 – T outside 40°C : heater on
- Step 3 – T supply 45°C : heater off

2.3.2.2 Manual mode

The heaters are limited to 45°C

- Step 1 – select 0 : heater off
- Step 2 – select 1 : heater on

The heater is not released when;

- The fanmotor is not running
- Max temperature alarm active
- Stop (local/remote) is activated
- Emergency stop is activated
- Selection switch Off

2.3.3 Valve control

Unit can run when pilot light (valve's in position) is illuminated:

- Main valve open
- Bypass valve open and NBC valves closed (pilot light) or
- Bypass valve closed (pilot light) and NBC valves open.

Unit stops when:

- Main valve not open (position closed or unknown and pilot light is flickering)
- Bypass valve not open or NBC valve not open

Unit cannot start when

- Main valve is closed (pilot light)
- Bypass valve and NBC valves are closed (pilot light)

2.3.4 Differential pressure control

Nbc filter is protected by a difference pressure switch. A low pressure is an indication of a missing filter. This check is done when:

- The unit is switched on
- The fan is running for at least 10 seconds.

A low differential pressure will result in a general alarm.

2.3.5 Control modes

The NBC filter unit can operate in two different control modes:

- Bypass mode
- NBC mode

2.3.5.1 By-pass mode

In normal situation (not a combat situation), the unit is operating in by-pass mode. This means that the NBC filters are by-passed and the air is not decontaminated. By-pass mode is used to reduce the costs for NBC filters.

2.3.5.2 NBC mode

In case of a possible NBC attack, the unit should be set to NBC mode. In NBC mode the NBC valve must be opened and the By-pass valve must be closed. When the NBC filters are installed correctly, an indication light on the unit will illuminate. When no NBC filters are installed in the unit, an alarm is generated in the PLC, due to a too low differential pressure over the filters. In this case, the unit will automatically be switched off.

2.3.6 Operation modes

The unit can be operated local and from the Central Monitoring System. By means of a selector switch local or remote operation can be selected. The control panel on the unit can only be used when the selector switch is set to local.

2.3.7 Control panel

2.3.7.1 Electrical starter / control panel

The control, monitoring and automation items are intergrated in the electrical starter/control panel located on the upper backside of the unit. The panel power supply is provided by an external 440V/60Hz/3ph power supply (delivery third party).

For lay-out refer to paragraph 4.3.1“: Lay-out Control panel”

After the main isolator the power supply is divided into the following groups, each with its own fuse:

- The fan motor
- Electrical heater
- Power supply 440V/60Hz-24VDC

Each group can be made powerless by removing the respective fuses.

The 24VDC voltage for the control and monitoring installation is supplied by the above mentioned power supply, which consists of a transformer, a rectifier bridge, a condensator and a fuse.

The control, monitoring and automation functions are performed by a PLC (Programmable Logic Controller), to which all input signals are connected by means of digital input cards. The PLC software program continuously controls the state of the digital outputs as a result of the signal lamps and contactors controlling the fan and the heater elements. The PLC program is written by Van Halteren Special Products B.V. and can only be changed with special software.

For the electrical diagrams refer to 8.2.5“: Electrical diagrams drawing no. 005-E-600” .

Main circuits

On the control panel door the main isolator is located with which the complete unit can be made powerless. This switch “MAIN ISOLATOR” should normally be in the “1” (ON) position. A bus bar system acts as distribution for the main circuits.

Fan

The fan can be operated with the “START” and “STOP” buttons. The fan will only start if the relevant conditions are met, refer to paragraph 2.3.1 "Fan control".

Electric heater

With the selector switch “HEATER” with positions “O” (Off) , “1” (Auto) , 2 (Manual) the heater can be controlled. If the selector switch is in position “O”, the heater is switched off. In position “1”, the heater is switched on continuously when the relevant conditions are met, refer to paragraph 2.3.2 "Humidity control".

In position “2”, the heater is manually switched on

For the automatic control of the heater refer to paragraph 2.3.2 "Humidity control".

For the heater, a green signal light indicates that the heater is switched on.

2.3.7.2 PLC hardware

The PLC consists of a rack, into which the following components are placed:

- The Central Processing Unit (CPU), that runs the PLC program. The CPU is the central control component of the PLC configuration which also consist of:
- 4 digital input modules.
- 2 digital output modules.
- 1 Analogue input module
- 1 Profibus module.

3 Technical specifications of the NBC 1200

3.1 Design conditions

Angles of inclination:

Rolling	30 degr. to both sides
Pitching	10 degr. forwards and backwards
Permanent list	15 degr. SB or PS
Permanent trim	5 degr. by the head or by the stern

Air conditions:

Outside conditions:

- Maximum temperature:	60°C with 70% RH
- Minimum temperature:	6 °C
- Maximum relative humidity:	100%RH at 26°C

Supply air conditions:

- Maximum temperature:	40°C
- Minimum temperature:	+16°C
- Maximum relative humidity:	60%RH
- Storage temperatures:	Minimum -12°C, maximum 40°C

3.2 General specifications

Dimensions (L x W x H)	930x1387x2150 mm
Mass:	915 kg

3.3 Electrical specifications

Power supply	440 V
Frequency	60 Hz
Phase	3 ph
Power consumption	8 kVA

3.4 Connections

Outlet connection	DN 200
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3.5 Capacity

Airflow	1200 m ³ /hr. nom.
Heating capacity	4 kW
External static pressure	1000 Pa

3.6 Filtering efficiency

Pre-filter:	G2 acc. EN 779
Fine filter:	F8 acc. EN 779
NBC filter:	acc. STANAG 4447
Separator:	100% for droplets > 13 µm

3.7 Additional requirements

Vibrations:	VDI 2056 class k ($v_{\text{eff}} = 1.8 \text{ mm/s}$)
Airborne noise	Lw: 69 dB(A) (without distance attenuation) Unit
Shock:	56g vertical and 28g horizontal
EMC:	The unit is designed to meet the requirements mentioned in IEC 801-1 to4 and IEC 533.
Blast protection grade:	1 bar

4 Operation of the NBC 1200

4.1 Before operation

4.1.1 Storage

When the unit is stored for a long period of time the following precautions should be taken:

- rotate impeller and motor once a month a few turns to prevent wear to bearings.

4.1.2 Hoisting

The unit may only be hoisted by lifting eyes at the top front side of the unit.



Make sure to use hoisting equipment with sufficient capacity.

For the weight of the unit refer to paragraph 3.2“: General specifications” .

4.2 Installation of the NBC 1200

4.2.1 Mounting instructions

For all positions refer to paragraph 8.2.3“: Main assembly drawing no. 005-E-200” .

1. Determine the position of the fixing bolts in the bulkhead by using the drilling jig which belongs to the series of units.



The unit has to be installed from the outside of the ship.

2. Remove the transport packaging.
3. Determine the position of the main valve and remove the blind flange position. Mind the gasket. Position 42, 116.
4. Remove the fixing bolts of the support frame.
5. Lift the unit by using the two lifting eyes on the top front side of the unit.
6. Pull the unit inside and fix it with M10 bolts including washers and rings. Bolts, nut and washers to be used: type M10; stainless steel A4, class 80.
7. Connect the supply ducting including the main valve.
8. Remove the cable gland plate and gasket (pos. 45 and 102) and drill holes to apply the correct cable glands for the power cables and signal cables to IMPS.
9. Connect the power cable and the remote control cables to the unit. Refer to paragraph 8.2.5“: Electrical diagrams drawing no. 005-E-600” page 10 & 18.
10. Remove the blind stop of the cable gland of the main valve and pull the electrical cable back into the panel. Apply the correct cable gland inner part.
11. Connect the signal cable to the main valve. Refer to paragraph 8.2.5“: Electrical diagrams drawing no. 005-E-600” sheet 14.
12. Connect the power cable directly to the main valve.
13. Check if the "Open" and "Closed" indication of the main valve is working properly.

4.2.2 Air balancing

The unit has been designed for an external static pressure of 1000 Pa (500 Pa overpressure + 500 Pa duct resistance)

During air balancing of the total system in the ship each NBC filter unit has to be adjusted with a volume damper in the supply ducting.

The initial set-point: **1320 m³/hr. with clean filters.**



The performance of the NBC filters will decrease when the airflow is higher than 10% of the nominal airflow of 1200 m³/hr.

4.3 Operation

4.3.1 Lay-out Control panel

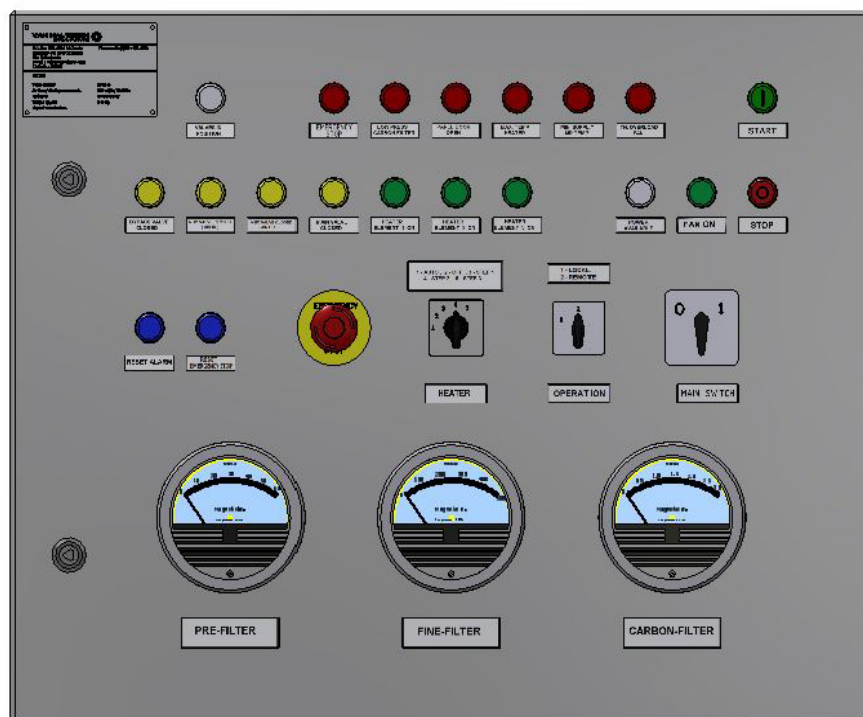


Figure 4.1 Lay-out of control panel

No.	Action	Type of switch	Name plate	Default
10Q1	Main power on/off	Selector switch 0/1	Main isolator	1(ON)
11S1	Emergency stop	Push button	Emergency stop	N.A.
11S2	Reset emergency stop	Push button	Reset emergency stop	N.A.
13S1	Stop fan	Push button	STOP	N.A.
13S2	Operation mode	Selector switch L/R	NBC UNIT	R(emote)
13S3	Start fan	Push button	START	N.A.
13S4	Heater operation	Selector switch O/1/2	HEATER	1
13S5	Reset alarm	Push button (on/off)	Reset Alarm	N.A.

Table 4.1 Switches on control panel

No.	Name plate	Colour
16L1	BYPASS VALVE CLOSED	yellow
16L2	NBC VALVE CLOSED (AIR IN)	yellow
16L3	MAIN VALVE CLOSED	yellow
16L4	PANEL DOOR OPEN	red
16L5	MAX TEMP HEATERS	red
16L6	MIN SUPPLY AIR TEMP	red
16L7	VALVES IN POSITION	white
16L8	LOW PRESS. CARBON FILTER	red
16L9	NBC VALVE CLOSED (AIR OUT)	yellow
17L1	FAN ON	green
17L2	HEATER ON	green
17L6	TH. OVERLOAD FAN	red
17L7	EMERGENCY STOP	red

Table 4.2 Signal lights on the control panel

No.	Name plate	Max. diff. pressure
17	PRE-FILTER	50 Pa
18	FINE-FILTER	150 Pa
19	CARBON-FILTER	1600 Pa

Table 4.3 Manometers

4.3.2 Out of operation

If the unit will be out of operation for a long period of time, switch off the main circuits and close both gas-tight valves to prevent saturation of the carbon filters. Refer to paragraph 4.1.1 "Storage" for instructions.

If the unit is stopped for a shorter period, switch off the heater and the fan.

All signal lamps will still function if the main isolator 10Q1 is still in the "1" position.

4.3.3 Switch on the NBC 1200

4.3.3.1 Start-up in NBC mode

Refer to Figure 4.1": Lay-out of control panel" for location of controls.



When the unit is started after a long period of time the starting condition of the fan should be tested after starting up. Refer to paragraph 2.3.1": Fan control"

1. Check whether all filters are present and mounted correctly, refer to Figure 7.2": Filter replacement". Make sure the NBC filters are present in stead of the dummy filters. With the dummy filters the unit does not protect against an NBC challenge
2. Check the unit visually for damage.
3. Set switch 13S2 on LOCAL. The unit can be operated with the control panel.
4. Make sure the main valve is open, (16L3) must be extinguished).
5. Make sure the "MAIN ISOLATOR" (10Q1) is in the "1" position.
6. Make sure if the NBC valves are in open position, the yellow signal lamp "NBC VALVE CLOSED" (16L2 and 16L9) must be extinguished.
7. Make sure the by-pass valve is closed, (16L1 must be on).
8. Make sure all valves are in position(16L7 must be on).
9. Push button (13S3) to switch on the fan.
10. Make sure the selector switch (13S4) is in the "1" position.
11. Check the differential pressure over the filters (refer to Table 4.3": Manometers").
12. Make sure all red indication lights are extinguished.



When the NBC filters are not installed, the NBC 1200 does not supply filtered and de-contaminated air.

4.3.3.2 Start-up in by-pass mode

Refer to Figure 4.1“: Lay-out of control panel” for location of controls.



When the unit is started after a long period of time the starting condition of the fan should be tested after starting up. Refer to paragraph 2.3.1“: Fan control”

1. Check whether all filters are present and mounted correctly, refer to 7.5.2“: Filter replacement” . In by-pass mode or with dummy filters the unit does not protect against a NBC challenge.
2. Check the unit visually for damage.
3. Set switch 13S2 on LOCAL. The unit can be operated with the control panel.
4. Make sure the main valve is open, (16L3) must be extinguished).
5. Make sure the “MAIN ISOLATOR” (10Q1) is in the “1” position.
6. Make sure if the NBC valves are in closed position, the yellow signal lamps “NBC VALVE CLOSED” (16L2 and 16L9) must be on.
7. Make sure the by-pass valve is in open position, the yellow signal lamp “BY-PASS VALVE CLOSED” (16L1) must be extinguished.
8. Push button (13S3) to switch on the fan.
9. Make sure the selector switch (13S4) is in the “1” position.
10. Check the differential pressure over the filters (refer to Table 4.3“: Manometers”).

4.3.4 Switch off the NBC unit

1. Push button (13S2) to switch off the fan. The fan will remain running for 1 minute if the heaters were switched on.
2. When the fan stops, set the main switch to the “0” position. All signal lights will extinguish.

4.3.5 Emergency operation

The unit can be remote emergency stopped via the central monitoring and control system. When the unit is emergency stopped, the fan and the heater will be switched off.

5 Operating conditions and settings of safety devices

5.1 Settings



Do not change the settings of the safety control devices. This can cause damage to the unit or injury to personnel.

Refer to drawing 005-E-600 in section 8 of this manual for details

No.	Description	Setting
TA1	High temperature alarm heater	70 °C
TA2	Low temperature warning supply air	5°C
PA1	Low diff. pressure alarm NBC filter	900 Pa
10Q2	Thermal overload fan	4.6 Amp

Refer to 4.3.1“: Lay-out Control panel” for location of manometers

No.	Description	Min. diff. pressure	Max. diff. pressure
17	Differential pressure pre-filter	5 Pa	50 Pa
18	Differential pressure fine filter	30 Pa	150 Pa
19	Differential pressure NBC filters	±1150 Pa	1600 Pa



The minimum differential pressure is the initial pressure drop over a clean filter.

Refer to drawing 005-E-600 in section 8 of this manual

No.	Description	Setting
10HE1	Heater control step 1	+ 40 °C



The heater control settings are set-points in the PLC, to switch on or off the heating elements.

Refer to drawing 005-E-600 in section 8 of this manual

No.	Description	Setting
10K1	Voltage	440V
10K1	U-max	484V
10K1	U-min	396V
10K1	Time	5 sec
10F13	I-nom	5,06 Amp

6 Trouble shooting

6.1 Malfunctions

Refer to 2.1“: General” and 4.3.1“: Lay-out Control panel” for location of items.

6.1.1 Fan does not start

Cause: no supply voltage.

Remedy: check supply voltage on X1:1, X1:2 and X1:3 (440VAC).

Cause: main isolator (10Q1) is in off position.

Remedy: switch main isolator to on position “1”.

Cause: unit emergency stopped.

Remedy: reset emergency stop on IMPS and press “RESET ALARM” button (13S5).

Cause: local remote selection not correct.

Remedy: check position of switch “LOCAL/REMOTE” (13S2).

Cause: valves not in position, signal lamp “VALVES IN POSITION” (16L7) not illuminated.

Remedy: check position of the NBC valves (8&12) and main valve valve (11).

Cause: main valve not open.

Remedy: open main valve (11).

Cause: loose wiring.

Remedy: check wiring of the fan (9).

Cause: fuse blown.

Remedy: check main circuit on short cut repair and replace fuses (10F1).

Cause: thermal overload protection activated.

Remedy: reset overload protection relay refer to paragraph 6.2.5“: Thermal failure fan motor” .

Cause: alarm active.

Remedy: refer to paragraph 6.2 "Alarm indications".

6.1.2 Fan stopped

Cause: refer to paragraph 6.1.1 "Fan does not start".

Remedy: refer to paragraph 6.1.1 "Fan does not start".

Cause: thermistor overheated.

Remedy: check setting thermal overload. Refer to paragraph 6.2.5 "Thermal failure fan motor".

Reset: let motor cool down and start fan again.

6.1.3 Heater not working

Cause: fan not started.

Remedy: start fan refer to paragraph 4.3.3: "Switch on the NBC 1200".

Cause: selector switch heater (13S5) in "O(ff)" position.

Remedy: put switch in "A(uto)" position.

Cause: fuses blown.

Remedy: check main circuit on short cut repair and replace fuses (10F4, 10F7 & 10F10).

Cause: alarm active.

Remedy: refer to paragraph 6.2 "Alarm indications".

6.1.4 Main valve not working

Cause: local/remote selection not correct.

Remedy: put switch in correct position.

Cause: unit emergency stopped.

Remedy: reset emergency stop on IMCS and press "RESET ALARM".

6.2 Alarm indications

An alarm will be indicated by an illuminated signal light on the control panel. The name plate underneath the signal light describes the meaning of the signal light.

6.2.1 Panel door open

Cause: one of the doors is not fully closed.

Remedy: check and close panel doors. Refer to paragraph 2.2.1: "Casing".

Reset: push button "RESET ALARM".

6.2.2 Maximum temperature alarm heater

Cause: heater manual operated at high temperatures.

Remedy: put heater selector switch (13S4) on "A(uto)" or "O(ff)".

Cause: no sufficient airflow.

Remedy: check unit and supply duct for obstructions.

Cause: not correct setting of maximum temperature.

Remedy: check setting (70°C) in software.

Reset: push button "RESET ALARM".

6.2.3 Minimum air temperature

Cause: heater not working.
Remedy: refer to paragraph 6.1.3 "Heater not working".

Cause: extreme cold outside temperature.
Remedy: none.

Cause: not correct setting in software.
Remedy: check setting in software.

Reset: automatically when temperature in range.

6.2.4 Low pressure NBC filter

Cause: filters not loaded.
Remedy: place filters, refer to paragraph 7.4.1": Filter replacement" .

Cause: not correct position of the valves.
Remedy: check if position equals with the required mode, refer to paragraph 4.3.3": Switch on the NBC 1200" .

Cause: incorrect setting of the pressostat.
Remedy: check set-point of the pressostat (dPa-CO-L).

Cause: NBC filters not correct mounted.
Remedy: check the positioning of the NBC filters, refer to paragraph 7.4.1": Filter replacement" .

Cause: press-on mechanism not placed.
Remedy: check if press-on mechanism is placed, refer to paragraph 7.4.1": Filter replacement" .

Reset: push button "RESET ALARM".

6.2.5 Thermal failure fan motor

Cause: loose wiring.
Remedy: check wiring in the main circuit of the fan.

Cause: airflow obstructed.
Remedy: check the unit and supply duct for obstructions.

Cause: setting thermal overload not correct.
Remedy: check setting of thermal overload relais 10F13 (4,6 Amp).
Located inside control panel

Reset: on thermal overload relais (10F13) and push button "RESET ALARM" (13S5).

7 Maintenance

7.1 General

This NBC 1200 is designed to be operational with a minimum of maintenance. However, to ensure a save and reliable operation, some preventive maintenance should be performed to the unit. Performing the preventive maintenance tasks conscientiously, will reduce possible malfunctioning of the unit. Refer to paragraph 7.3 "Preventive maintenance" for the preventive maintenance plan.



The HEPA part of the NBC filter only is monitored by the differential pressure indicator. The carbon part of the NBC filters could be saturated with contamination while the pressure drop is still less than 1600 Pa.



All the filters should be replaced after a NBC challenge, disregarding the differential pressure.



Maintenance tasks may only be performed by suitable trained personnel. Maintenance on the electrical components of the NBC 1200 should be executed by an electrical service engineer. Maintenance on the mechanical components of the NBC 1200 should be executed by a mechanical service engineer.

7.2 Maintenance after a NBC challenge

The following maintenance task should be performed after a NBC challenge

- Replace the pre-filter refer to paragraph 7.4.1.1 "Clean or replace the pre-filter".
- Replace the fine filter refer to paragraph 7.4.1.2: "Replace the fine filter" .
- Replace the NBC filters refer to paragraph 7.4.1.3 "Replace the NBC filters".
- Back home: have the units cleaned by experts.



New NBC filters should always be installed when the units are not yet cleaned by experts.

7.3 Preventive maintenance

This paragraph gives an overview of the preventive maintenance tasks, divided into intervals. The maintenance tasks are not only dependent on the given interval, but also on the actual running hours of the components (i.e. filters or fan).

Task	Level	Frequency	Time estimate	Skill of personnel	Required spec. tools	Ref.	Remarks
Run unit with heater on	Shipboard	Monthly	15 min.	Mechanic		4.3.3	
Check motor for noise and vibration	Shipboard	Monthly	5 min.	Mechanic		7.3.1	Replace bearings when required

Task	Level	Frequency	Time estimate	Skill of personnel	Required spec. tools	Ref.	Remarks
Check differential pressure pre-filter	Shipboard	Monthly	2 min.	Mechanic		7.3.1	Replace filter when required
Check differential pressure fine-filter	Shipboard	Monthly	2 min.	Mechanic		7.3.1	Replace filter when required
Check differential pressure NBC-filter	Shipboard	Monthly	2 min.	Mechanic		7.3.1	Replace filters when required
Check operation of control panel	Shipboard	Quarterly	20 min.	Mechanic		7.3.2	
Check flexible connections for cracks	Shipboard	Quarterly	15 min.	Mechanic		7.3.2	Replace if damaged
Check shock mounts for damage	Shipboard	Quarterly	15 min.	Mechanic		7.3.2	Replace if damaged
Check the unit for loose bolts, nuts and connections	Shipboard	Quarterly	1 hours	Mechanic		7.3.2	Fasten when required
Check unit and control panel for loose electrical connections	Shipboard	Quarterly	1 hour	Electrician		7.3.2	Fasten when required
Replace battery of PLC	Base	Annual	5 min	Electrician		7.3.3	
Measure current of heater elements	Base	Annual	30 min	Electrician		7.3.3	
Inspect and clean heater	Base	Annual	30 min	Mechanic	Brush and vacuum cleaner	7.3.3	Only clean if required
Clean impeller	Base	Annual	20 min	Mechanic	Brush and vacuum cleaner	7.3.3	Only clean if required
Check for corrosion	Base	Annual	20 min	Mechanic		7.3.3	Tough up if required
Inspect and clean blast valve	Base	Annual	20 min	Mechanic	Brush and compressed air	7.3.3	Only clean if required
Grease hinges of filter doors	Base	Annual	5 min	Mechanic	Grease gun	7.3.3	

Table 7.1 Overview preventive maintenance tasks

7.3.1 Overview monthly maintenance

The following maintenance tasks should be performed each month.

- Run the unit monthly at least for a quarter of a hour with the heater switched on.
- Inspect the motor and fan for unusual noise (to detect worn bearings).
- Check the differential pressure over the pre-filter (to detect clogging of filter). Clean or replace filter when the differential pressure exceeds 50 Pa. Refer to paragraph 7.4.1.1 "Clean or replace the pre-filter".
- Check the differential pressure over the fine-filter (to detect clogging of filter). Replace filter when the differential pressure exceeds 150 Pa. Refer to paragraph 7.4.1.2: "Replace the fine filter".
- Check the differential pressure over the carbon (NBC) filter (if filters installed). Replace filters when the differential pressure exceeds 1600 Pa. Refer to paragraph 7.4.1.3 "Replace the NBC filters".



The HEPA part of the NBC filter only is monitored by the differential pressure indicator. The carbon part of the NBC filters could be saturated with contamination while the pressure drop is still less than 1600 Pa.



All the filters should be replaced after a NBC challenge, disregarding the differential pressure.

During monthly maintenance, the unit is available for operation.

The monthly maintenance tasks can be performed as first level maintenance.

No test and service equipment or special tools are required to perform the monthly maintenance tasks.

No spare parts are required to perform the monthly maintenance tasks.

7.3.2 Quarterly maintenance

The following maintenance tasks should be performed each three months:

- Check the operation of the control panel (switches, control keys and lights).
- Check flexible connection for cracks.
- Check the shock mounts for damage.
- Visual inspect the tube connections inside the unit.
- Visual inspect the unit for loose bolts and nuts.



Shut-off the electrical supply before you open the control panel. The equipment in the control panel carry high voltages.

- Visually inspect the electrical connections internally in the unit and control panel.

During quarterly maintenance, the unit is not available for operation.

The quarterly maintenance tasks can be performed as first level maintenance, by an authorised electrical service engineer.

No test and service equipment or special tools are required to perform the quarterly maintenance tasks.

No spare parts are required to perform the quarterly maintenance tasks.

7.3.3 Annual maintenance

The following maintenance tasks should be performed each year:

- Replace the battery of the PLC, refer to paragraph 7.4.2 "Replace the battery of the PLC".
- Measure the nominal current of the heater elements. For the currents refer to paragraph 8.2.5": Electrical diagrams drawing no. 005-E-600" accuracy ± 0.3 A.
- Visually inspect the heater and clean the elements if necessary with a brush and a vacuum cleaner.
- Check unit visually for corrosion and signs of water at the inside of the unit.
- Clean the impeller of the fan with a brush and a vacuum cleaner.
- Touch up damaged paint.



Use safety glasses when you work with pressurised air.

- Visual inspect the blast valve and clean it with pressurised air.



Obey the safety instructions of the manufacturer when you work with grease.

- Re-grease the hinges of the fan door, pre- and fine filter door, NBC filter door with aqua-gear-grease.

During annual maintenance, the unit is not available for operation, except for the paint repair work. All annual maintenance tasks can be performed as first level maintenance.

7.4 General maintenance

This paragraph describes the general maintenance tasks which must be performed during repairs or replacement of components, or maintenance tasks which must be performed due to deviations found during preventive maintenance.

7.4.1 Filter replacement

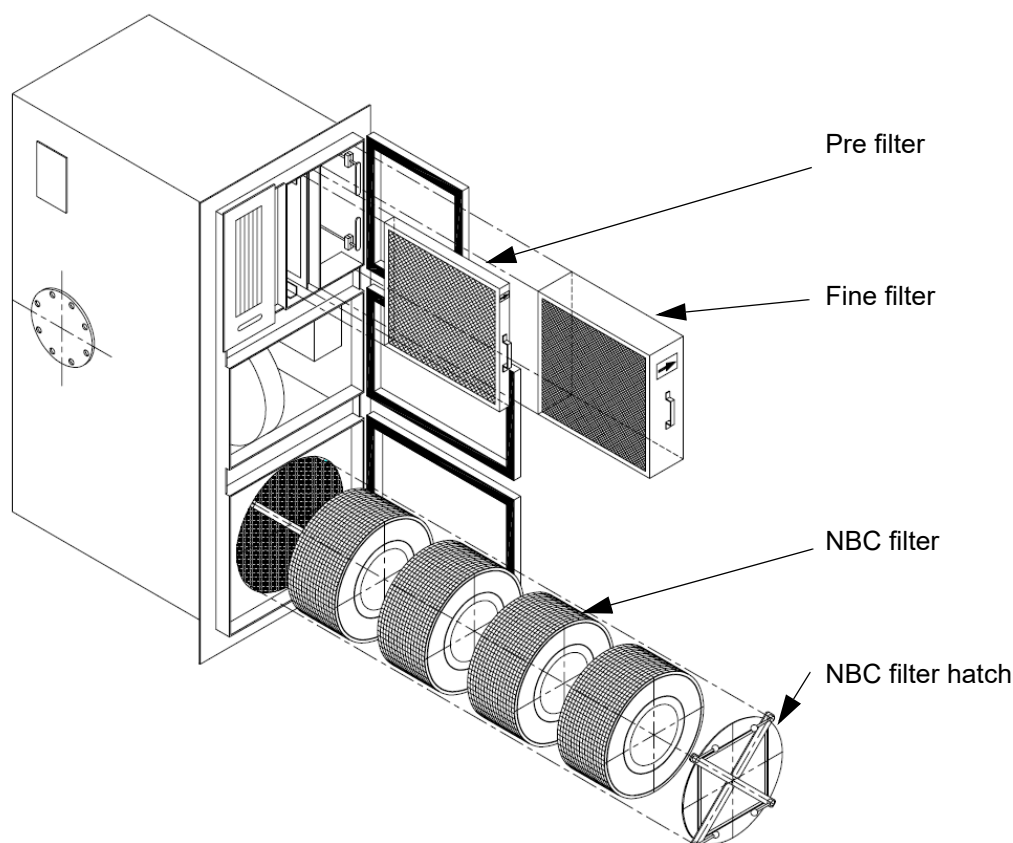


Figure 7.1 Filter replacement

7.4.1.1 Clean or replace the pre-filter

This paragraph gives the procedure for cleaning or removal of the pre-filter and installation of a new pre-filter, including the necessary precautions for removal of a contaminated pre-filter. If the pre-filter is NOT contaminated it can be cleaned with water and re-used.

Refer to Figure 7.1 "Filter replacement" for location of filter.



All the filters should be replaced after a NBC challenge, disregarding the differential pressure.



If the pre-filter is contaminated, the filter should be disposed according Naval regulations.



Make sure you will take the necessary personal precautions when replacing a filter after a NBC attack.

1. Stop the unit.
2. Open the door to get access to the pre-filter.
3. Remove the pre-filter.
4. Clean the filter with clear water (a detergent could be added).
5. Wash the filter with clear water if a detergent has been used.
6. Dispose the filter according the Naval regulations if it is contaminated.



Check the flow direction of the filter before you put the filter in place. This is indicated by an arrow on the filter. The arrow must point outwards.

7. Put the cleaned or new pre-filter in place. Make sure all packaging material is removed from the filter.
8. Close the access door.
9. Start the unit.
10. Check the differential pressure over the pre-filter to make sure the filter is installed correctly.

During the replacement of the filter, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task

:

LCRS Item nr.	Item name	NSN	Qty
1	Pre-filter		1

7.4.1.2 Replace the fine filter

This paragraph gives the procedure for removal of a fine filter and installation of a new fine filter, including the necessary precautions for removal of a contaminated fine filter.

Refer to Figure 7.1 "Filter replacement" for location of filter.



All the filters should be replaced after a NBC challenge, disregarding the differential pressure.



Make sure you will take the necessary personal precautions when replacing a filter after a NBC attack



If the fine filter is contaminated the filter should be disposed according Naval regulations.

1. Switch off the unit.
2. Open the door to get access to the fine filter.
3. Loosen the press-on mechanism of the fine filter.
4. Remove the fine filter.
5. Dispose the filter according the Naval regulations.



Check the flow direction of the filter before you put the filter in place. This is indicated by an arrow on the filter. The arrow must point outwards.

6. Put the new fine filter in place. Make sure all packaging material is removed from the filter.
7. Tighten the press-on mechanism of the fine filter.
8. Close the door.
9. Switch on the unit.
10. Check the differential pressure over the fine filter on the control panel, to make sure the filter is installed correctly.

During the replacement of the filter, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task

LCRS Item nr.	Item name	NSN	Qty
2	Fine filter		1

7.4.1.3 Replace the NBC filters

This paragraph gives the procedure for removal of a contaminated filter and installation of new NBC filters, including the necessary precautions for removal of contaminated filters.

Refer to Figure 7.1 "Filter replacement" for location of filters.



All the filters should be replaced after a NBC challenge, disregarding the differential pressure.



Make sure you will take the necessary personal precautions when replacing a filter after a NBC attack.



If the NBC filters are contaminated the filters should be disposed according Naval regulations.



Handle contaminated filters carefully while contaminated dust could fall into the clean part of the unit.

1. Switch off the unit.
2. Open the door to get access to the NBC filters.
3. Loosen the NBC filter hatch.
4. Remove the NBC filters carefully.
5. Dispose the filters according the Naval regulations.
6. Put the new NBC filters in place. Make sure all packaging material is removed from the filters.
7. Remount the NBC filter hatch.
8. Close the NBC door.
9. Switch on the unit.
10. Check the differential pressure over the NBC filters on the control panel, to make sure the filters are installed correctly.

During the replacement of the filters, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task:

LCRS Item nr.	Item name	NSN	Qty
3	NBC filter		4

7.4.2 Replace the battery of the PLC

To prevent malfunctioning of the PLC, the battery of the PLC should be replaced annually.



If you wait too long to replace a discharged battery, the memory in the PLC can be lost.

Do the following to replace the battery:



Shut of the electrical supply before you open the control panel. The equipment in the control panel carries high voltage.

1. Set the main switch of the control panel to OFF.
2. Open the door of the control panel.
3. Remove the cover at the right side of the PLC.
4. Remove the battery from the battery holder.
5. Install a new battery in the battery holder.
6. Place the cover.
7. Set the main switch to "ON", the unit is ready for use.



Dispose the battery on an environmental friendly way.

During the replacement of the battery, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task:

LCRS Item nr.	Item name	NSN	Qty
	Battery 3V Lithium		1

7.4.3 Replace the differential pressure switch

Do the following to replace the differential pressure switch:



Shut of the electrical supply before you open the control panel. The equipment in the control panel carries high voltage.

1. Set the main switch of the control panel to OFF.
2. Open the control panel door to get access to the switch.
3. Disconnect the hoses from the switch.
4. Disconnect the electrical wiring from the switch. Mark the electrical connections. This will help you during installation.
5. Remove the mounting materials and remove the switch from the unit.
6. Install the new switch with the mounting materials in the unit.
7. Connect the electrical wiring according the marks.

8. Connect the hoses to the switch.
9. Set the cut-off pressure on the numeric scale indicator by adjusting the screw. Refer to section 5.1 for the correct setting (PA1).
10. Close the door.
11. Set the main switch to ON position.

During the replacement of the switch, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task:

LCRS Item nr.	Item name	NSN	Qty
30	Differential pressure switch		1

7.4.4 Replace the 3 phase safety relay

Do the following to replace the 3 phase safety relay:



Shut off the electrical supply before you open the control panel. The equipment in the control panel carries high voltage.

1. Set the main switch of the control panel to OFF.
2. Open the control panel door to get access to the relay.
3. Disconnect the electrical wiring from the switch. Mark the electrical connections. This will help you during installation.
4. Remove the relay from the DIN rail.
5. Install the new relay onto the DIN rail.
6. Connect the electrical wiring according the marks.
7. Set the main switch to ON position.
8. Adjust the relay by incorporating the correct settings. Refer to section 5.1 for the correct setting (10K1).
9. Close the door.

During the replacement of the relay, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task:

LCRS Item nr.	Item name	NSN	Qty
40	3 phase safety relay		1

7.4.5 Replace the thermal protection relay

Do the following to replace the thermal protection relay:



Shut of the electrical supply before you open the control panel. The equipment in the control panel carries high voltage.

1. Set the main switch of the control panel to OFF.
2. Open the control panel door to get access to the relay.
3. Disconnect the electrical wiring from the switch. Mark the electrical connections. This will help you during installation.
4. Remove the relay from the DIN rail.
5. Install the new relay onto the DIN rail.
6. Connect the electrical wiring according the marks.
7. Set the main switch to ON position.
8. Adjust the relay by incorporating the correct setting. Refer to section 5.1 for the correct setting (10F13).
9. Close the door.

During the replacement of the relay, the unit is not available.

No special tools are required to perform this maintenance task.

The following spare part is required to perform the maintenance task:

LCRS Item nr.	Item name	NSN	Qty
41	Thermal protection relay		1

8 Drawings, listings and logbook

8.1 Logbook

8.1.1 General

For adequate maintenance management a log-book should be maintained.

A log-book comprises:

- all inspections;
- all executed repairs and replacements of components;
- particular events like:
 - deviations from the normal management/operation;
 - dangerous situations;

8.1.2 Periodical inspections

Records of periodical inspections could contain:

- what periodical inspections should be carried out;
- the executor who should carry out these inspections;
- the time interval between which the inspections should be carried out;
- persons who should be informed about these inspections.

Sheet 8.1.1 is an example of a sheet to be used for recording periodical inspections.

8.1.3 Repair and maintenance

Repairs should only be carried out by skilled personnel and after permission of the management. Repairs and maintenance should be carried out by more than one person.

Each repair and case of maintenance should be recorded in the log-book.

Sheet 8.1.2 is an example of a sheet to be used for recording repairs and cases of maintenance.

8.1.4 Replacement of components and revision of installation

Revisions and replacement of components should be recorded in the log-book.

Sheet 8.1.3 is an example of a sheet to be used for recording revisions and replacement of components.

8.1.5 Particular events

Faults, accidents, deviations of normal management and other particular events should be recorded in the log-book.

Sheet 8.1.4 is an example of a sheet to be used for recording particular events.

Logbook sheets

Sheet 8.1.2": Periodical inspections"

Description inspection	Executor	Time interval	Persons to be informed	Date	Remarks

Sheet 8.1.3": Repair and maintenance"

Description execution	Executor	Date	Time interval	Remarks

Sheet 8.1.4: "Replacement of components and revision of installation"

Description execution	Executor	Date	Remarks

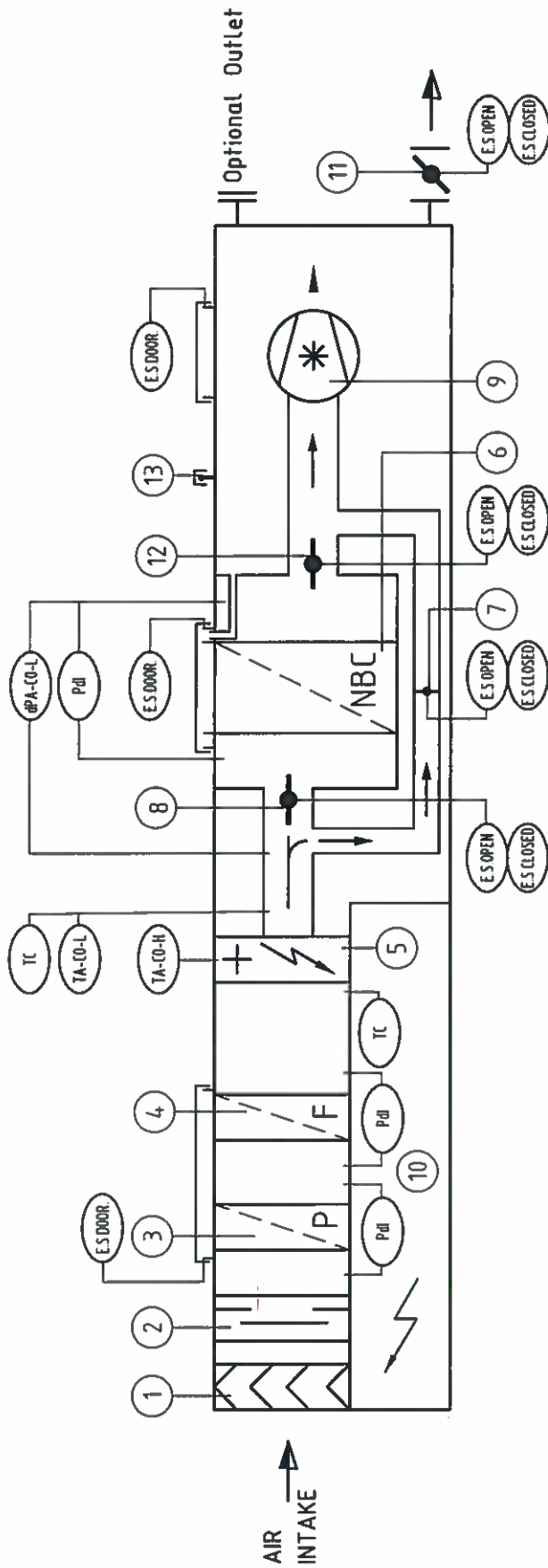
Sheet 8.1.5": Particular events"

Description event	Responsible person	Date	Remarks

8.2 Drawings & parts list

All necessary technical (engineering) drawings, like lay-out drawing, flow diagram, electrical drawing.

8.2.1 Flow diagram drawing



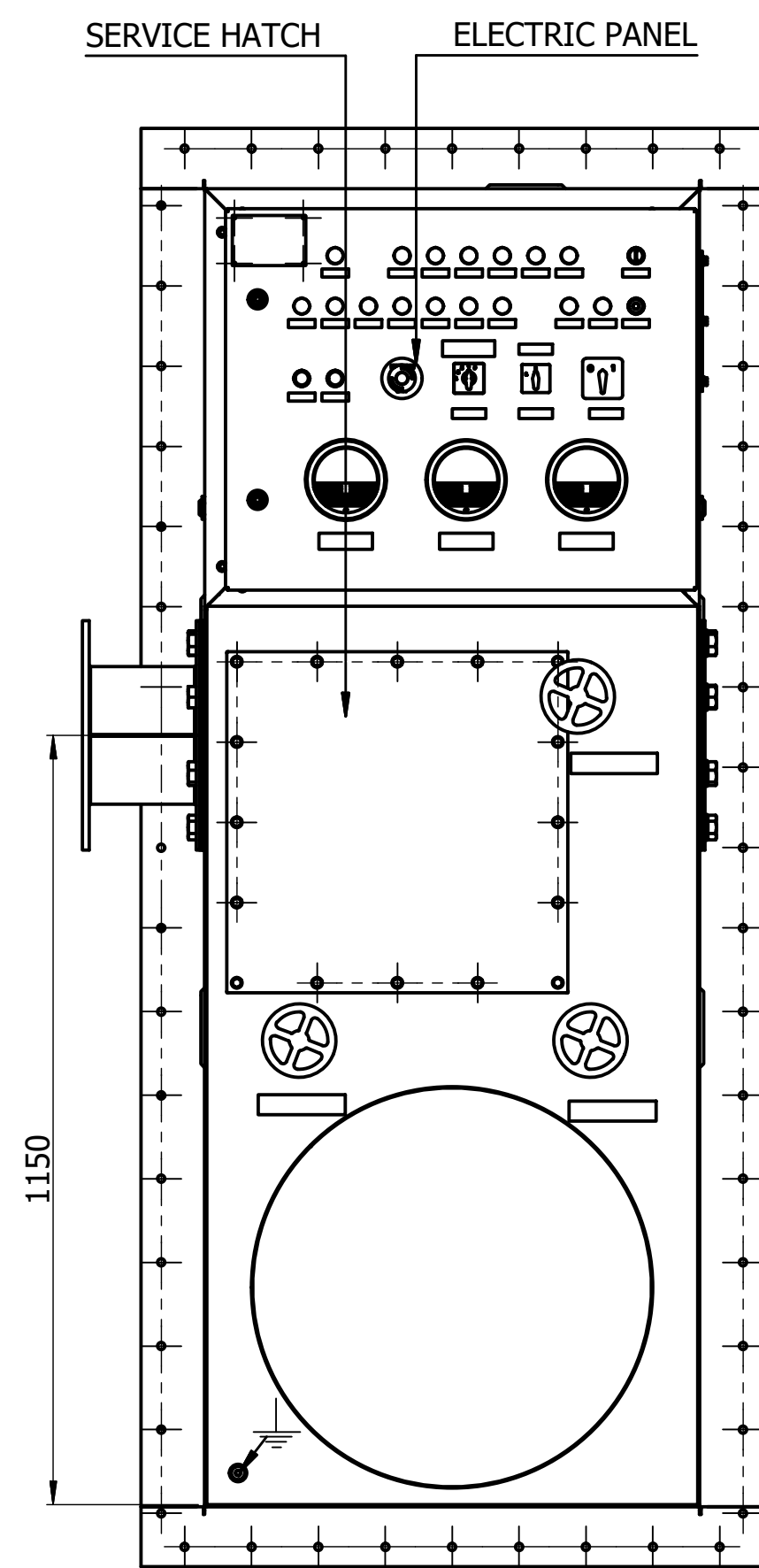
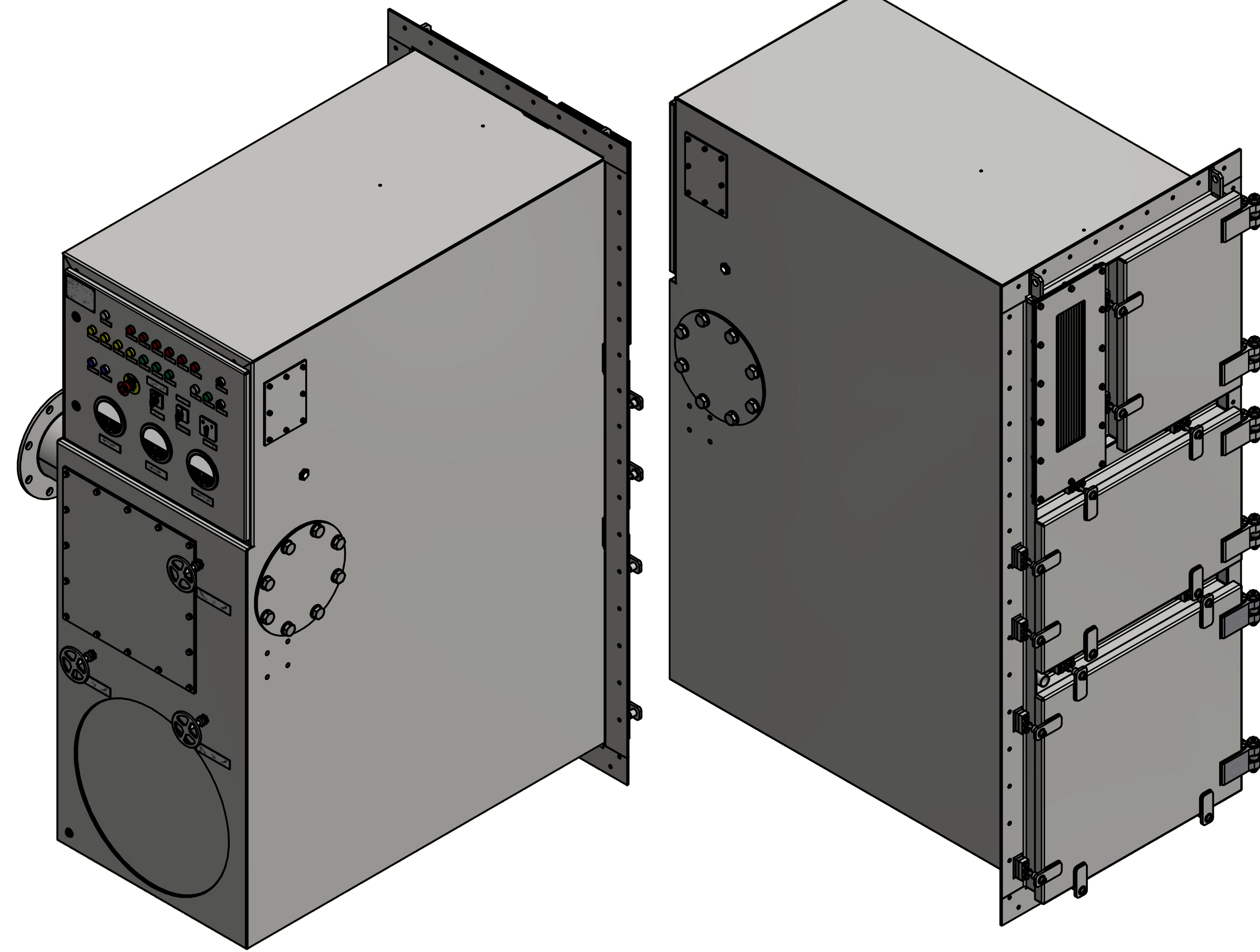
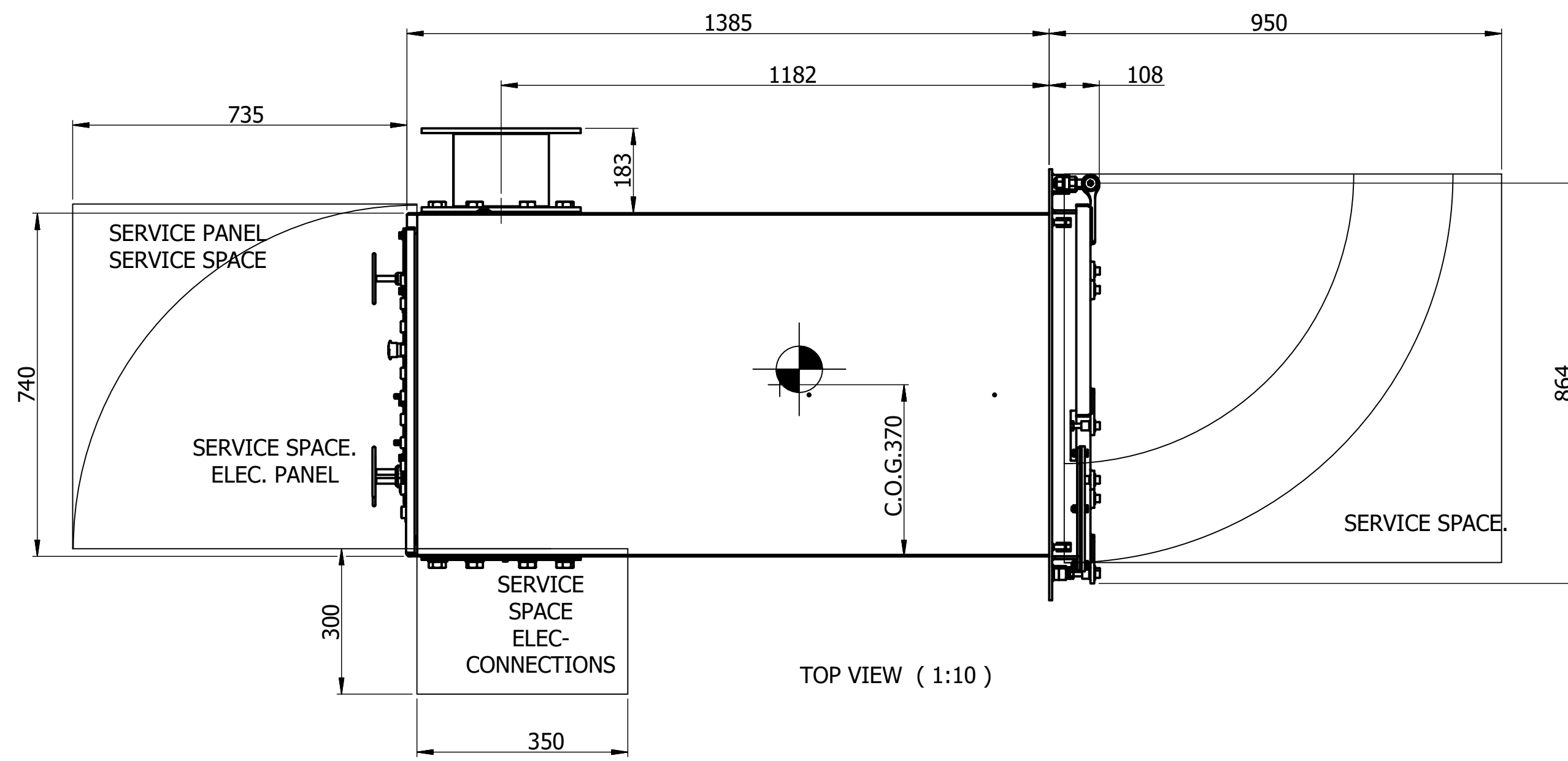
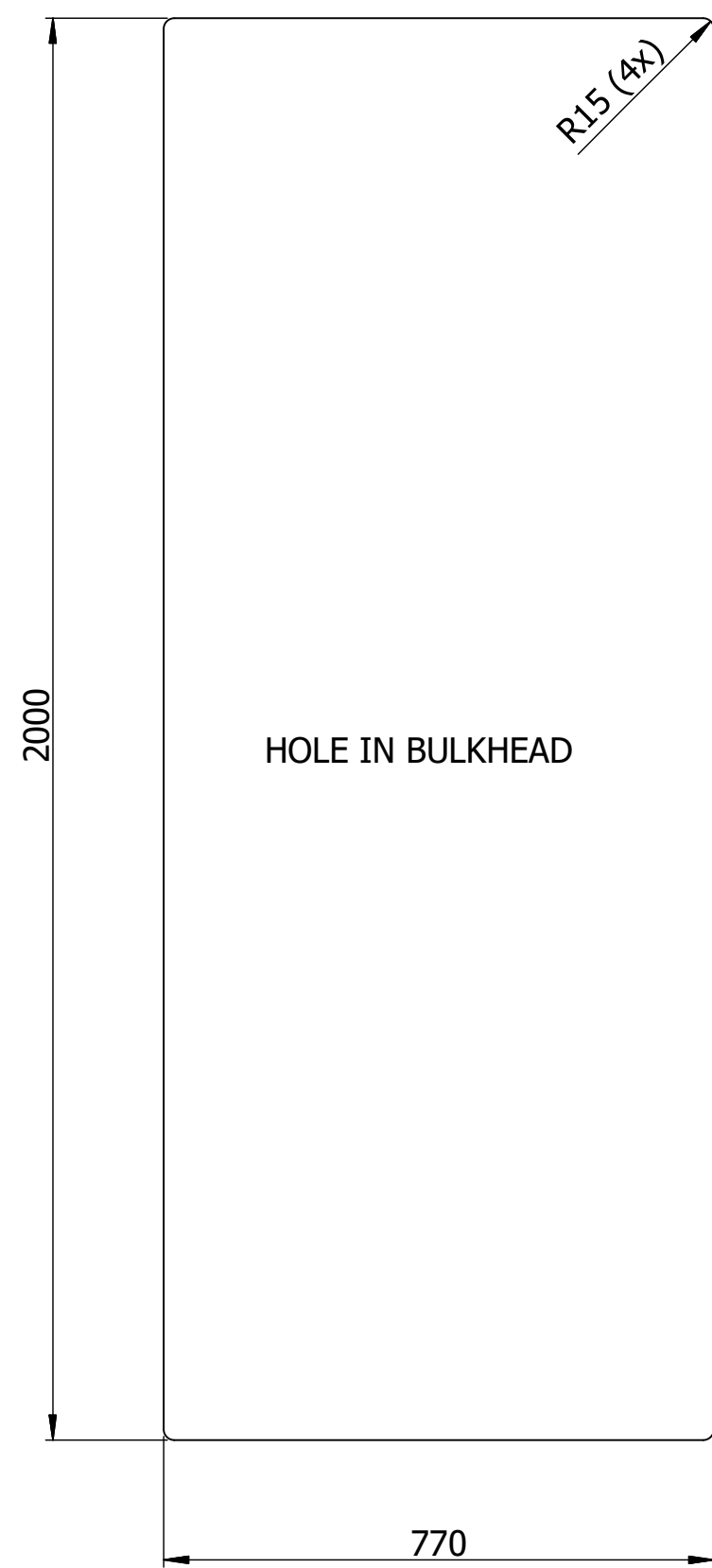
NOTE:
Restricted Commercial in Confidence

POS	DESCRIPTION
1	WATER SEPARATOR.
2	BLAST VALVE.
3	PRE/FILTER.
4	FINE FILTER.
5	ELEC HEATER.
6	N.B.C.FILTER.
7	BY PASS VALVE.
8	NBC VALVE.(AIR IN)
9	HIGH PRESSURE FAN
10	ELEC PANEL & SWITCH BOARD.
11	MAIN VALVE.(BY OTHERS)
12	NBC VALVE.(AIR OUT)
13	TEST MEASURING POINT.

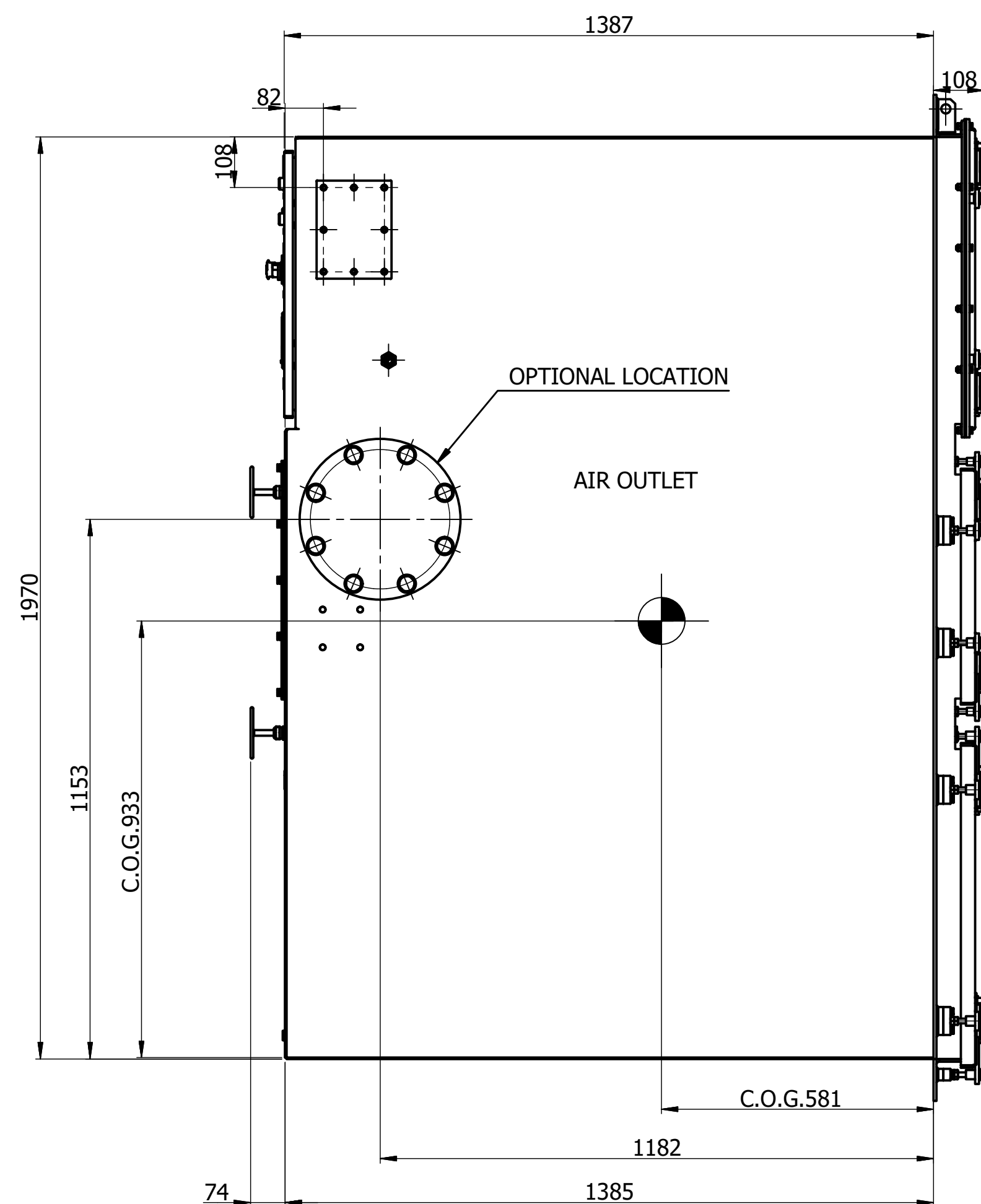
- ES OPEN — END SWITCH OPEN
- ES CLOSED — END SWITCH CLOSED
- ES DOOR — END SWITCH DOOR
- Pd — PRESSURE DIFF INDICATOR
- TA-CO-L — TEMP ALARM CUT OUT LOW
- TA-CO-H — TEMP ALARM CUT OUT HIGH
- TC — TEMP CONTROL

REV	0	01-05-2019	ORIGINAL	PSR	CHK	APPD
Dim. tol.	0.07/0.08	DATE	DESCRIPTION	Weight	kg	Approved
Surface	Rainpum	Material		Norm material		Scale
						A 3
Name:			Project: NBC 1200			
Drawing no:			005-E-100			
Rev:			0			
VAN HALTEREN SPECIAL PRODUCTS Van Halteren Special Products P.O. Box 659, 8000 AR Zwolle The Netherlands Copyright reserved/Commercial in confidence			Drawn by: PSR Date: 01-05-2019 Sheet 1 of 1 Sheets Project: NBC 1200			

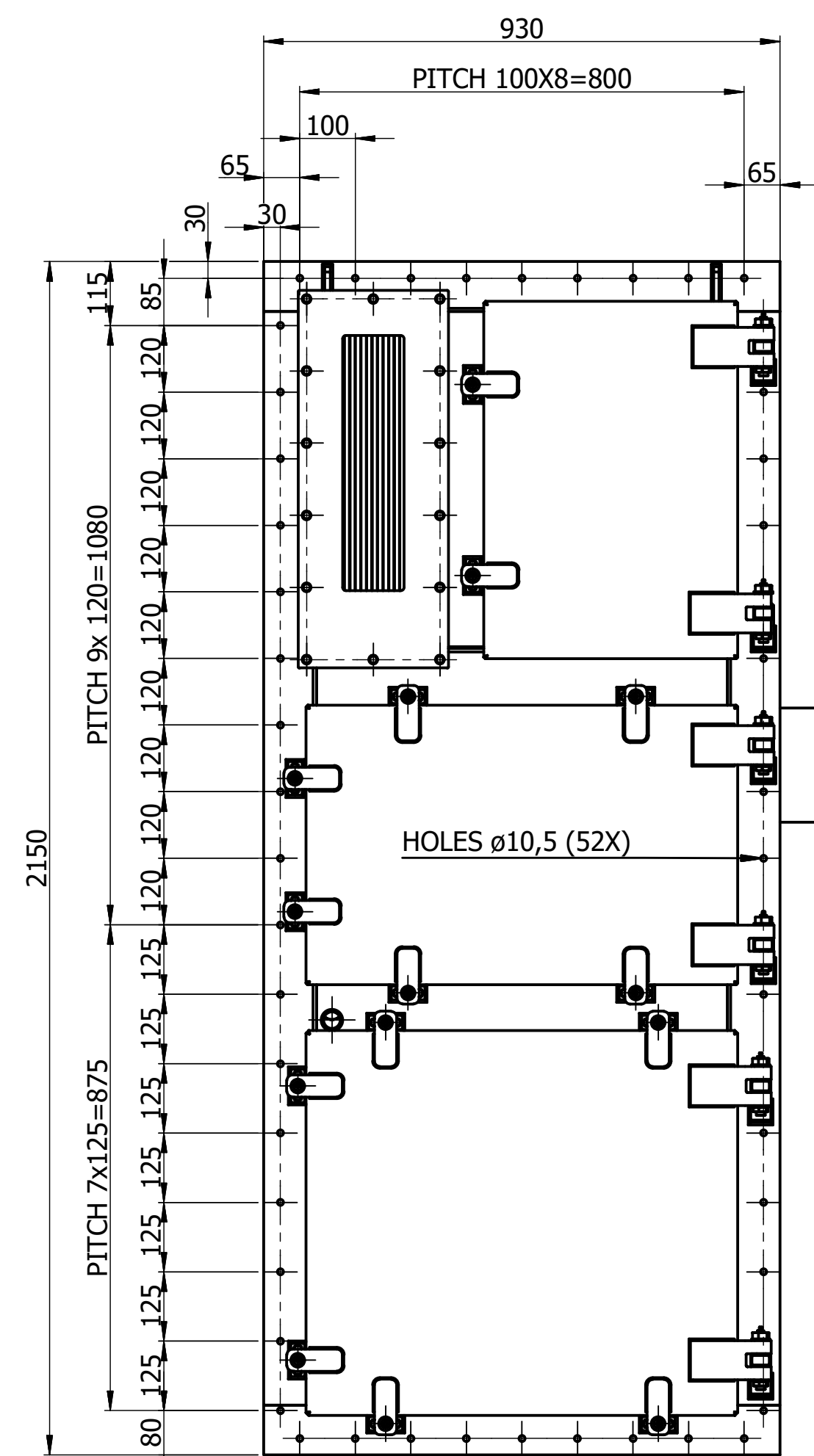
8.2.2 Dimension sketch drawing



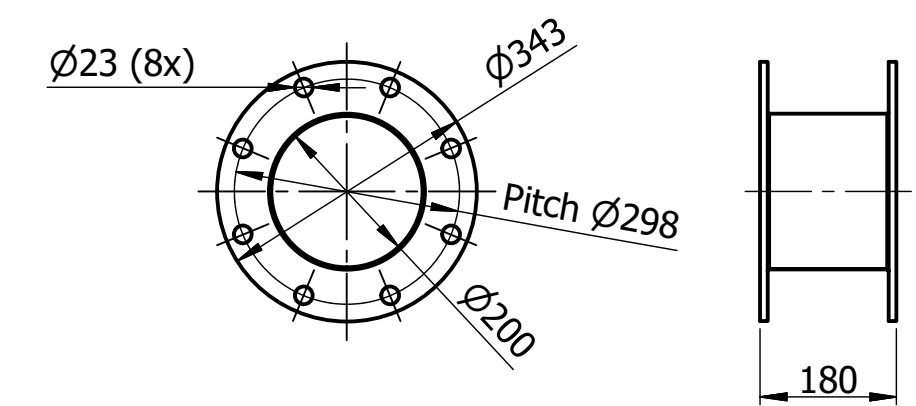
REAR VIEW (1:10)



SIDE VIEW (1:10)



FRONT VIEW (1:10)

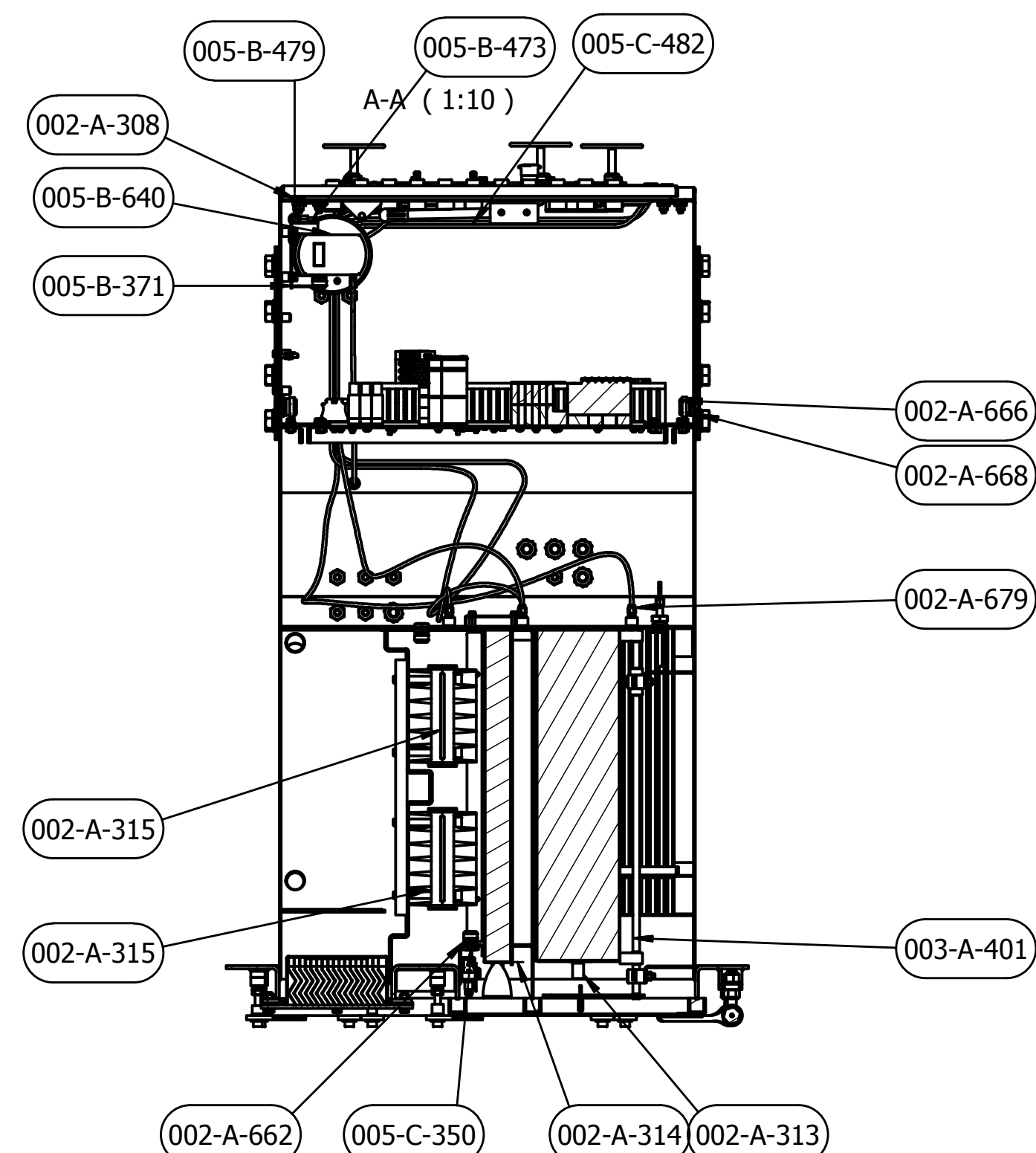
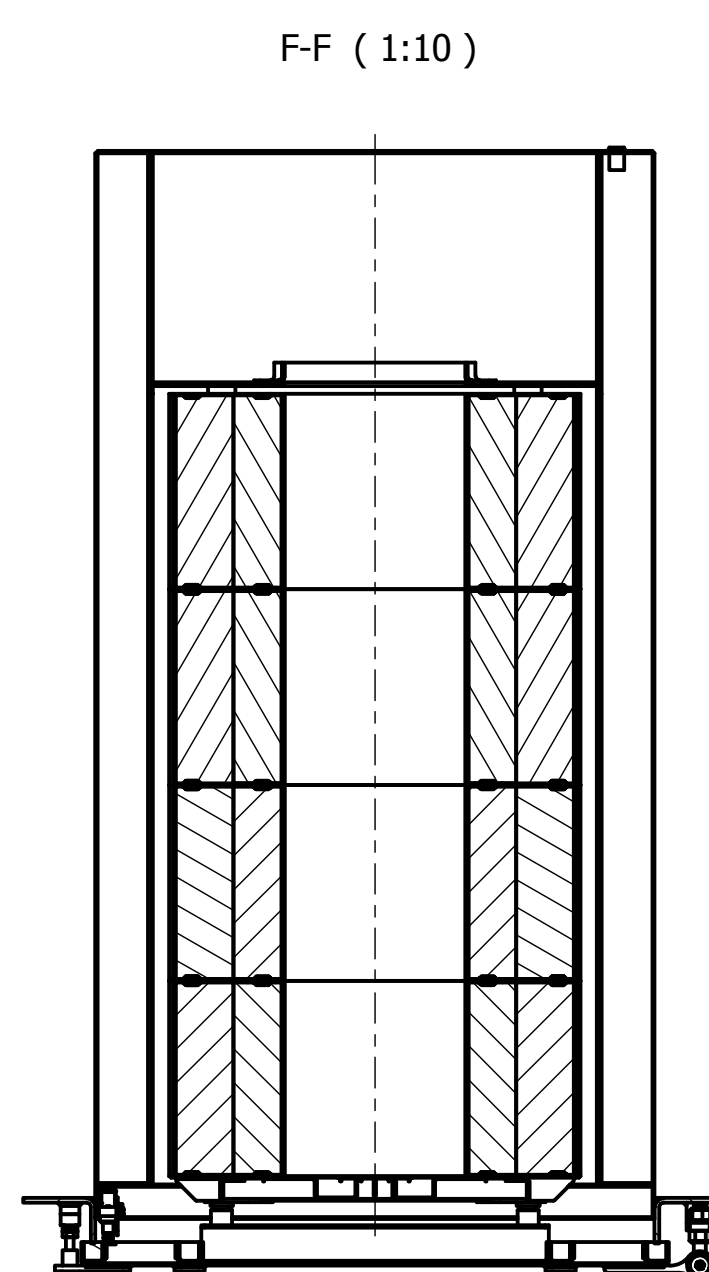
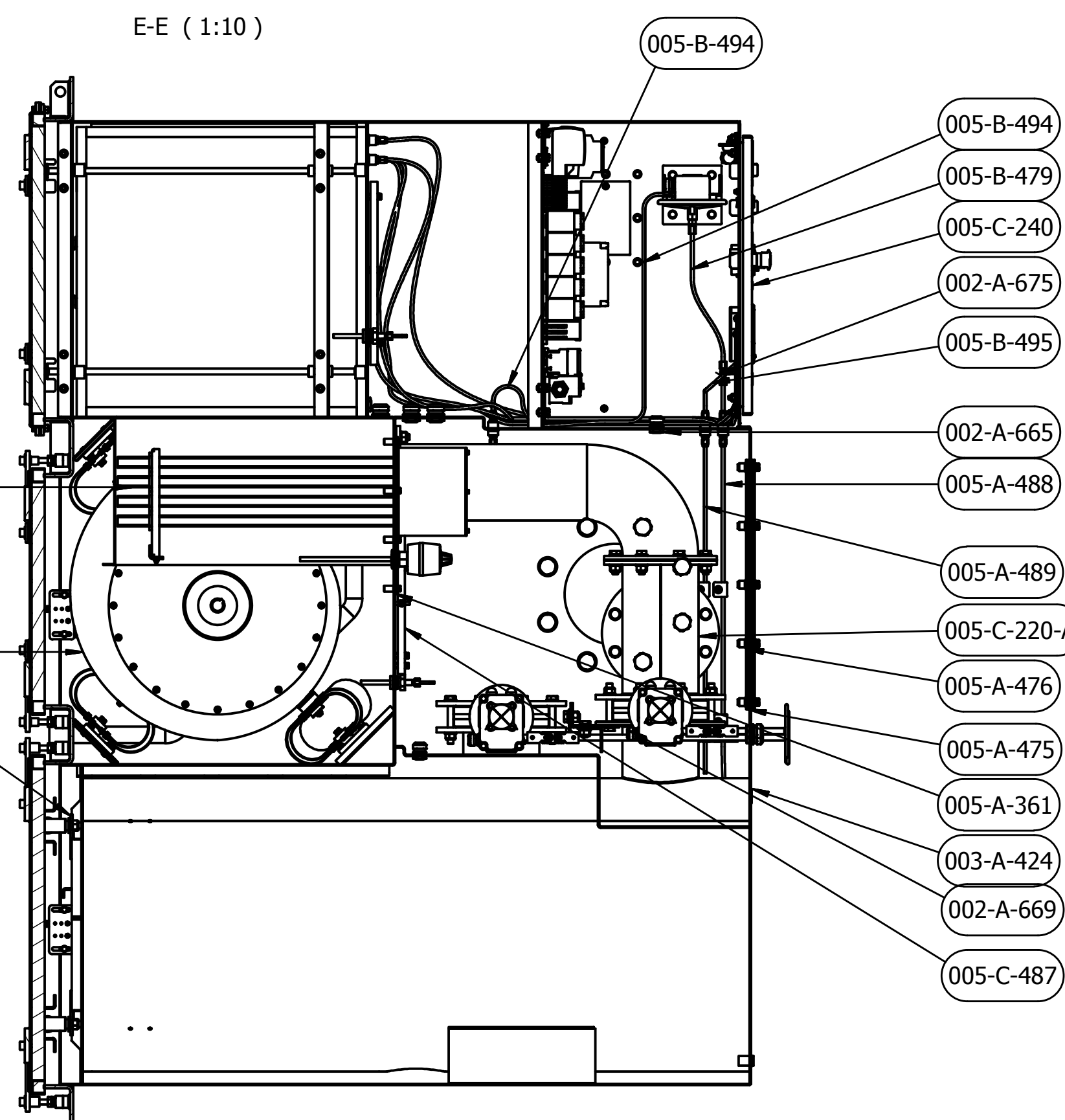
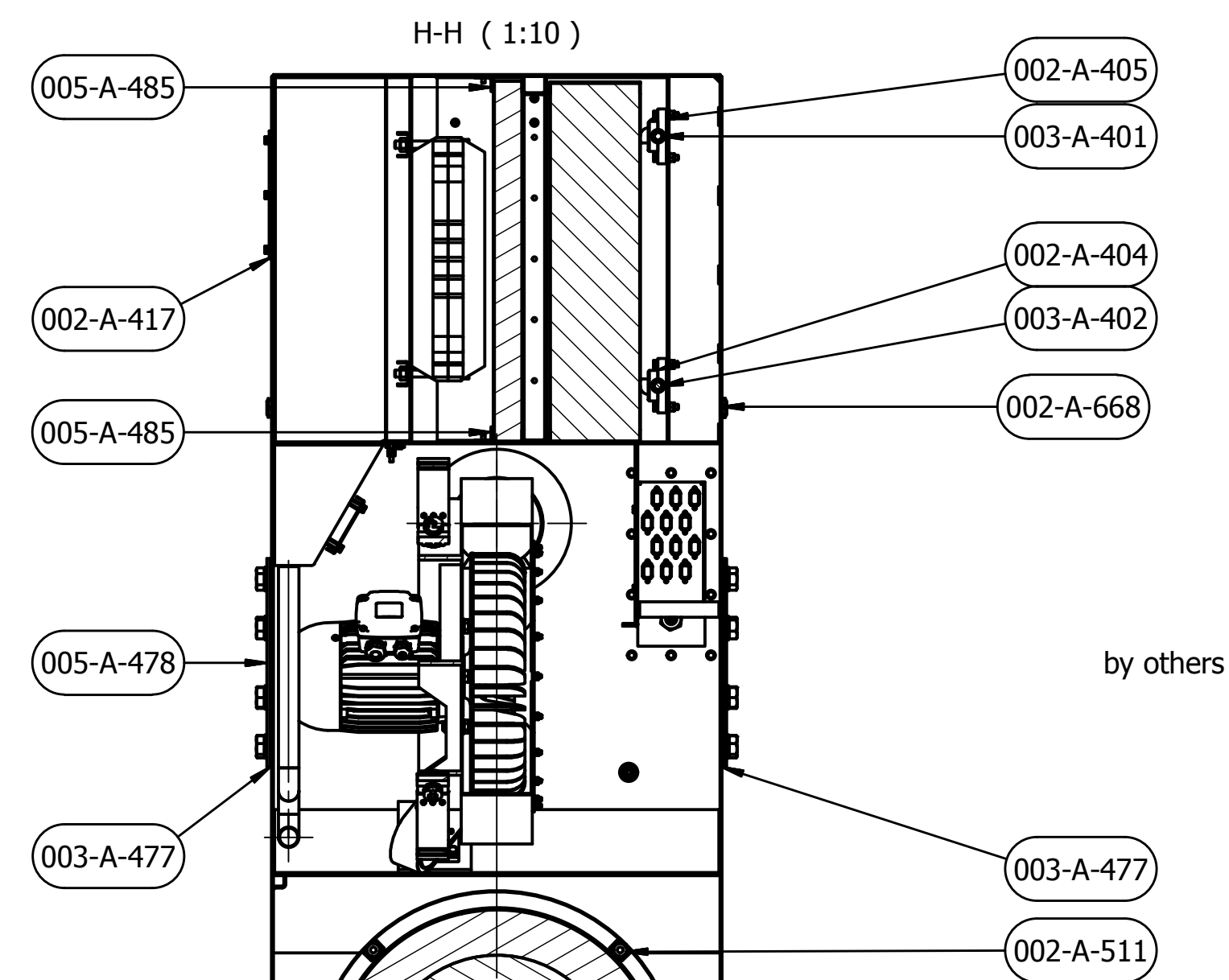


FLANGE CONNECTION NOM 200 (1 : 10)

NOTES:
1: HOLES IN BULKHEAD TO BE DRILLED WITH DRILLING JIG



O	13-5-2019	Original	PSR	PBH	LDD
Rev.	Date	Description	Dr.by	Check	Appd
Name:			Project:		
DIMENSION SKETCH			NBC		
1200 m3/h			ANEP - 57		
VAN HALTEREN SPECIAL PRODUCTS		Projection	Weight: (kg)	Sheet 1 of 1	A1
Van Halteren Special Products B.V.		Scale: 1:10	915,0 kg	File name:	
P.O. Box 659, 8000 AR Zwolle		Scale: 1:10	Material: -	005-E-150-0.dwg	0
The Netherlands		Drawing no.:			
Copyright reserved. Commercial in confidence.					

8.2.3 Main assembly drawing



Notes:

1. PAINT ONLY SEA SIDE OFF FRAME AND APPROX 100 mm OFF OUTER HULL

B	10-08-2017	BOUTEN EN MOEREN TOEGEVOEGD	PSR	WLN	LDO
A	17-02-2017	POS 46 & 47,RAL CHANGED INTO 7040,POS 49 CHANGED POS 97 ADDEET	PSR	LWN	APH
O	23-01-2019	Original	PSR	LWN	APH
Rev.	Date	Description	Dr-by	Check	Appd
Name: NBC UNIT COMPLETE			Project: NBC		
1200 m3/h					
			Weight (kg)	Sheet 1 of 1	A0
VAN HALTEREN Special Products B.V. P.O. Box 482, 8007 AB Zwolle The Netherlands Copyright reserved. Material is confidential.		925,0 kg Drawing (no): Scale: 005-C-200 Rev. B	File name: Material:	005-C-200-dwg 005-C-200	
		005-C-200 Rev. B 005-C-200 Rev. B			

8.2.4 Parts list doc.

Code: RDEC-01-01	Title: BOM-Receptuur	Version: 02			
Project name:	Frizonia	Made by:	PSR	File name:	H:\PL - NBC Systems\Projects\17-10460 NBC 900 & 1200 Frizonia\06. ILS\ILS_Frizonia\Manual NBC1200\Documents chapter 8\PL 005-C-200 mech BOM Rev B.xlsx\PL005-C-200 mech Rev B
Product name:	NBC 1200-C	Checked by:	WLN		
Product number:		Approved by:	AKN	Remarks:	
Order/Project	17-21137/1	PL number	PL-005-C-200		
Revision letter:	B	Revision date:	1-12-2017		

External use											
Engineer - Inventor											
Item	QTY	Unit	Part Number	Description	REV	Type	Material	Dimension	Mass	Drawing No.	ArticleNr VHSP
1	1	pc	005-A-312	SEPARATOR	O	EDS005-A-312	X6CrNiMoTi1-12-2 (AISI 316-Ti)	005-A-312	15,000 kg		
2	2	pc	002-A-315	BLASTVALVE	O	EDS002-A-315		-	7,760 kg		
3	1	pc	002-A-313	FINE FILTER	O	EDS002-A-313	N.A.	592x592x149	3,000 kg	002-A-313	
4	1	pc	002-A-314	PRE FILTER	O	EDS002-A-314	X2CrNiMo18.10 (AISI 316-L)	594x594x48	6,300 kg	002-A-314	
5	1	pc	005-A-310	HEATER (13,2 kW)	O	EDS005-A-310	N.A.	005-A-310	11,000 kg		
6	1	pc	005-C-300	FAN 1200 COMPLETE	O	EDS005-A-300		005-A-300	60,000 kg		
8	4	pc	002-A-304	SHIP NBC AIR FILTER	O	STANAG 4447		O.D.544,3 L= 258,8 mm	29,600 kg	002-A-304	
10	3	pc	003-C-362	Switch with Roll Plunger	O	IP67 Snap Action Limit Switch		69.4 x 70 x 21.7 mm	0,253 kg		
11	6	pc	002-A-307	HINGE ASSY	O	398253		-	0,564 kg		
11.3	3	pc	002-A-430-4	WASHER	O	DIN 125A	A4	M16	0,017 kg		
11.5	2	pc	002-A-430-6	NUT (NYLOCK)	O	DIN 985	A4	M16	0,043 kg		
11.6	1	pc	002-A-430-7	NUT (FLAT)	O	DIN 439B	A4	M16	0,022 kg		
12	1	pc	002-A-309	TELESCOPIC STRUT	O	AXA WEPEWE 30X		-	0,392 kg		
15	2	pc	002-A-308	INVISIBLE HINGE	O	1032-U2		-	0,069 kg		
19	1	pc	005-C-341	BY-PASS VALVE (Complete)	O	005-C-341		DN 125	11,866 kg	005-C-341	
19.1	1	pc	002-A-331	COUPLING	O	DIN 808		12 x 20 x 105 - RVS 316	0,241 kg		
19.2	1	pc	003-B-330-11	Spindel& Handwheel	O	003-B-330-11	Steel AISI 4130		0,370 kg		
19.3	1	pc	005-C-330	BUTTERFLY VALVE DN 125		EDS005-B-330		005-B-330	11,254 kg		
20	1	pc	005-C-340	Butterfly-VALVE (Complete)	O	005-C-340		DN 150	13,138 kg	005-C-340	
20.1	1	pc	002-A-331	COUPLING	O	DIN 808		12 x 20 x 105 - RVS 316	0,241 kg		
20.2	1	pc	003-B-330-11	Spindel& Handwheel	O	003-B-330-11	Steel AISI 4130		0,370 kg		
20.3	1	pc	003-B-330	BUTTERFLY VALVE DN 150	O				12,527 kg	003-B-330	
22	1	pc	005-C-342	Butterfly-VALVE (Complete)	O	005-C-342		DN 150	13,437 kg	005-C-342	
22.1	1	pc	002-A-331	COUPLING	O	DIN 808		12 x 20 x 105 - RVS 316	0,241 kg		
22.2	1	pc	005-C-330-12	Spindel& Handwheel	O	005-C-330-12	Steel AISI 4130		0,670 kg		
22.3	1	pc	003-B-330	BUTTERFLY VALVE DN 150	O				12,527 kg	003-B-330	
31	1	pc	003-A-341	HOSE CLAMP	O	TYPE 150-181	X5CrNi18.9 (AISI 304)	For O.D. 168 mm	0,051 kg		
32	1	pc	005-A-342	HOSE CLAMP	O	TYPE 130-165	X2CrNiMo18.10 (AISI 316-L)	For O.D. 150 mm	0,048 kg		
34	1	pc	003-C-424	NBC VALVE NAME PLATE (AIR IN)	O	003-C-424	Aluminum-6061	130x30 S=1.5	0,016 kg		
35	1	pc	003-A-425	BYPASS VALVE NAME PLATE	O	003-A-425	Aluminum 1100-O	130x30 S=1.5	0,016 kg		
36	1	pc	003-C-426	NBC VALVE NAME PLATE (AIR OUT)	O	003-C-426	Aluminum-6061	130x30 S=1.5	0,016 kg		
42	3	pc	005-C-361	GASKET FOR FLANGE DN150	O	005-C-361	Neoprene	ø230x2	0,051 kg		
43	1	pc	005-A-312-8	Gasket for Sperator	O	005-A-312-8	Neoprene	680x270 S=4	0,258 kg		
44	1	pc	002-A-417	GASKET FOR GLAND PLATE	O	002-A-417	CR (Neopreen)	-	0,051 kg		
45	2	pc	003-A-477	GASKET FOR FLANGE DN200	O	003-A-477	Neoprene	ø343x3	0,200 kg		
46	1	pc	005-A-361	GASKET FOR HEATER	O	005-A-361	Neoprene	O.D. 320x150 I.D. 280x110 S	0,062 kg		
47	1	pc	005-A-471	GASKET FOR SERVICE HATCH	O	005-A-471	Neoprene	510x510x3	0,208 kg		
48	1	pc	005-A-594	FLEXIBLE CONNECTION	O	005-A-594	IIR (Butyl)	-	0,232 kg		
49	1	pc	005-A-475	GASKET FOR FIXING FRAME	O	005-A-475	Neoprene	-	0,138 kg		
50	1	pc	002-A-675	TEE UNION	O	SO 53021-6	X5CrNi18.9 (AISI 304)	rond 6mm	0,044 kg		
51	1	pc	002-A-677	MALE ADAPTOR UNION	O	SO 51121-4-1/8 BSP	X5CrNi18.9 (AISI 304)	1/8"BSP & for Tube O.D. 6mm	0,011 kg		
52	1	pc	002-A-678	MALE ADAPTOR UNION	O	SO 51121-6-1/4 BSP	X5CrNi18.9 (AISI 304)	1/4"BSP & for Tube O.D. 6mm	0,028 kg		
53	12	pc	002-A-679	MALE ADAPTOR UNION	O	SO 51121-6-1 4 NPT	X2CrNi18.9 (AISI 304)	1/4"NPT & for Tube O.D. 6mm	0,017 kg		
54	25	pc	003-A-670	STIFFENER SLEEVE	O	SO 50003-6-4	X5CrNi18.9 (AISI 304)	ø6xø4x1	0,000 kg		
55	1	pc	005-B-473	TUBE HIGH PRESS	O		PTFE	ø6x1	0,014 kg		
56	1	pc	005-B-479	TUBE HIGH PRESS.	O		PTFE	ø6x1	0,011 kg		
57	1	pc	005-C-480	HIGH PRESS. TUBE	O		PTFE	ø6x1	0,066 kg		
58	1	pc	005-C-481	LOW PRESS. TUBE	O		PTFE	ø6x1	0,072 kg		
59	1	pc	005-C-482	LOW PRESS. TUBE	O		PTFE	ø6x1	0,080 kg		
60	1	pc	005-B-494	TUBE LOW PRESS.	O		PTFE	ø6x1	0,031 kg		
61	1	pc	005-B-495	TUBE LOW PRESS.	O		PTFE	ø6x1	0,013 kg		
63	1	pc	005-B-474	TUBE HIGH PRESS	O		PTFE	ø6x1 L= 350 mm	0,002 kg		
64	1	pc	005-C-483	HIGH PRESS. TUBE	O		PTFE	ø6x1	0,077 kg		
65	1	pc	005-B-497	PIPE	O	005-B-497	X5CrNi18.9 (AISI 304)	ø6x1	0,024 kg		
66	4	pc	003-A-674	SINGLE PIPE CLAMP	O	LN1 6 PP		LN1 6 PP	0,023 kg		
74	2	pc	MBT120 G1 2 80 Pocket sensor	Pocket sensor		MBT120	AISI 316-Ti	G1/2"A, insert 80 mm	0,087 kg		
75	2	pc	MBT153 PT100 (2001-0350)	Temperature sensor		MBT153 PT100	Silicone	Cable L=3,5 m PT1000	0,098 kg		
87	1	pc	005-B-516	FLANGE DN125	O	005-B-516	X2CrNiMo18.10 (AISI 316-L)	ø304x10	2,452 kg		
89	1	pc	005-C-680 rev.A	PANEL LAY OUT (COMPLETE)	O	005-C-680			25,000 kg		
89.1	1	pc	005-B-507	CONTROL PANEL	O	005-B-507	X2CrNiMo18.10 (AISI 316-L)	-	10,127 kg		

Code: RDEC-01-01		Title: BOM-Receptuur			Version: 02	
Project name:		Frizonia	Made by:	PSR	File name:	H:\PL - NBC Systems\Projects\17-10460 NBC 900 & 1200 Frizonia\06. ILS\ILS_Frizonia\Manual NBC1200\Documents chapter 8\PL 005-C-200 mech BOM Rev B.xlsx\PL005-C-200 mech Rev B
Product name:		NBC 1200-C	Checked by:	WLN		
Product number:			Approved by:	AKN	Remarks:	
Order/Project		17-21137/1	PL number	PL-005-C-200		
Revision letter:		B	Revision date:	1-12-2017		

External use											
Engineer - Inventor											
Item	QTY	Unit	Part Number	Description	REV	Type	Material	Dimension	Mass	Drawing No.	ArticleNr VHSP
89.2	38	pc	DIN 939 - M6 - RVS A2-70	Hexagon thin nut			RVS A2-70		0,002 kg		
89.3	38	pc	DIN 127 - A 6 - RVS A2-70	Spring lock washer square ends		DIN 127 - A 6	RVS A2-70	A 6	0,001 kg		
89.4	31	pc	DIN 7985 Z - M6x12 - 4.8 - Z - RVS A2-70	Cross recessed pan head screw			RVS A2-70		0,006 kg		
89.5	2	pc	DIN 127 - A 5 - RVS A2-70	Spring lock washer square ends		DIN 127 - A 5	RVS A2-70	A 5	0,000 kg		
89.6	4	pc	DIN 933 - M6x16 - RVS A2-70	Hex head bolt			RVS A2-70		0,006 kg		
89.7	3	pc	DIN 127 - A 4 - RVS A2-70	Spring lock washer square ends		DIN 127 - A 4	RVS A2-70	A 4	0,000 kg		
89.8	2	pc	DIN 912 - M6x12x9,5 - RVS A2-70	Hex socket head cap screw		DIN 912 - M6x12x9,5	RVS A2-70	M6x12	0,006 kg		
89.9	4	pc	DIN 939 - M4 - RVS A2-70	Hexagon thin nut			RVS A2-70		0,001 kg		
89.10	12	pc	DIN 125 - 1A 6,4 - RVS A2-70	Plain washer		DIN 125 - 1A 6,4	RVS A2-70	1A 6,4	0,001 kg		
90	1	pc	005-B-640	DIFF PRESS SWITCH	O	C6045D 1019		-	1,579 kg		
91	1	pc	005-C-360	THREAD PIN FLANGE	O		Stainless Steel AISI 440C, Welded		1,642 kg	005-C-360	
92	2	pc	005-C-350-102	Bracket for flange	O	005-C-350-102	X2CrNiMo18.10 (AISI 316-L)	60 x 60 x3	0,258 kg		
93	1	pc	1013-U1	Document holder	O	1013-U1			0,167 kg		
99	1	pc	005-C-487	CABLE TRAY 100	O	003-A-487	X5CrNi18.9 (AISI 304)	20x100x20 S=2 L=324	0,750 kg	003-A-487	
100	2	pc	002-A-516	FIX PLATE (SMALL)	O	002-A-516	X2CrNiMo18.10 (AISI 316-L)	-	0,071 kg	002-A-516	
101	1	pc	002-A-517	FIX PLATE (BIG)	O	002-A-517	X2CrNiMo18.10 (AISI 316-L)	-	0,072 kg	002-A-517	
102	1	pc	003-A-304	GLAND PLATE ASSY	O	003-A-304	Default	.	0,545 kg		
103	1	pc	003-A-401	Press-on Mech.(Top)	O	003-A-401	X2CrNiMo18.10 (AISI 316-L)	-	1,107 kg	003-A-401	
104	1	pc	003-A-402	Press-on Mech.(Bottom)	O	003-A-402	X2CrNiMo18.10 (AISI 316-L)	-	1,109 kg	003-A-402	
105	2	pc	005-C-488	CABLE TRAY 100	O	005-C-488	X5CrNi18.9 (AISI 304)	15x100x15 S=1,25 L=374	0,592 kg	005-C-488	
106	1	pc	005-C-492	CABLE TRAY 70	O	005-C-492	X5CrNi18.9 (AISI 304)	15x70x15 S=1,25 L=456	0,587 kg	005-C-492	
107	15	pc	003-A-490	FILLING PLATE S=1	O	003-A-490	X2CrNiMo18.10 (AISI 316-L)	ø45x1	0,012 kg		
108	4	pc	002-A-514	PANEL PLATE	O	002-A-514	X2CrNiMo18.10 (AISI 316-L)	-	0,224 kg		
109	1	pc	005-A-476	SERVICE HATCH FRAME	O	005-A-476	X2CrNiMo18.10 (AISI 316-L)	-	2,641 kg		
109.1	1	pc	005-A-537	FRAME	O	005-A-537	X2CrNiMo18.10 (AISI 316-L)	O.D.=510x510 I.D.=450x450	2,173 kg		
109.2	4	pc	005-A-538	THREAD BLOCK M6	O	005-A-538	X2CrNiMo18.10 (AISI 316-L)	ø16x20 M6	0,014 kg		
109.3	16	pc	005-A-539	THREAD BLOCK M8	O	005-A-539	X2CrNiMo18.10 (AISI 316-L)	ø16x20 M8	0,024 kg	005-A-539	
110	4	pc	002-A-404	BEARING BLOCK	O	002-A-404		-	0,356 kg	002-A-404	
111	4	pc	002-A-405	BEARING BLOCK SHIM	O	002-A-405	X2CrNiMo18.10 (AISI 316-L)	90x24 S=1	0,016 kg		
112	4	pc	002-A-511	ADJUSTABLE AXLE	O	002-A-511	X5CrNiMo18.10 (AISI 316)	M12 ø21 L=170	0,207 kg		
113	3	pc	003-A-514	MOUNTING PLATE	O	003-A-514	X6Cr17	80x80x10	0,488 kg	003-A-514	
114	1	pc	005-A-270	DOOR FAN SECTION	O	005-A-270	N.A.	-	21,809 kg		
114.1	1	pc	005-A-550	DOOR FAN SECTION	O	005-A-550	X2CrNiMo18.10 (AISI 316-L)	839x556x31	21,504 kg		
114.2	1	pc	005-A-266-11	TITAN MOS	O	005-A-266-11	TITAN MOS	25x25 20 Shore L=2558	0,305 kg		
114.3	1	pc	002-A-702	CONTACT GLUE	O	SABA	N.A.	-	0,000 kg		
114.4	1	pc	002-A-701	SEALANT	O	002-A-701	BUTYLEEN SEALANT	-	0,000 kg		
115	1	pc	005-A-472	SERVICE HATCH	O	005-A-472	X2CrNiMo18.10 (AISI 316-L)	510x510 S=5	10,467 kg		
116	2	pc	005-A-478	BLIND FLANGE DN 200	O	003-A-478	X2CrNiMo18.10 (AISI 316-L)	ø343x5	3,610 kg		
117	1	pc	005-C-240	PANEL DOOR (COMPLETE)	O	005-C-240		-	9,075 kg		
117.1	1	pc	005-C-590	PANEL DOOR	O	005-C-590	X2CrNiMo18.10 (AISI 316-L)	-	7,140 kg		
117.2	2	pc	002-A-586	PANEL DOOR GASKET STRIP (SHORT)	O	20x12 (on one side glue)	Cell rubber CR (Neopreen)	L= 560 mm	0,027 kg		
117.3	2	pc	002-A-587	PANEL DOOR GASKET STRIP (LONG)	O	20x12 (on one side glue)	Cell rubber CR (Neopreen)	L= 680 mm	0,030 kg		
117.4	2	pc	002-A-318	PANEL DOOR LOCK (COMPLETE)	O	002-A-318			0,097 kg	002-A-318	
117.5	6	pc	002-A-676	MALE ADAPTOR UNION	O	SO 51121-6-1/8 NPT	X5CrNi18.9 (AISI 304)	1/8 NPT	0,023 kg		
117.6	1	pc	005-C-422	NAME PLATE	O	EDS005-C-422	Aluminum-6061	005-C-422	0,033 kg		
117.7	1	pc	005-B-519	DIFF PRESS. GAUGE MODEL 2000 0-60Pa	O	EDS005-B-519		005-B-519	0,314 kg		
117.8	1	pc	005-B-520	DIFF PRESS GAUGES MODEL 2000 500 Pa	O	EDS005-B-520		005-B-520	0,298 kg		
117.9	1	pc	005-B-521	DIFF PRESS GAUGES MODEL 2000 - 3 kPa	O	EDS005-B-521		005-B-521	0,298 kg		
117.10	1	pc	1004-04	KEY		1004-04 (DRIEKANT)	Aluminum	DRIEKANT 8	0,000 kg		
118	1	pc	005-B-371	BRACKET FOR DELTA-P SWITCH	O	005-B-371	X5CrNiMo18.10 (AISI 316-L)		0,295 kg		
119	1	pc	002-A-250	NBC FILTER HATCH ASSY	O	002-A-250		-	9,298 kg	002-A-250	
119.1	1	pc	002-A-254	NBC FILTER HATCH	O	002-A-254		-	7,498 kg	002-A-254	
119.2	4	pc	002-A-319	SPANNER (FLAT)	O	06381 2122x60	X5CrNi18.9 (AISI 304)	M12	0,400 kg		
119.3	4	pc	Flakke sluitring	Flakke sluitring (RVS) A4		DIN 7349	A4	M12	0,028 kg		
119.4	4	pc	DIN 985 - A4-M12	Hexagon nut with plastic insert		DIN 985	A4		0,022 kg		
120	1	pc	002-A-501	NBC DOOR	O	002-A-501	X2CrNiMo18.10 (AISI 316-L)	-	29,102 kg	002-A-501	
121	1	pc	005-C-220-A	AIR BY PASS TEE	O	005-C-220-A	-	-	10,521 kg		
122	1	pc	005-A-260	DOOR PRE-FILTER SECTION	O	005-A-260	N.A.	.	16,933 kg		
122.1	1	pc	005-A-500	DOOR PRE-FILTER SECTION	O	005-A-500	X2CrNiMo18.10 (AISI 316-L)	005-A-500	16,392 kg		
122.2	2	pc	002-A-320	STOPBUMPER	O	Evol 279	CR (Neopreen)	H= 61;M8	0,104 kg		
122.3	1	pc	005-A-500-12	TITAN MOS	O	005-A-500-12	TITAN MOS	25x25 20° Shore L=2766	0,333 kg		
122.4	1	pc	002-A-702	CONTACT GLUE	O	SABA	N.A.	-	0,000 kg		

Code: RDEC-01-01	Title: BOM-Receptuur	Version: 02			
Project name:	Frizonia	Made by:	PSR	File name:	H:\PL - NBC Systems\Projects\17-10460 NBC 900 & 1200 Frizonia\06. ILS\ILS_Frizonia\Manual NBC1200\Documents chapter 8\PL 005-C-200 mech BOM Rev B.xlsx\PL005-C-200 mech Rev B
Product name:	NBC 1200-C	Checked by:	WLN		
Product number:		Approved by:	AKN	Remarks:	
Order/Project	17-21137/1	PL number	PL-005-C-200		
Revision letter:	B	Revision date:	1-12-2017		

External use											
Engineer - Inventor											
Item	QTY	Unit	Part Number	Description	REV	Type	Material	Dimension	Mass	Drawing No.	ArticleNr VHSP
122.5	1	pc	002-A-701	SEALANT	O	002-A-701	BUTYLEEN SEALANT	-	0,000 kg		
123	1	pc	005-C-350	GENERAL FRAME LAYOUT	O	005-C-350	-		458,845 kg	005-C-350	
124	1	pc	002-A-506	TITAN MOS	O	25X25. 20 -SHORE	TITAN MOS	L=2916 mm	0,352 kg	002-A-506	
125	1	pc	005-C-597	BY-PASS RESISTANCE PLATE	O	005-C-597	-	DN 125	0,432 kg		
126	3	pc	003-C-595	SENSOR BRACKET	O	003-A-595	X2CrNiMo18.10 (AISI 316-L)	50x100 S=2	0,071 kg		
127	1	pc	005-C-598	RESTRICIE PLAAT	O	005-C-598	X2CrNiMo18.10 (AISI 316-L)	For DN 125	0,201 kg		
130	14	pc	002-A-588	THREAD BLOCK	O	002-A-588	X2CrNiMo18.10 (AISI 316-L)	60x25 H=15	0,150 kg		
131	1	pc	005-A-488	PIPE	O	005-A-488	X2CrNiMo18.10 (AISI 316-L)	ø6x1	0,101 kg		
132	1	pc	005-A-489	PIPE	O	005-A-489	X5CrNiMo18.10 (AISI 316)	ø6x1 L=678	0,086 kg		
134	2	pc	005-A-485	ANGLE	O	005-A-485	X2CrNiMo18.10 (AISI 316-L)	550x50 S=2	0,662 kg		
135	1	pc	003-A-350-48	FLANGE DN150	O	003-A-350-48	X2CrNiMo18.10 (AISI 316-L)	O.D.=ø265 I.D.ø=156 S=10	2,798 kg	003-A-350-48	
136	1	pc	005-C-230	MAIN AIR PIPE		005-C-230	Stainless Steel AISI 440C, Welded		9,115 kg	005-C-230	
142	3	pc	005-A-317	RING PUFFER 7455	O	RING PUFFER 7455	N.A.	-	0,000 kg		
143	3	pc	005-A-318	RING PUFFER 7456	O	RING PUFFER 7456	N.A.	-	0,000 kg		
144	3	pc	005-A-319	LSM-20	O	002-A-319		-	1,162 kg		
200	49	pc	DIN 127-M6-A2	Spring washer			A2		0,001 kg		
201	49	pc	DIN 125-1 A A2-M6	Plain washer		DIN 125-1 A / ISO 7089	A2		0,001 kg		
202	34	pc	DIN 933 - A2 -M6x12	Hexagon head bolts		DIN 933 - ISO 4017	A2	M6x12	0,005 kg		
203	6	pc	DIN 933 - A4 -M4x30	Hexagon head bolts		DIN 933 - ISO 4017	A4	M4x30	0,004 kg		
204	6	pc	DIN 985 - A4-M4	Hexagon nut with plastic insert		DIN 985	A4		0,001 kg		
207	80	pc	DIN 125-1 A A2-M12	Plain washer		DIN 125-1 A / ISO 7089	A2		0,006 kg		
208	44	pc	DIN 985 - A2-M12	Hexagon nut with plastic insert		DIN 985	A2		0,022 kg		
236	14	pc	DIN 912 - A4-M10x80	Hexagon socket head screw		DIN 912 - ISO 4762	A4	M10x80	0,065 kg		
237	28	pc	DIN 934 - A4-M10	Hexagon nut		DIN 934	A4		0,013 kg		
238	42	pc	DIN 933 - A4 -M8x30	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x30	0,018 kg		
239	14	pc	DIN 7349-M10-A4	Plain washer		DIN 7349	A4	M10	0,013 kg		
240	62	pc	DIN 127-M8-A4	Spring washer			A4		0,002 kg		
241	16	pc	DIN 933 - A2 -M22x50	Hexagon head bolts		DIN 933 - ISO 4017	A2	M22x50	0,253 kg		
242	32	pc	DIN 125-1 A A2-M22	Plain washer		DIN 125-1 A / ISO 7089	A2		0,019 kg		
243	16	pc	DIN 985 - A2-M22	Hexagon nut with plastic insert		DIN 985	A2		0,104 kg		
247	78	pc	DIN 125-1 A A4-M8	Plain washer		DIN 125-1 A / ISO 7089	A4		0,002 kg		
248	25	pc	DIN 985 - A4-M8	Hexagon nut with plastic insert		DIN 985	A4		0,007 kg		
249	8	pc	DIN 934 - A4-M12	Hexagon nut		DIN 934 - A4-M12	A4		0,019 kg		
250	8	pc	DIN 912 - A4-M12x110	Hexagon socket head screw		DIN 912 - ISO 4762	A4	M12x110	0,121 kg		
251	8	pc	DIN 125-1 A A4-M12	Plain washer		DIN 125-1 A / ISO 7089	A4		0,006 kg		
252	8	pc	DIN 127-M12-A4	Spring washer			A4		0,004 kg		
255	8	pc	DIN 933 - A4 -M8x35	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x35	0,020 kg		
256	8	pc	DIN 933 - A4 -M12x40	Hexagon head bolts		DIN 933 - ISO 4017	A4	M12x40	0,055 kg		
257	16	pc	DIN 933 - A4 -M12x90	Hexagon head bolts		DIN 933 - ISO 4017	A4	M12x90	0,101 kg		
258	8	pc	DIN 933 - A4 -M12x80	Hexagon head bolts		DIN 933 - ISO 4017	A4	M12x80	0,092 kg		
259	18	pc	DIN 933 - A2 -M8x20	Hexagon head bolts		DIN 933 - ISO 4017	A2	M8x20	0,014 kg		
260	18	pc	DIN 127-M8-A2	Spring washer			A2		0,002 kg		
261	18	pc	DIN 125-1 A A2-M8	Plain washer		DIN 125-1 A / ISO 7089	A2		0,002 kg		
262	8	pc	DIN 933 - A2 -M6x20	Hexagon head bolts		DIN 933 - ISO 4017	A2	M6x20	0,007 kg		
263	16	pc	DIN 933 - A4 -M8x20	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x20	0,014 kg		
266	14	pc	DIN 934 - A2-M6	Hexagon nut		DIN 934 - A2-M6	A2		0,003 kg		
267	6	pc	DIN 985 - A2-M8	Hexagon nut with plastic insert		DIN 985	A2		0,007 kg		
268	6	pc	DIN 7349-M8-A2	Plain washer		DIN 7349	A2	M8	0,009 kg		
269	2	pc	DIN 7991 A2-M4x20	Hexagon socket countersunk head screw		DIN 7991	A2		0,002 kg		
270	4	pc	DIN 125-1 A A2-M4	Plain washer		DIN 125-1 A / ISO 7089	A2		0,000 kg		
271	4	pc	DIN 985 - A2-M4	Hexagon nut with plastic insert		DIN 985	A2		0,001 kg		
272	2	pc	DIN 933 - A2 -M4x12	Hexagon head bolts		DIN 933 - ISO 4017	A2	M4x12	0,002 kg		
273	2	pc	DIN 127-M4-A2	Spring washer			A2		0,000 kg		
274	11	pc	DIN 985 - A4-M6	Hexagon nut with plastic insert		DIN 985	A4		0,003 kg		
275	17	pc	DIN 933 - A4 -M6x16	Hexagon head bolts		DIN 933 - ISO 4017	A4	M6x16	0,006 kg		
276	21	pc	DIN 125-1 A A4-M6	Plain washer		DIN 125-1 A / ISO 7089	A4		0,001 kg		
277	4	pc	DIN 933 - A4 -M12x25	Hexagon head bolts		DIN 933 - ISO 4017	A4	M12x25	0,041 kg		
278	12	pc	DIN 933 - A4 -M8x25	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x25	0,016 kg		
279	3	pc	DIN 933 - A4 -M8x40	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x40	0,022 kg		
280	1	pc	DIN 933 - A4 -M8x70	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x70	0,035 kg		
281	2	pc	DIN 933 - A4 -M8x55	Hexagon head bolts		DIN 933 - ISO 4017	A4	M8x55	0,028 kg		
650	15	pc	GMM 218 PA Nut M18x1.5	Cable gland Nut		U40.Marine	x2CrNiMo17.13.2 (AISI 316L) 1.4404	M18x1.5	0,010 kg		

Code: RDEC-01-01		Title: BOM-Receptuur				Version: 02					
Project name:		Frizonia		Made by:		PSR		File name:		H:\PL - NBC Systems\Projects\17-10460 NBC 900 & 1200 Frizonia\06. ILS\ILS_Frizonia\Manual NBC1200\Documents chapter 8\PL 005-C-200 mech BOM Rev B.xlsx]PL005-C-200 mech Rev B	
Product name:		NBC 1200-C		Checked by:		WLN					
Product number:				Approved by:		AKN		Remarks:			
Order/Project		17-21137/1		PL number		PL-005-C-200					
Revision letter:		B		Revision date:		1-12-2017					
External use											
Engineer - Inventor											
Item	QTY	Unit	Part Number	Description	REV	Type	Material	Dimension	Mass	Drawing No.	ArticleNr VHSP
651	9	pc	GMM 224 PA Nut M24x1.5	Cable gland Nut		U40.Marine	x2CrNiMo17.13.2 (AISI 316L) 1.4404	M24x1.5	0,012 kg		
652	1	pc	224 281 104 Cable gland EMC	Cable gland EMC		U40.Marine	x2CrNiMo17.13.2 (AISI 316L) 1.4404	M24x1.5	0,109 kg		
653	3	pc	2162209S04	CABLE GLAND M16 Range: 9,0 - 6,5	O	U71. Marine		M16x1,5	0,055 kg		
654	3	pc	2182209S04	CABLE GLAND M18 Range: 9,0 - 6,5	O	U 71. Marine		M18x1,5	0,074 kg		
655	9	pc	224 281 406 Cable gland EMC	Cable gland EMC		U40.Marine	x2CrNiMo17.13.2 (AISI 316L) 1.4404	M24x1.5	0,106 kg		
656	15	pc	218 221 102 Cable gland EMC	Cable gland EMC		U40.Marine	x2CrNiMo17.13.2 (AISI 316L) 1.4404	M18x1.5	0,079 kg		
700	1	pc	003-A-726	ANTI-SEIZE NSBT-8	O		N.A.		0,000 kg		
701	1	pc	002-A-701	SEALANT	O	002-A-701	BUTYLEEN SEALANT	-	0,000 kg		
702	1	pc	002-A-702	CONTACT GLUE	O	SABA	N.A.	-	0,000 kg		
703	1	pc	003-A-720	SIGMA EP UV PRIMER	O		N.A.		0,000 kg		
704	1	pc	003-A-721	SIGMA CM COATING GREY	O		N.A.		0,000 kg		
705	1	pc	005-C-722	SIGMARINE UNDERCOAT GREY RAL 7040	O		N.A.		0,000 kg		
706	1	pc	005-C-723	SIGMARINE ENAMEL GREY RAL 7040	O		N.A.		0,000 kg		
707	1	pc	003-A-724	NUTLOCK 243	O		N.A.		0,000 kg		
708	1	pc	003-A-725	Loctite Hydraulic sealant 542	O		N.A.		0,000 kg		
709	1	pc	005-B-631-1	Danfoss Contact pasta	O		N.A.		0,000 kg		

8.2.5 Electrical diagrams drawing

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005-E-600_00	24-5-2019	14:33:34	1	
005-E-600_01	24-5-2019	14:33:15	2	
005-E-600_02	24-5-2019	14:34:25	3	
005-E-600_10	24-5-2019	14:49:18	10	
005-E-600_11	24-5-2019	14:48:33	11	
005-E-600_12	24-5-2019	14:48:00	12	
005-E-600_13	24-5-2019	14:47:31	13	
005-E-600_14	24-5-2019	14:47:00	14	
005-E-600_16	24-5-2019	14:44:41	16	
005-E-600_17	24-5-2019	14:44:09	17	
005-E-600_18	24-5-2019	14:43:21	18	
005-E-600_19	24-5-2019	14:39:32	19	
005-E-600_37	24-5-2019	14:37:06	37	
005-E-600_38	24-5-2019	14:36:19	38	

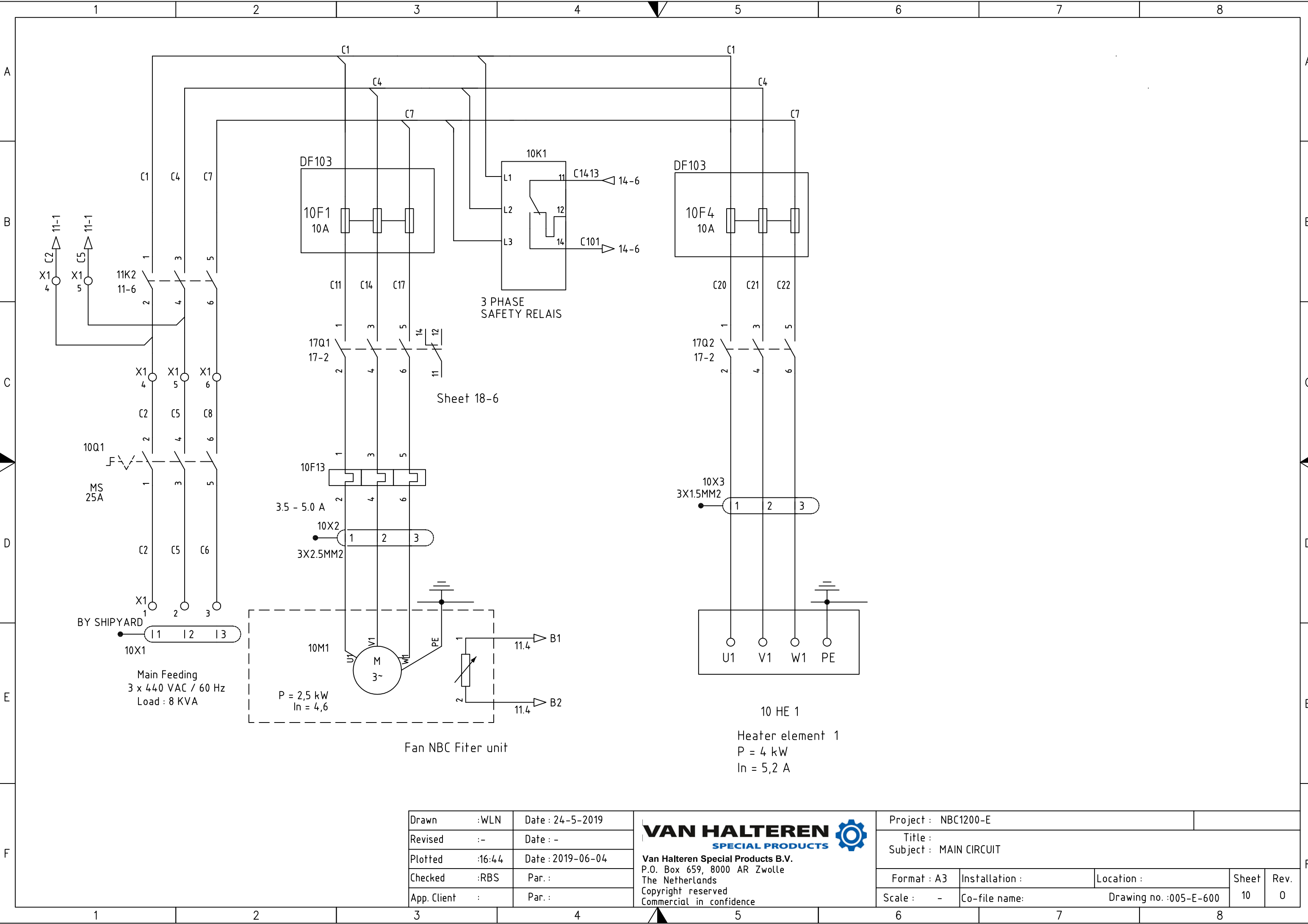
Drawn	:WLN	Date : 24-5-2019	<div><div><div>VAN HALTEREN</div><div>SPECIAL PRODUCTS</div><div><div><div></div></div></div><div>Van Halteren Special Products B.V. P.O. Box 659, 8000 AR Zwolle The Netherlands Copyright reserved Commercial in confidence</div></div></div>	Project : NBC1200-E				
Revised	:-	Date : -		Title : Subject : INDEX				
Plotted	:16:44	Date : 2019-06-04		Format : A3	Installation :	Location :	Sheet	Rev.
Checked	:RBS	Par. :		Scale : -	Co-file name:	Drawing no. :005-E-600	3	0
App. Client	:	Par. :						

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Drawing frame : ISO 5457-A3


Path : D:\WORKSPACE\PROJECTS\NBC\005-E-600\005-E-600_02.DWG

Path : D:\WORKSPACE\PROJECTS\NBC\005-E-600\005-E-600_10.DWG



Drawn	:WLN	Date : 24-5-2019
Revised	:-	Date : -
Plotted	:16:44	Date : 2019-06-04
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App. Client	:	Par. :

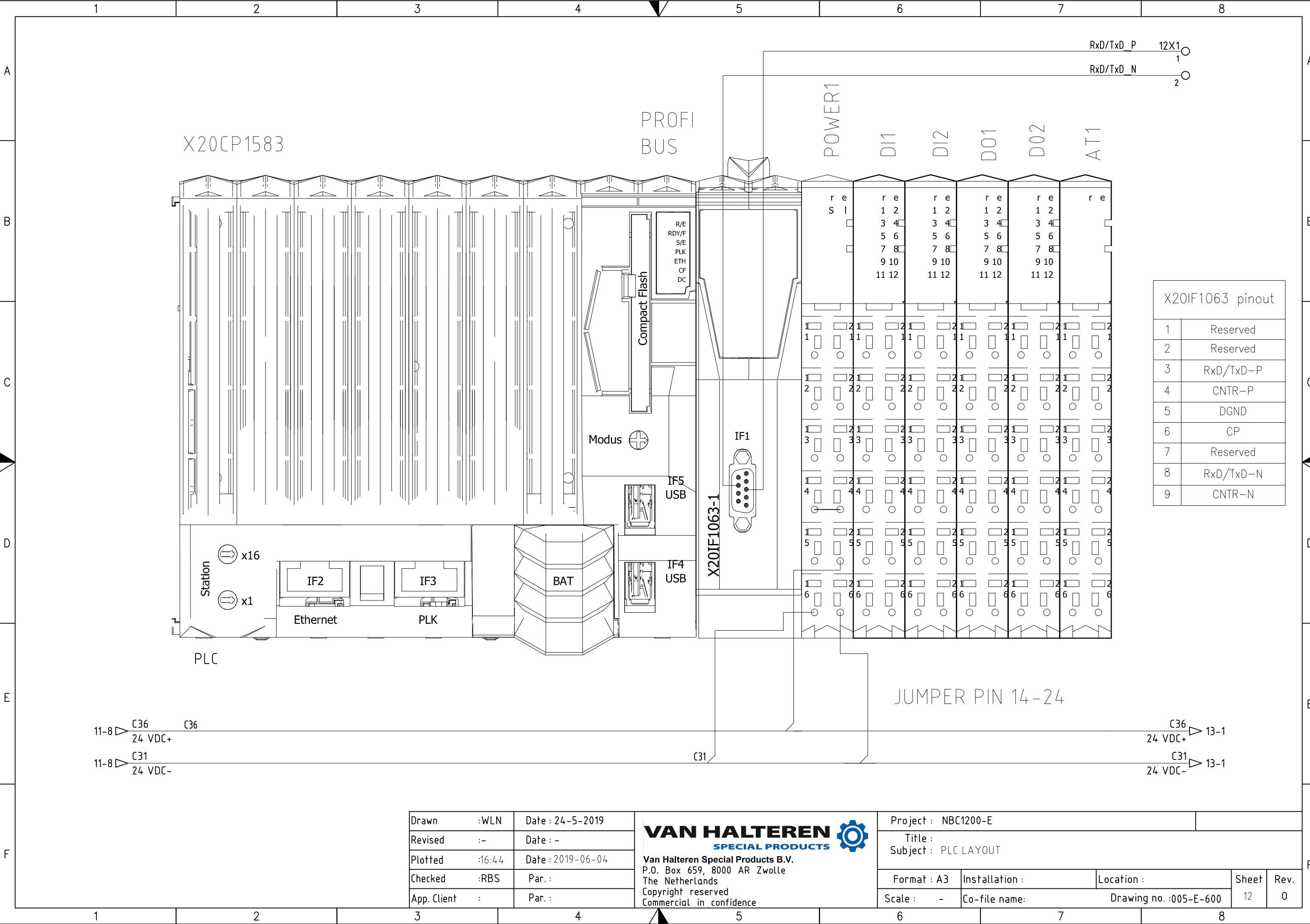
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SPECIAL PRODUCTS



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Project : NBC1200-E					
Title :		Subject : MAIN CIRCUIT			
Format : A3	Installation :	Location :	Sheet	Rev.	
Scale : -	Co-file name:	Drawing no. :005-E-600	10	0	

Drawing frame : ISO 5457-A3
Path : D:\WORKSPACE\PROJECTS\NBC\005-E-600\005-E-600_12.DWG



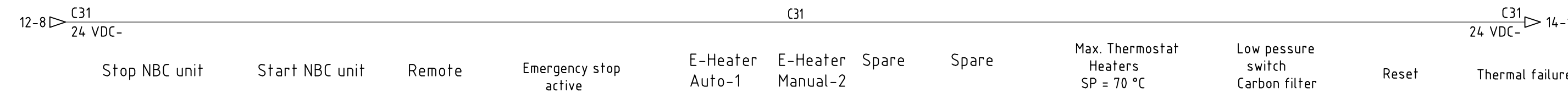
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Revised	:-	Date : -
Plotted	:16:44	Date : 2019-06-04
Checked	:RBS	Par. :
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VAN HALTEREN
SPECIAL PRODUCTS

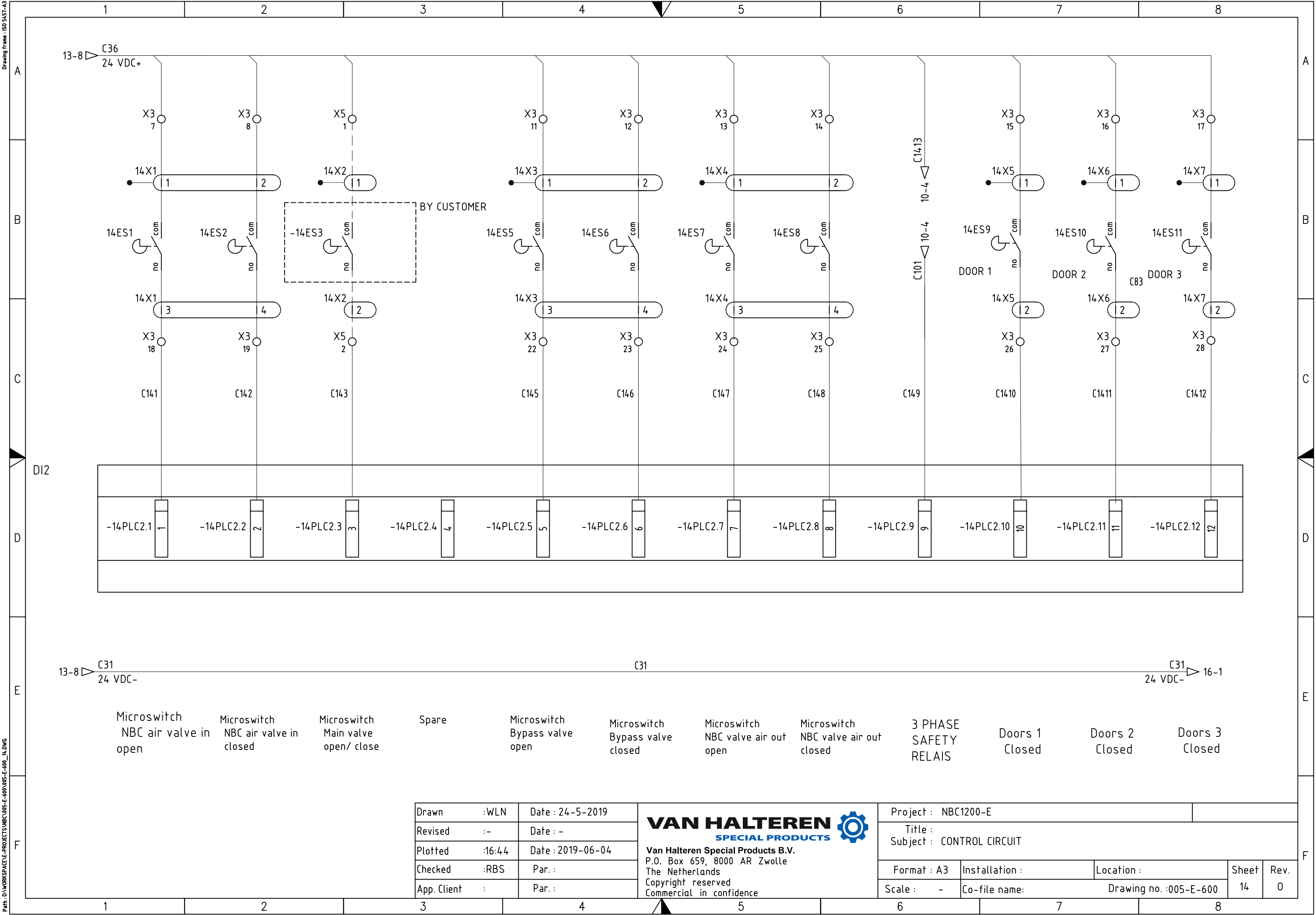


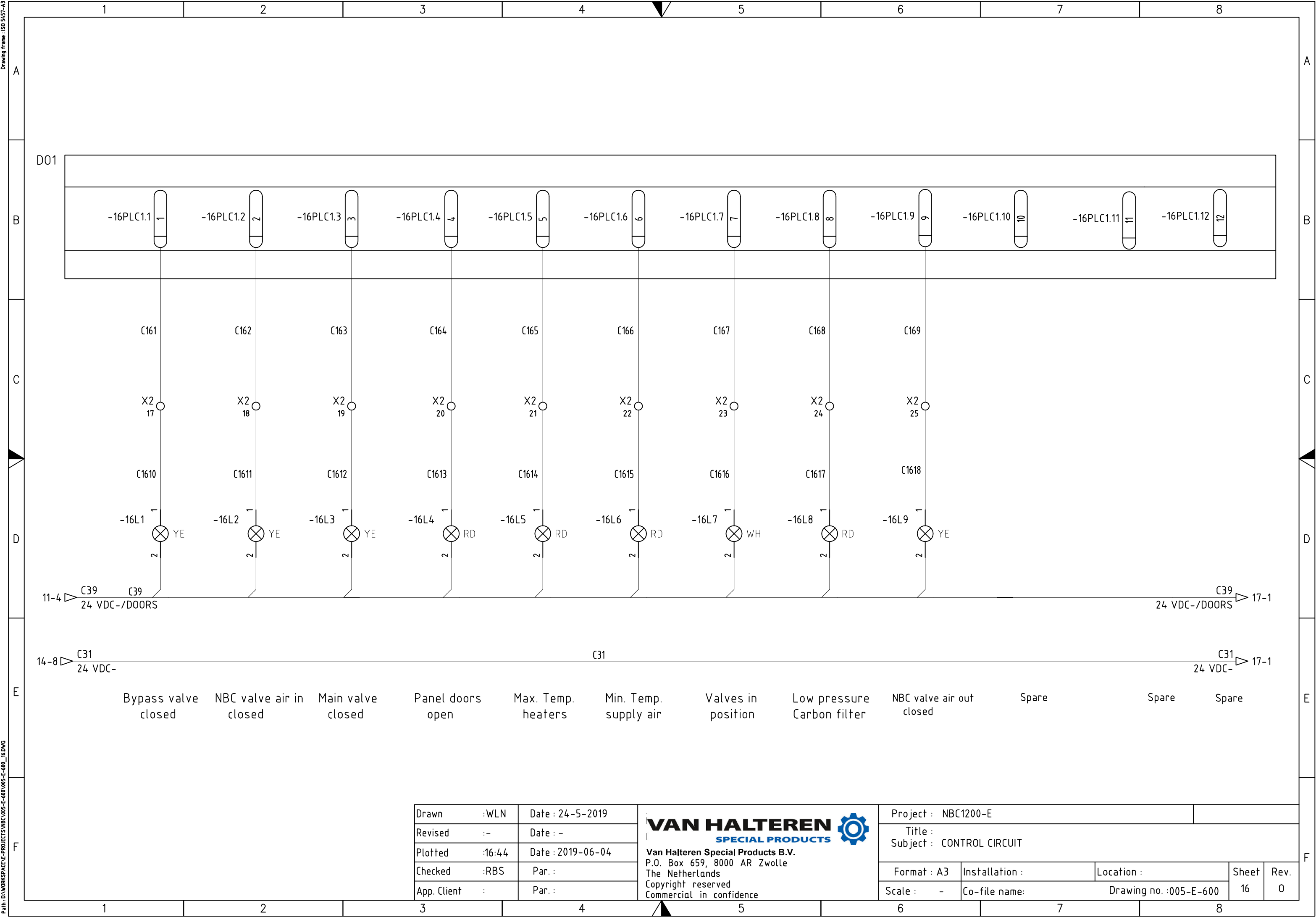
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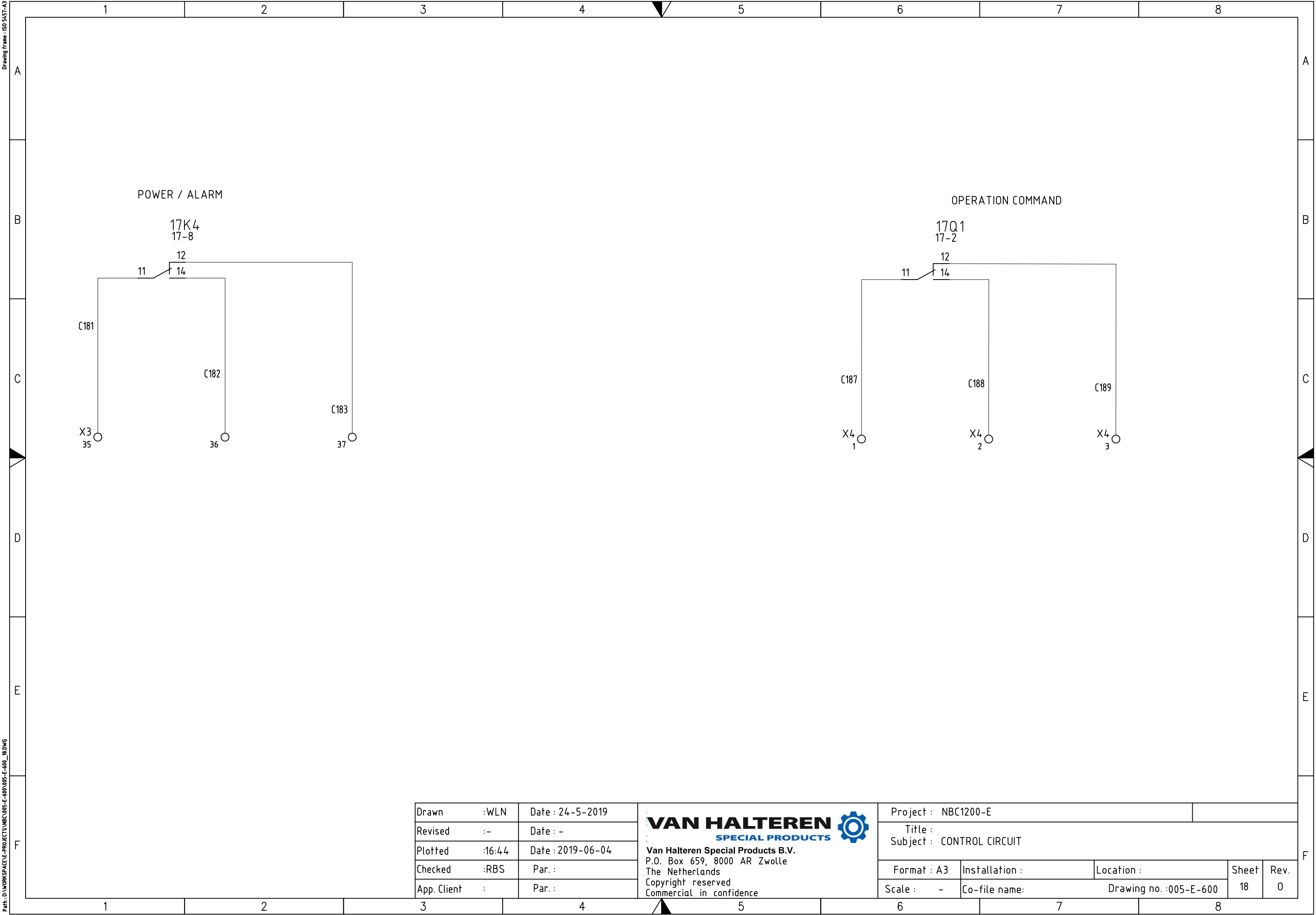
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Title :		Subject : PLC LAYOUT			
Format : A3	Installation :	Location :	Sheet	Rev.	
Scale : -	Co-file name:	Drawing no. :005-E-600	12	0	

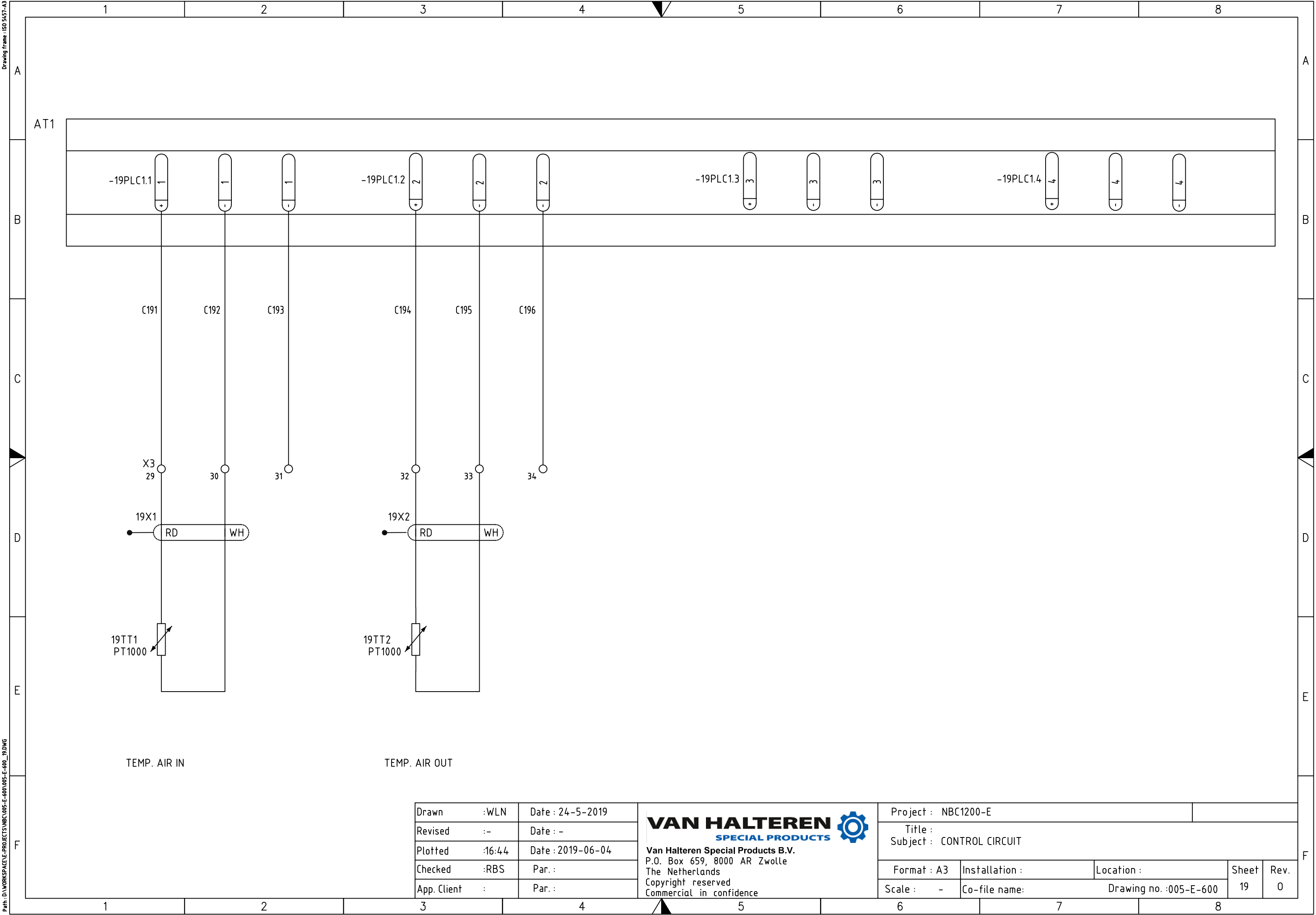


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TAGS	QTY	SUB	CATALOG	MFG	DESCRIPTION
		*1	M22-CK10	EATON	
13S3	1	*1	M22-D-G	EATON	
		*1	M22-A	EATON	
		*1	M22-CK10	EATON	
13S1	1	*1	M22-D-R	EATON	
		*1	M22-A	EATON	
		*1	M22-CK01	EATON	
13STA1	1		-	VOLTA	
PLC	1		X20	B&R	
13S2	1	*1	M22-W	EATON	
		*1	M22-A	EATON	
		*1	M22-CK01D	EATON	
10Q1	1		P1-25/E	EATON	
13S4	1		T0-4-8213/E	EATON	
X2	16		WDK2,5	Weidmüller	
X2	23		WDU2,5	Weidmüller	
X3					
X5					
X1	6		ZDU10	Weidmüller	
X1	22		ZDU2,5	Weidmüller	
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X3					
X4					
10X2	2		TIOI	DRAKA	
10X3					
11X1	19		TXOI	DRAKA	
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13X2					
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Drawing frame : ISO 5457-A3
Path : D:\WORKSPACE\E-PROJECTS\NBC\005-E-600\005-E-600_38.DWG

TERMINAL STRIPS

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
X11	C2	NBC	PANEL		1	10
X12	C5	NBC	PANEL		2	10
X13	C8	NBC	PANEL		2	10
X14	C2	NBC	PANEL		1	10
X14	C2	NBC	PANEL		1	10
X15	C5	NBC	PANEL		1	10
X15	C5	NBC	PANEL		2	10
X16	C8	NBC	PANEL		2	10
X17	C1413	NBC	PANEL		6	11
X18	C111	NBC	PANEL		6	11

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
X21	C39	NBC	PANEL		3	11
X22	C39	NBC	PANEL		5	11
X23	C39	NBC	PANEL		5	11
X24	C39	NBC	PANEL		6	11
X25	C1413	NBC	PANEL		6	11
X26	C133	NBC	PANEL		1	13
X27	C131	NBC	PANEL		1	13
X28	C137	NBC	PANEL		2	13
X29		NBC	PANEL		3	13
X210	C1310	NBC	PANEL		4	13
X211	C1315	NBC	PANEL		4	13
X212	C1316	NBC	PANEL		4	13
X215	C1321	NBC	PANEL		7	13
X216	C1323	NBC	PANEL		7	13
X217	C161	NBC	PANEL		1	16
X218	C162	NBC	PANEL		2	16
X219	C163	NBC	PANEL		3	16
X220	C164	NBC	PANEL		3	16
X221	C165	NBC	PANEL		4	16
X222	C166	NBC	PANEL		4	16
X223	C167	NBC	PANEL		5	16
X224	C168	NBC	PANEL		6	16
X225	C169	NBC	PANEL		6	16
X226	C172	NBC	PANEL		1	17
X227	C174	NBC	PANEL		2	17
X230	C1710	NBC	PANEL		5	17
X231	C1713	NBC	PANEL		7	17
X232	C1715	NBC	PANEL		8	17

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
X31	C42	NBC	PANEL		3	11
X32	C43	NBC	PANEL		4	11
X33	C36	NBC	PANEL		6	13
X34	C1319	NBC	PANEL		6	13
X35	C36	NBC	PANEL		7	13
X36	C1320	NBC	PANEL		7	13
X37	C36	NBC	PANEL		1	14
X38	C36	NBC	PANEL		2	14
X311	C36	NBC	PANEL		4	14
X312	C36	NBC	PANEL		4	14
X313	C36	NBC	PANEL		5	14
X314	C36	NBC	PANEL		6	14
X315	C36	NBC	PANEL		7	14
X316	C36	NBC	PANEL		7	14
X317	C36	NBC	PANEL		8	14
X318	C141	NBC	PANEL		1	14
X319	C142	NBC	PANEL		2	14
X322	C145	NBC	PANEL		4	14
X323	C146	NBC	PANEL		4	14
X324	C147	NBC	PANEL		5	14
X325	C148	NBC	PANEL		6	14
X326	C1410	NBC	PANEL		7	14
X327	C1411	NBC	PANEL		7	14
X328	C1412	NBC	PANEL		8	14
X329	C191	NBC	PANEL		1	19
X330	C192	NBC	PANEL		2	19
X331	C193	NBC	PANEL		2	19
X332	C194	NBC	PANEL		3	19
X333	C195	NBC	PANEL		3	19
X334	C196	NBC	PANEL		4	19
X335	C181	NBC	PANEL		2	18
X336	C182	NBC	PANEL		3	18
X337	C183	NBC	PANEL		4	18

Cable list

CBL	SH	MFG	CAT	REF	DESC1	DESC2	DESC3
10X1	10			1	BY SHIPYARD		
10X2	10	DRAKA	TIOI	3	3X2.5MM2		
10X3	10	DRAKA	TIOI	5	3X1.5MM2		
11X1	11	DRAKA	TXOI	3	1X2X0.75MM2		
13X1	13	DRAKA	TXOI	6	1X2X0.75MM2		
13X2	13	DRAKA	TXOI	7	1X2X0.75MM2		
14X1	14	DRAKA	TXOI	1	1x4x0.75mm2		
14X2	14	DRAKA	TXOI	3	1x4x0.75mm2		
14X2	14	DRAKA	TXOI	3	1x4x0.75mm2		
14X3	14	DRAKA	TXOI	4	1x4x0.75mm2		
14X4	14	DRAKA	TXOI	5	1x4x0.75mm2		
14X5	14	DRAKA	TXOI	7	1X2X0.75MM2		
14X6	14	DRAKA	TXOI	7	1X2X0,75MM2		
14X7	14	DRAKA	TXOI	8	1X2X0.75MM2		
19X1	19			1	ASSOCIATED CABLE		
19X2	19			3	ASSOCIATED CABLE		

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
X41	C184	NBC	PANEL		4	18
X42	C185	NBC	PANEL		5	18
X43	C186	NBC	PANEL		6	18

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
X51	C36	NBC	PANEL		3	14
X52	C143	NBC	PANEL		3	14

STRIP-ID	TERM	WIRENO	INST	LOC	REF	SH
12X11	RxD/TxD_P	NBC	PANEL		8	12
12X12	RxD/TxD_N	NBC	PANEL		8	12

Drawn :WLN

Revised :-

Plotted :16:44

Checked :RBS

App. Client :

Date : 24-5-2019

Date : -


Date : 2019-06-04

Par. :

Par. :

VAN HALTEREN

SPECIAL PRODUCTS



Van Halteren Special Products B.V.

P.O. Box 659, 8000 AR Zwolle

The Netherlands

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Project : NBC1200-E

Title :
Subject : CABLE & TERMINAL LIST

Format : A3

Installation :

Location :

Sheet 38

Rev. 0

Scale : -

Co-file name:

Drawing no. :005-E-600