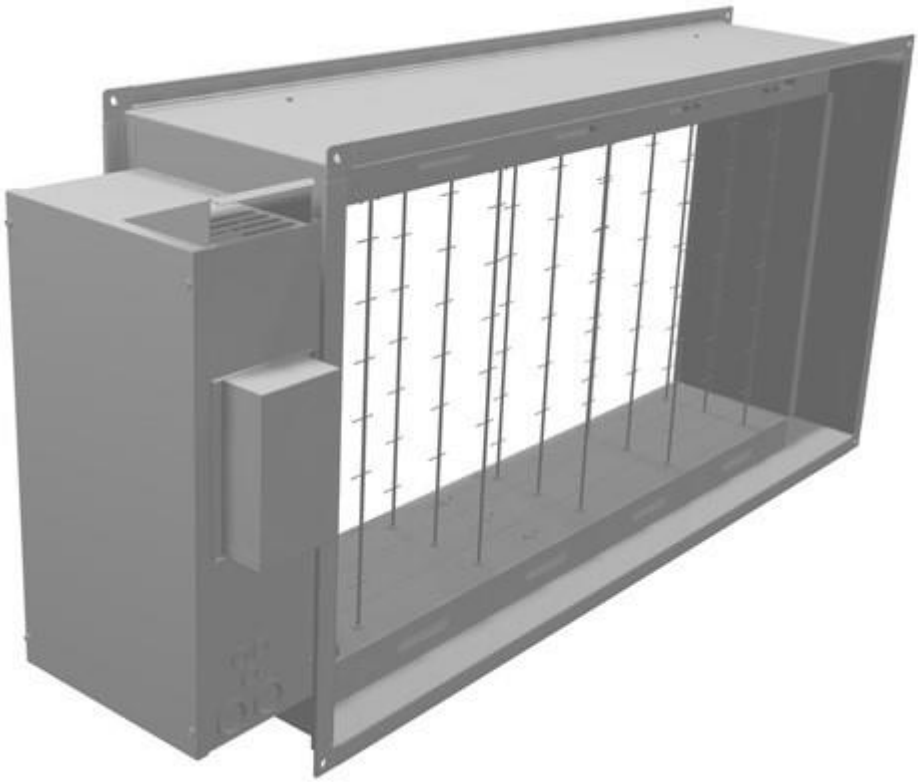
Electric heaters – slices
Technical and operational documentation



The control gear was made in accordance with:

PN-EN 60335-1:2012
PN-EN 61000-6-2:2008
PN-EN 61000-6-3:2008/A1:2012

OMM_HE_SEC_ver 1.6

Table of contents

1 Possible installation standards

For VVS and VVSc AHUs, the electric heater made of plasters can be used in two different ways (VVSs heaters are only available in a non-insulated duct variant):

1.1 Electric heater in an non-insulated duct

Non-insulated duct - all plasters installed in a short duct with a junction box on the side.

When insulating the ventilation ducts, which include an electric heater in this version, make sure that the connection point (especially its ventilation openings) is outside the insulating layer.

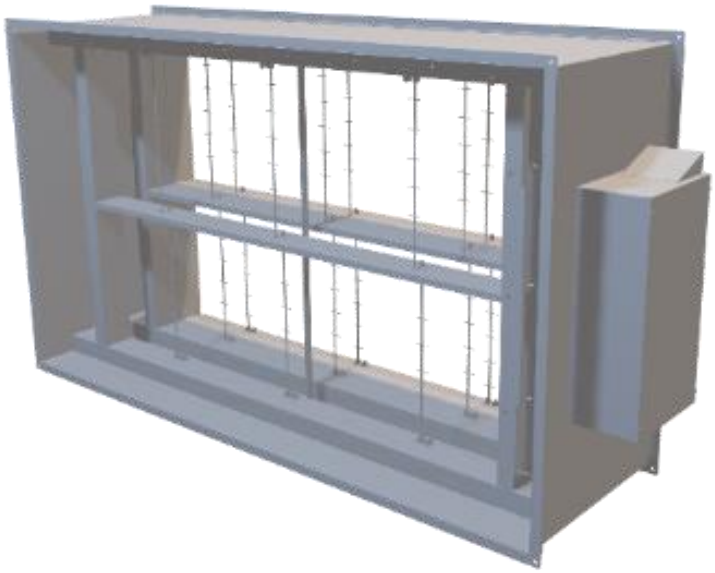


Figure 1 - electric heater in an uninsulated duct

1.2 Electric heater in the AHU casing

Full installation in original housing - the heater and its power connection box will be installed inside the "empty section" of the relevant air handling unit. For such an installation, the slices will not be mounted in the duct (blocks mounted directly to the inner surface of the empty AHU section).

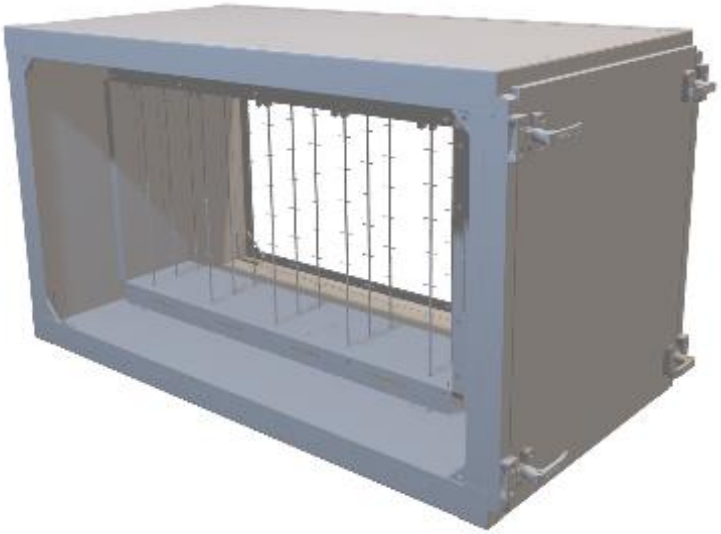


Figure 2 - electric heater in the AHU casing

2 Scope of application

The maximum power of electric heaters available for given sizes and types of AHUs is shown below. A full list of the available powers will be provided in *Chapter 3 - Technical Details*.

2.1 Modular AHU - VVS

Size - VVS		21	30	40	55	75	100	120	150	180	230	300	400	500	650
Maximum slices number	pcs	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Single slice power	kW	18	18	24	30	30	36	36	36	36	36	36	36	36	36
Total heater power	kW	36	54	72	90	90	108	108	108	108	108	108	108	108	108

Table 1 – maximum available power for AHU VVS

2.2 Compact Standing AHU – VVSc

Size - VVSc		21	30	40	55	75	100	120	150
Maximum slices number	pcs	2	3	3	3	3	3	3	3
Single slice power	kW	18	18	24	30	30	36	36	36
Total heater power	kW	36	54	72	90	90	108	108	108

Table 2 – maximum available power for AHU VVSc

2.3 Compact Suspended AHU - VVSs

Size - VVSs		5	10	15	20	30
Maximum slices number	pcs	1	1	2	2	2
Single slice power	kW	10	12	18	18	18
Total heater power	kW	10	12	36	36	36

Table 3 – maximum available power for AHU VVSs

2.4 NVS AHU

Size - NVS		23	39	65	80
Maximum slices number	pcs	1	2	3	3
Single slice power	kW	18	18	18	24
Total heater power	kW	18	36	54	72

Table 4 – maximum available power for AHU NVS

3 Technical details

The current version of electric heaters is delivered in two power variants - *low power*, adjusted to AHUs with relatively low heating demand, and *high power*, for AHU cases for facilities with higher thermal requirements. These types differ mainly in the types of electrical connections of the individual heaters in the assembly (star connection for *low power* or delta connection for *high power*).

Appropriate connection between the heaters is made at the heater production stage - the installer only needs to connect the power and control cables - it is not allowed to modify the heater system connections in relation to the factory configuration.

3.1 Control

The graphs below show how the voltage supplying the modulated slice changes depending on the required heat demand:

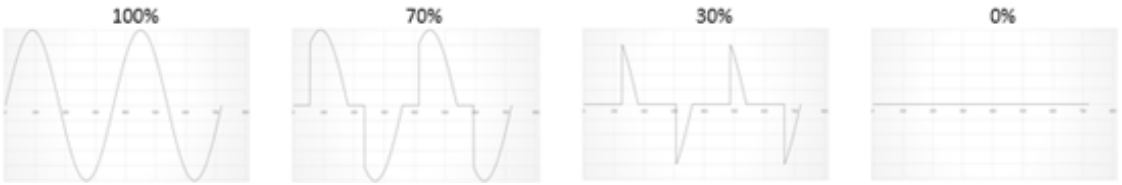


Figure 3 - modulating the supply voltage depending on the demand for heating power

Each time the modulated slice reaches full power, the demand is transferred to the next slice, which starts working at full capacity. Any additional heating power will be realized by smoothly increasing the adjustable heating power of the modulated slice.

3.2 Available heaters power variants for the AHUs - low power

AHU type and size	power [kW]	power box type	power cable 1		
			current L1/L2/L3 [A]	circuit breaker [A]	conductor cross-section [mm2]
VVS005s	2,5	1x18	6,3/6,3/0	10	1,5
VVS010s	3	1x18	7,5/7,5/0	10	1,5
VVS015s	6	1x18	8,7/8,7/8,7	16	2,5
VVS020s	6	1x18	8,7/8,7/8,7	16	2,5
VVS030s	6	1x18	8,7/8,7/8,7	16	2,5
VVS021c / VVS021	6	1x18	8,7/8,7/8,7	16	2,5
VVS030c / VVS030	6	1x18	8,7/8,7/8,7	16	2,5
VVS040c / VVS040	6	1x18	13/7,5/7,5	16	2,5
VVS055c / VVS055	9	1x18	16,2/16,2/8,7	20	2,5
VVS075c / VVS075	9	1x18	16,2/16,2/8,7	20	2,5
VVS100c / VVS100	12	1x18	17,3/17,3/17,3	20	2,5
VVS120c / VVS120	12	1x18	17,3/17,3/17,3	20	2,5
VVS150c / VVS150	12	1x18	17,3/17,3/17,3	20	2,5
VVS180	12	1x18	17,3/17,3/17,3	20	2,5
VVS230	12	1x18	17,3/17,3/17,3	20	2,5
VVS300	12	1x18	17,3/17,3/17,3	20	2,5
VVS400	12	1x18	17,3/17,3/17,3	20	2,5
VVS500	12	1x18	17,3/17,3/17,3	20	2,5
VVS650	12	1x18	17,3/17,3/17,3	20	2,5

Table 5 – available low power heaters variants

3.3 Available heaters power variants for the AHUs- high power

AHU type and size	power [kW]	power box type	power cable 1			power cable 2		
			current L1/L2/L3 [A]	circuit breaker [A]	conductor cross-section [mm2]	current L1/L2/L3 [A]	circuit breaker [A]	conductor cross-section [mm2]
VVS005s	10	1x18	21,6/12,5/12,5	25	4	-	-	-
VVS010s	12	1x18	26/15/15	32	6	-	-	-
VVS015s	18	1x18	26/26/26	32	6	-	-	-
VVS015s	36	2x18	52/52/52	63	16	-	-	-
VVS020s	18	1x18	26/26/26	32	6	-	-	-
VVS020s	36	2x18	52/52/52	63	16	-	-	-
VVS030s	18	1x18	26/26/26	32	6	-	-	-
VVS030s	36	2x18	52/52/52	63	16	-	-	-
VVS021c / VVS021	18	1x18	26/26/26	32	6	-	-	-
VVS021c / VVS021	36	2x18	52/52/52	63	16	-	-	-
VVS030c / VVS030	18	1x18	26/26/26	32	6	-	-	-
VVS030c / VVS030	36	2x18	52/52/52	63	16	-	-	-
VVS030c / VVS030	54	4x18	52/52/52	63	16	26/26/26	32	6
VVS040c / VVS040	24	2x18	41/41/26	50	10	-	-	-
VVS040c / VVS040	48	4x18	41/41/26	50	10	41/26/41	50	10
VVS040c / VVS040	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS055c / VVS055	30	2x18	52/41/41	63	16	-	-	-
VVS055c / VVS055	60	4x18	52/52/52	63	16	41/41/26	50	10
VVS055c / VVS055	90	6x18	78/78/78	100	25	52/52/52	63	16
VVS075c / VVS075	30	2x18	52/41/41	63	16	-	-	-
VVS075c / VVS075	60	4x18	52/52/52	63	16	41/41/26	50	10
VVS075c / VVS075	90	6x18	78/78/78	100	25	52/52/52	63	16
VVS100c / VVS100	36	2x18	52/52/52	63	16	-	-	-
VVS100c / VVS100	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS100c / VVS100	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS120c / VVS120	36	2x18	52/52/52	63	16	-	-	-
VVS120c / VVS120	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS120c / VVS120	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS150c / VVS150	36	2x18	52/52/52	63	16	-	-	-
VVS150c / VVS150	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS150c / VVS150	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS180	36	2x18	52/52/52	63	16	-	-	-
VVS180	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS180	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS230	36	2x18	52/52/52	63	16	-	-	-
VVS230	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS230	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS300	36	2x18	52/52/52	63	16	-	-	-
VVS300	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS300	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS400	36	2x18	52/52/52	63	16	-	-	-
VVS400	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS400	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS500	36	2x18	52/52/52	63	16	-	-	-
VVS500	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS500	108	6x18	78/78/78	100	25	78/78/78	100	25
VVS650	36	2x18	52/52/52	63	16	-	-	-
VVS650	72	4x18	52/52/52	63	16	52/52/52	63	16
VVS650	108	6x18	78/78/78	100	25	78/78/78	100	25
NVS23	18	1x18	26/26/26	32	6	-	-	-
NVS39	36	2x18	52/52/52	63	16	-	-	-
NVS65	54	4x18	52/52/52	63	16	26/26/26	32	6
NVS80	72	4x18	52/52/52	63	16	52/52/52	63	16

Table 6 – available high power heaters variants

3.4 Electrical system details

grid type	TN
rated supply voltage [V]	3x400
rated insulation voltage [V]	400
rated impulse withstand voltage [V]	2500
rated short-time current I_{cw} for individual circuits - effective value of the periodic component withstood for 1s, i.e. the short-circuit current expected at switching voltage [A]	6000
rated short-circuit current [A]	6000
coincidence factor	0,8
rated frequency [Hz]	50
ingress protection level	IP00
permissible operating temperature [°C]	0-50
control circuits supply voltage DC [V]	24

Table 7 - details of the electrical installation

4 Electrical connection and protection

The power connection should be made via a separate switchgear, which is not supplied with the VTS delivery. The wiring for powering the electric heater must be led through the panel on the back of the unit. If the cabling is led through the inspection panel from the front side, it should be arranged in such a way as to enable the opening of the section for maintenance and service works.

The connection of the heater should be made in such a way that the heater cannot be turned on when the fans are not working - this is done by factory-installed, serial connected safety devices in the form of a thermostat and a pressure switch, preventing the heater from being turned on if the temperature and air flow conditions are not met.

In case of fan stoppage, it is absolutely necessary to turn off the heater power supply.

The type of cables used for each function of the heaters is presented in the table below (the cable cross-section and its protection should be selected on the basis of the information provided in the tables in *Chapter 3 - Technical details*).

cable (s) for powering the electric heaters	**rated voltage**	3x400V AC
	type	multi-core cable, copper conductor - twisted cable
	work temperature [°C]	-30 - 60
control system power cable	**rated voltage**	230V AC
	type	multi-core cable, copper conductor - twisted cable
	work temperature [°C]	-30 - 60
control system control cable	**rated voltage**	24V DC
	type	multi-core cable, copper conductor - twisted cable
	work temperature [°C]	-30 - 60

Table 8 - types of cables to be used in heaters

Heater wiring can be divided into two parts:

1) Group of cables with connection independent of the type of heater
2) Group of cables, the connection of which changes with the type of heater and the components used in the AHU

<table>
<tr><th>Terminal number</th><th>Terminal name</th><th>Signal name</th><th>Connect to:</th><th colspan="4">Type of control box</th><th colspan="2">Connection terminal on the control box</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">GND</td><td rowspan="3">Ground</td><td rowspan="3">-></td><td colspan="4">CBX</td><td colspan="2">G0</td></tr>
<tr><td colspan="4">Compact</td><td colspan="2">G0</td></tr>
<tr><td colspan="4">Other</td><td colspan="2">GND</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">24VDC</td><td rowspan="3">Power 24VDC</td><td rowspan="3">-></td><td colspan="4">CBX</td><td colspan="2">G</td></tr>
<tr><td colspan="4">Compact</td><td colspan="2">G</td></tr>
<tr><td colspan="4">Other</td><td colspan="2">+24V DC</td></tr>
<tr><td colspan="4" rowspan="2">X</td><td colspan="4">Sections quantity</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>X</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">St1</td><td rowspan="3">Stage 1</td><td rowspan="3">-></td><td>CBX</td><td>G</td><td>G</td><td>G</td><td colspan="2"></td></tr>
<tr><td>Compact</td><td>G</td><td>G</td><td>G</td><td colspan="2"></td></tr>
<tr><td>Other</td><td>+24V DC</td><td>+24V DC</td><td>+24V DC</td><td colspan="2"></td></tr>
<tr><td>L</td><td>L</td><td rowspan="2">Power 230V AC</td><td rowspan="2">-></td><td colspan="6" rowspan="2">230V AC</td></tr>
<tr><td>N</td><td>N</td></tr>
<tr><td rowspan="2">A1</td><td rowspan="2">A1</td><td rowspan="5">Work confirmation</td><td rowspan="5">-></td><td colspan="4">CBX</td><td colspan="2">DI2</td></tr>
<tr><td colspan="4">Compact</td><td colspan="2">DI2</td></tr>
<tr><td rowspan="3">A2</td><td rowspan="3">A2</td><td colspan="4">Other</td><td colspan="2">free voltage contact</td></tr>
<tr><td colspan="4">CBX</td><td colspan="2">G0</td></tr>
<tr><td colspan="4">Compact</td><td colspan="2">G0</td></tr>
<tr><td colspan="4">Other</td><td colspan="2">free voltage contact</td></tr>
</table>

Table 9 – group of cables with connection independent of the type of heater

Terminal number	Terminal name	Signal name	Connect to:	Type of control box	Type of heater	Terminal name on the control box		
2	0-10V	Signal 0-10V DC	->	CBX	main	Y1		
					preheater	AO2		
					reheater – AHU with DXH	NO1		
					reheater – AHU with hum.	NO1		
					reheater – other	NO1		
				Compact	main	Y1		
					preheater	AO4		
					reheater – AHU with DXH	Y1		
					reheater – AHU with hum.	AO4		
					reheater – other	AO3		
				Other	all	0-10V DC		
X						Sections quantity		
						1	2	3
5	St2	Stage 2	->	CBX	main	-	NO1	NO1
					preheater	-	NO3	-
					reheater – AHU with DXH	-	NO1	-
					reheater – AHU with hum.	-	NO3	-
					reheater – other	-	NO3	-
				Compact	main	-	DO1	DO1
					preheater	-	DO6	-
					reheater – AHU with DXH	-	DO1	-
					reheater – AHU with hum.	-	DO6	-
					reheater – other	-	DO6	-
				Other	all	-	+24V DC	+24V DC
6	St3	Stage 3	->	CBX	main	-	-	NO6
					preheater	-	-	-
					reheater – AHU with DXH	-	-	-
					reheater – AHU with hum.	-	-	-
					reheater – other	-	-	-
				Compact	main	-	-	DO5
					preheater	-	-	-
					reheater – AHU with DXH	-	-	-
					reheater – AHU with hum.	-	-	-
					reheater – other	-	-	-
				Other	all	-	-	+24V DC

Table 10 – group of cables, the connection of which changes with the type of heater and the components used in the AHU

4.1 Views of examplary power boxes

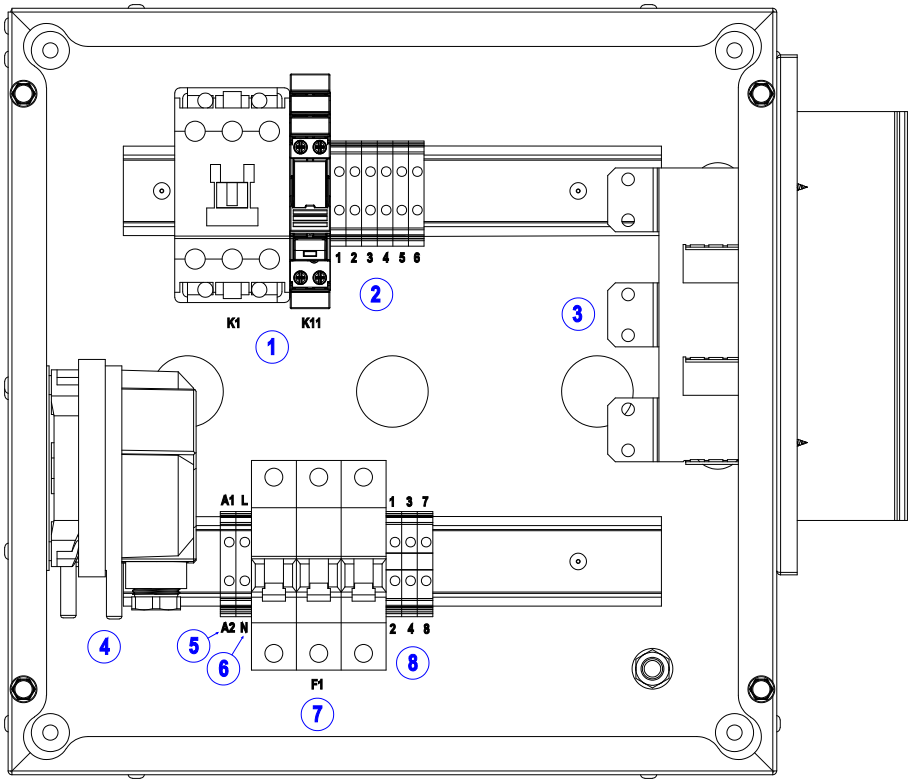


Figure 4 – power box – type 1x18kW

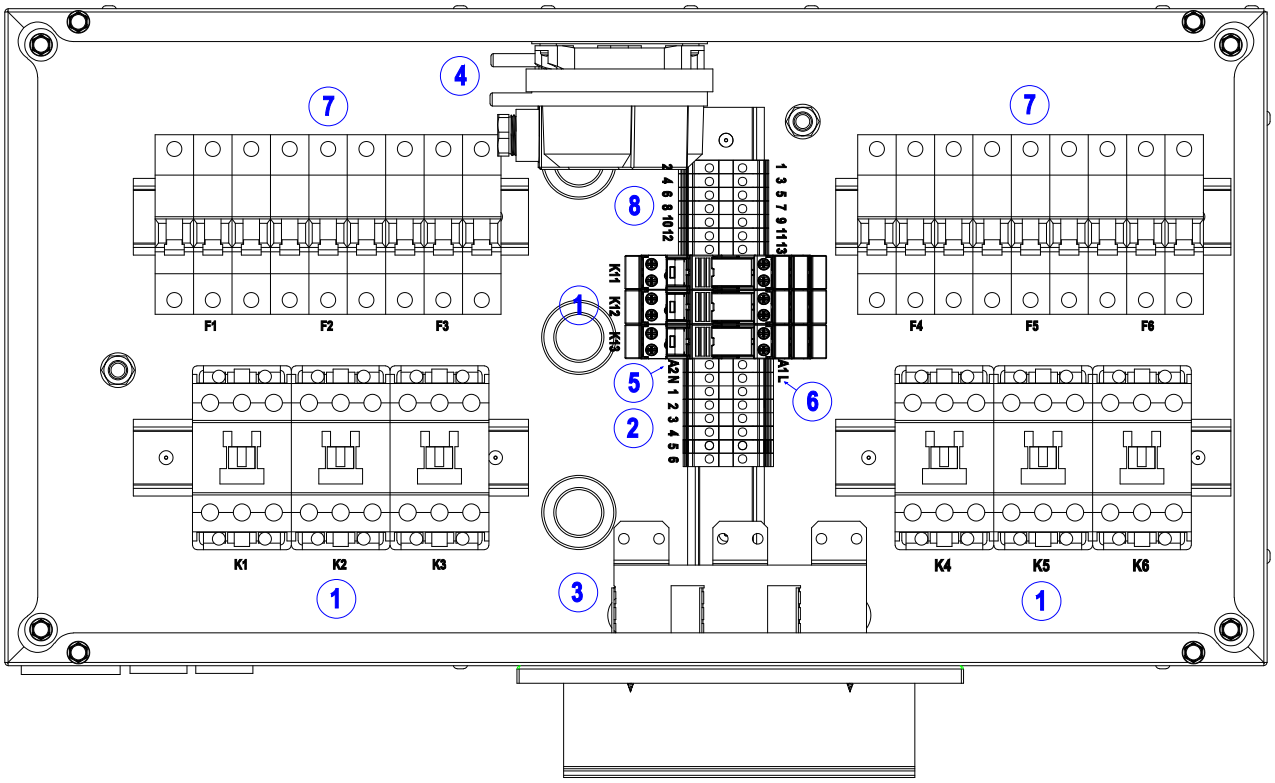


Figure 5 – power box – type 6x18kW

marking	component	connection	remarks
1	relays	manufacturer	-
2	heaters connectors	manufacturer	-
3	heater	manufacturer	-
4	pressure switch	manufacturer	the pressure switch pipes are connected by the user
5	control connectors – alarm	user	-
6	1 phase power connectors	user	-
7	circuit breakers	user	for 6x18 power boxes, connect the power cable into the central circuit breakers
8	control connectors – controls	user	-

Tabela 11 – power boxes views descriptions

The presented views of power boxes are intended to illustrate the arrangement of components inside their housing. Please note that they are only illustrative - when making electrical connections, always follow the wiring diagrams provided in *Chapter 5 - Wiring Diagrams.*

4.2 Thermostat

The functionality of the thermostat is based on the properties of the bimetallic element - it opens the contacts of the heater control circuit at an air temperature near the thermostat of 65 ° C. After an emergency switch-off, the heater switches on automatically when the air temperature drops by 20 ° C. After intentional or emergency (caused by overheating) power off, the supply fan must run for a certain time (0.5–5 min) so that the heaters reach the normal temperature.

The thermostat is an integrated, factory-installed component of each heater slice - it does not require additional assembly or electrical connection by the installer.

Figure 6 – thermostat

function	protection of the heater against overheating (temperature control of the heating elements)
structure	-metal housing -two screw terminals -bimetallic element with NC contact function
rated work voltage [V DC]	30
type of output signal	free voltage (switching contact)
activation temperature [°C]	65±3
temperature hysteresis [°C]	17±3

Table 12 – thermostat data

4.3 Pressure switch

The pressure switch is another, next to the thermostat, element protecting against the heater's operation in forbidden conditions. It prevents the heater from being switched on when the pressure generated by the AHU's fan sets is insufficient to ensure safe operation of the heating elements.

Similarly to the thermostat, the pressure switch is a factory-installed and electrically connected component - connection of the pressure hoses of the pressure switch should be made in accordance with the following recommendations:

- one of the tubes should be brought out to atmospheric pressure - in the case of installation of the power box on the duct (outside), the pipe does not need to be connected - there is atmospheric pressure present in the power box
- the second tube should be connected to the overpressure or underpressure in the AHU or in the duct (before or after the air supply fan)
- in the duct version of the heater, it is allowed to move the pressure switch outside the power box to avoid the need to run long measuring pipes - recommended position of the pressure switch - horizontal, with a vertical position the reading is 11Pa higher compared to the actual one

The pressure switch switching threshold is 20 Pa. After connecting to the AHU, check if the pressure switch is working properly for the lowest AHU airflow available. In the absence of the detected pressure difference, the place of connection of the second pressure hose to the installation should be changed.

In the opposite case - when for a given pressure switch setting, the pressure difference is detected even when the AHU is turned off (heater operation is allowed despite the lack of fans operation), the setpoint should be gradually increased until the correct operation is obtained - its sign is that the electric heater does not work despite the signals from the control device appearing if the pressure switch does not detect the pressure difference between the measurement channels - the permission should take place only after the fans are started.

After the pressure switch is fully connected, perform the heater shutdown test. To do so, it is necessary to force the electric heater to be manually controlled (e.g. by providing heater control signals from the controller) and at the same time to stop the fans. The pressure switch should prevent the operation of the electric heater (it will be visible e.g. by disconnecting the contactors in the switchgear).

Figure 7 – pressure switch

function	protecting the heater against overheating (fan compression control)
structure	-plastic housing - two screw terminals -a membrane connected to a mechanical module
rated work voltage [V DC]	30
type of output signal	free voltage (switching contact)
measuring range [Pa]	20-300

Table 13 – pressure switch data

5 Wiring diagrams

In this chapter, wiring diagrams for each heaters power will be presented, sorted depending on the type and size of the AHU. Pay attention to the following markings:

Dashed line - - - - - - - - CONNECTIONS MADE BY THE USER

Solid line ———————— CONNECTIONS MADE BY THE MANUFACTURER

For some high power configurations it is required to use two 3x400V power cables, according to a given diagram - this is dictated by the smaller cross-sections of the conductors and the reduction of the required bending radii thanks to this procedure.

For heaters with the capacity of 90kW and 108kW, factory-equipped with two sets of three B32 switches, connect the power cables to the terminals of the central switches of each set!

Green percentages on the diagrams inform about the division of the heater power into the various stages of the heater activation.

For example:

0-10V DC =25%
ST2 =25%
ST3 =50%

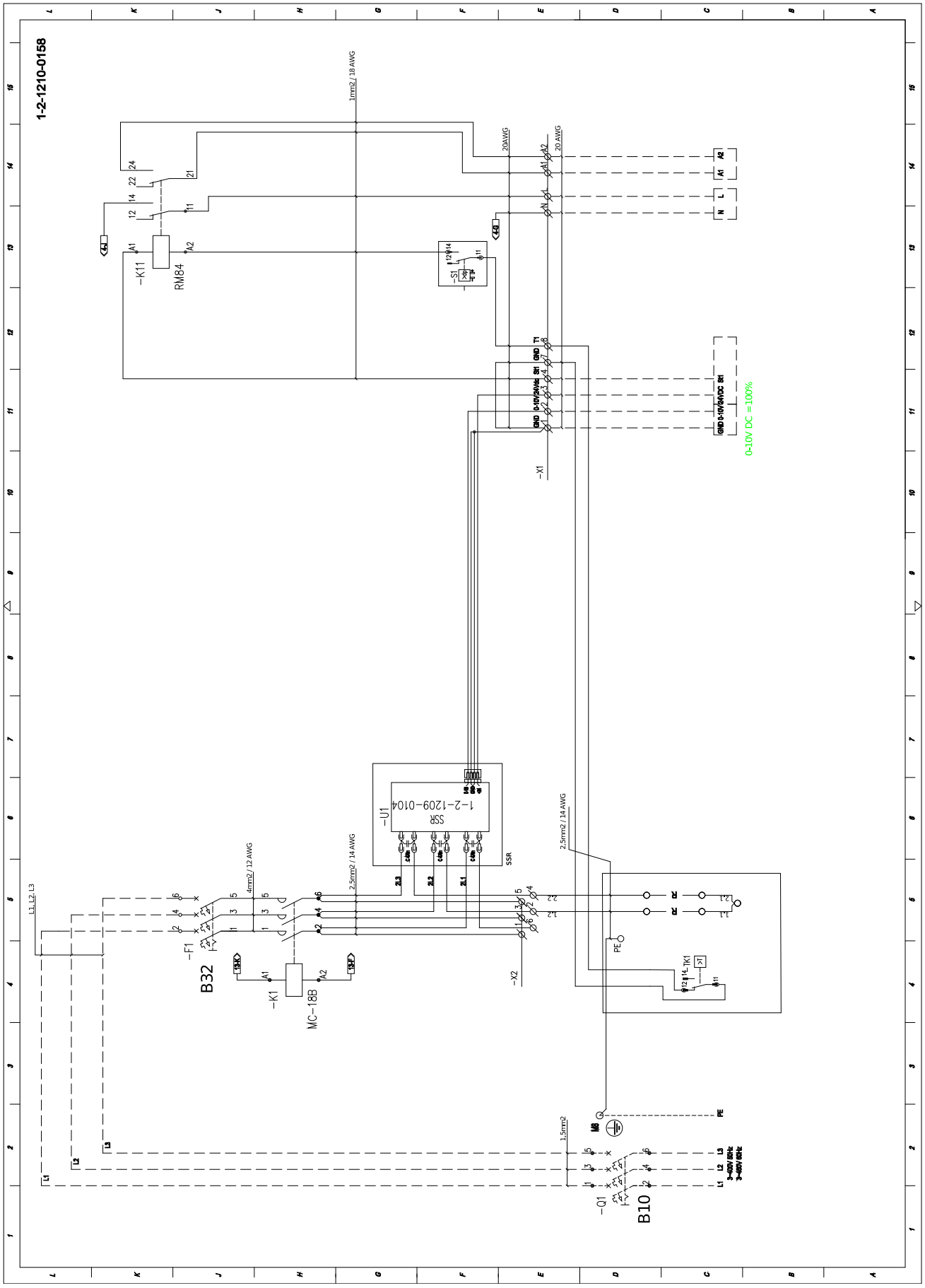
This notation means that the smoothly regulated part of a given heater constitutes 25% of its power (0-10V DC). The second step – switched on/off (ST2) is also 25%, while the third step – switched on/off (ST3) is 50% of the total power of the heater.

These parameters should be reflected in the appropriate uPC3 driver settings. The settings are made on the HMI Advanced screens:

-**A05** for pre-heater
-**A09** for main heater
-**A06** for re-heater

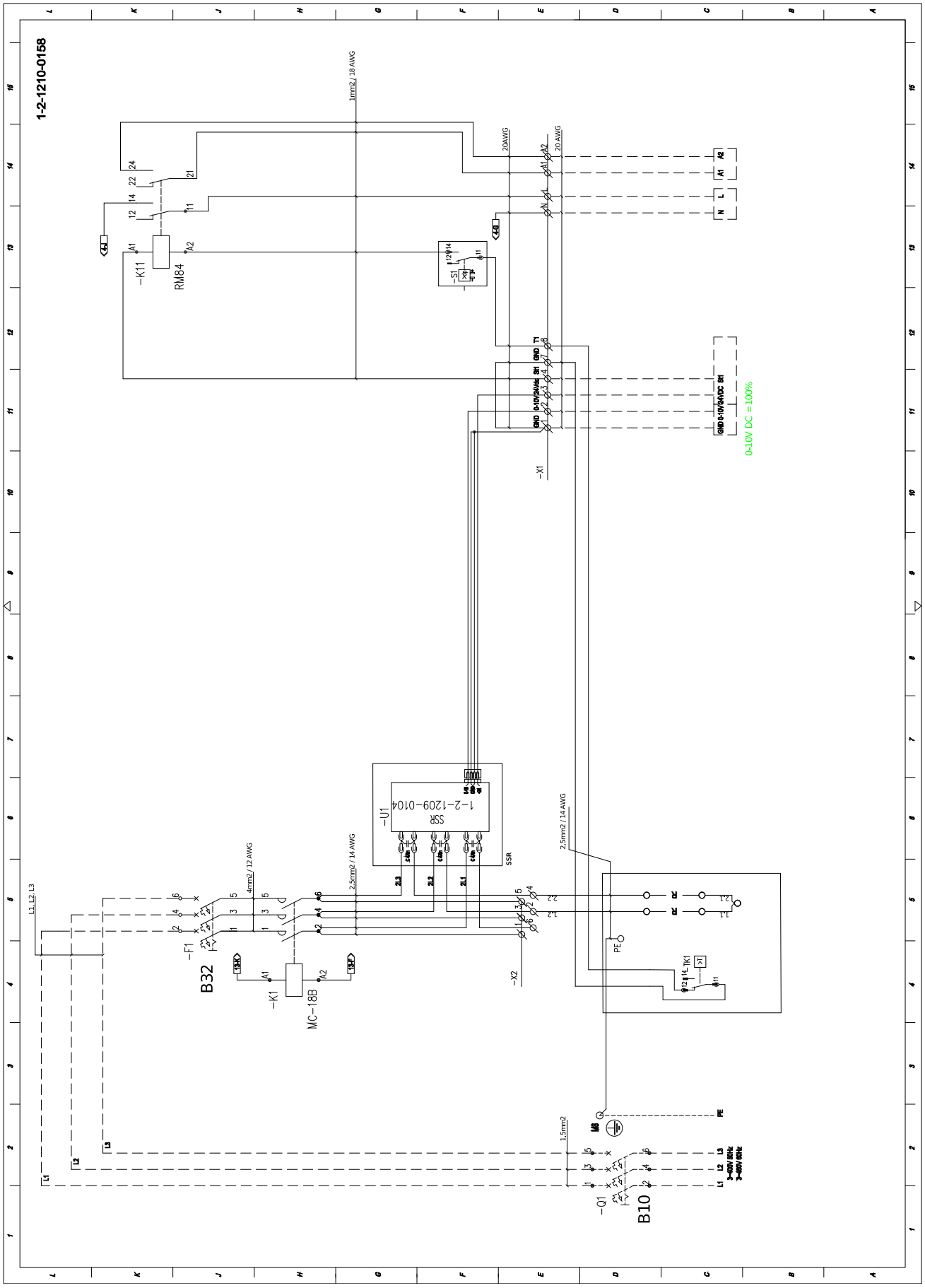
If in a given system one or both stages switched on/off are not present (no ST2 / ST3 markings in the diagram), the value of 0% should be selected in the controller settings in the appropriate position.

5.1 Low power – 2.5kW – VVS005s



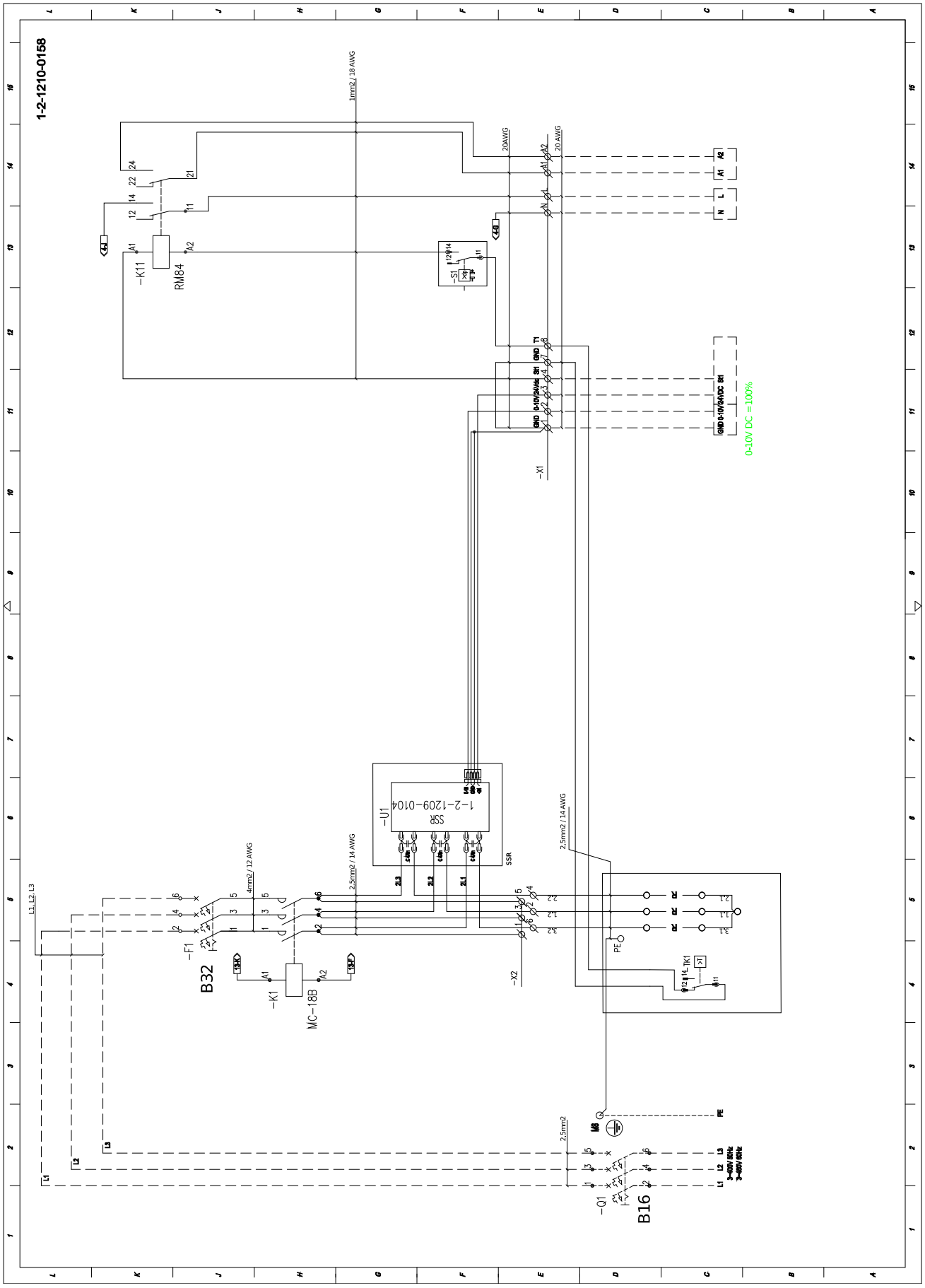
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.2 Low power – 3kW – VVS010s



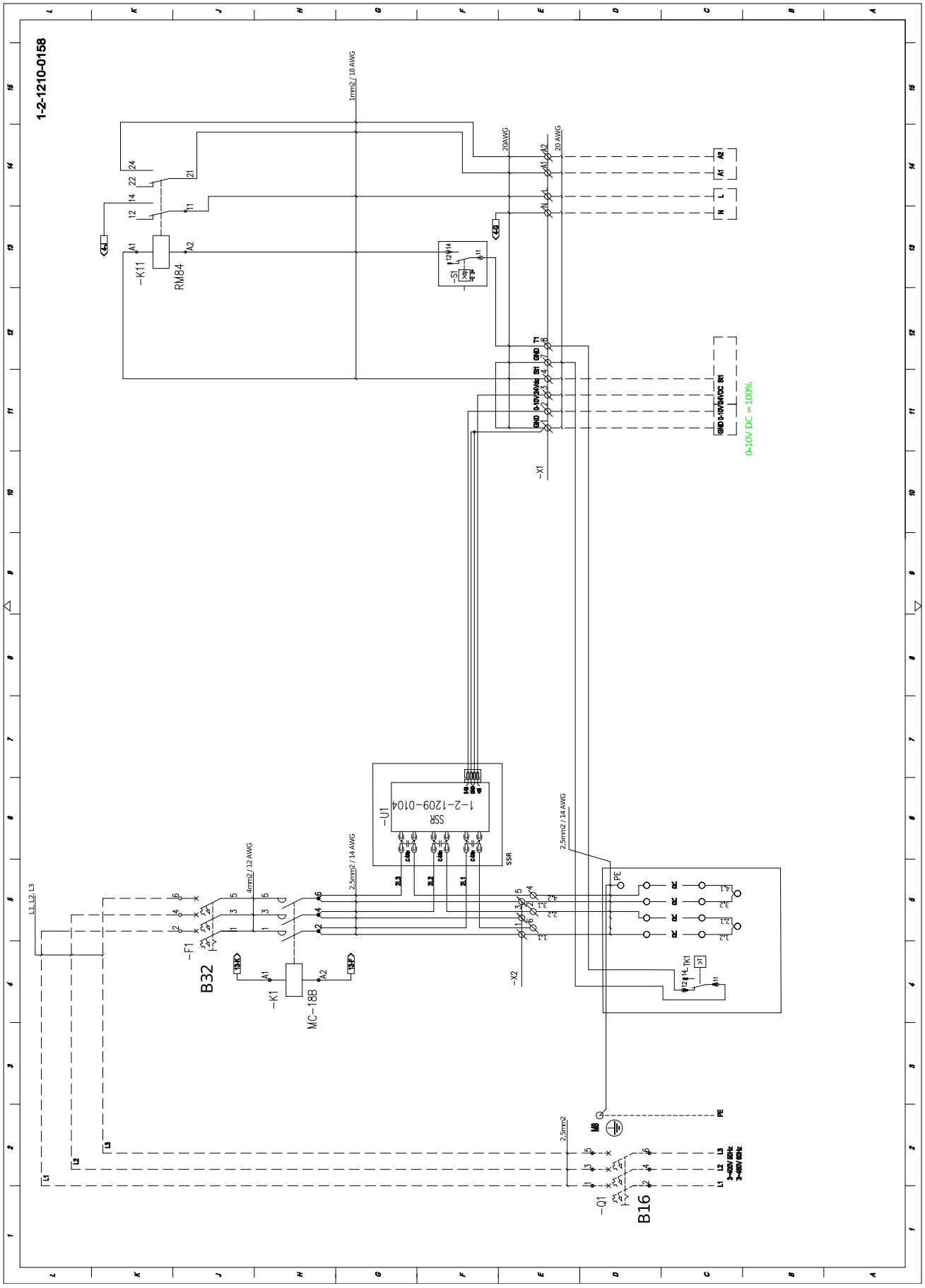
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.3 Low power – 6kW – VVS015s – VVS030s, VVS021 – VVS030



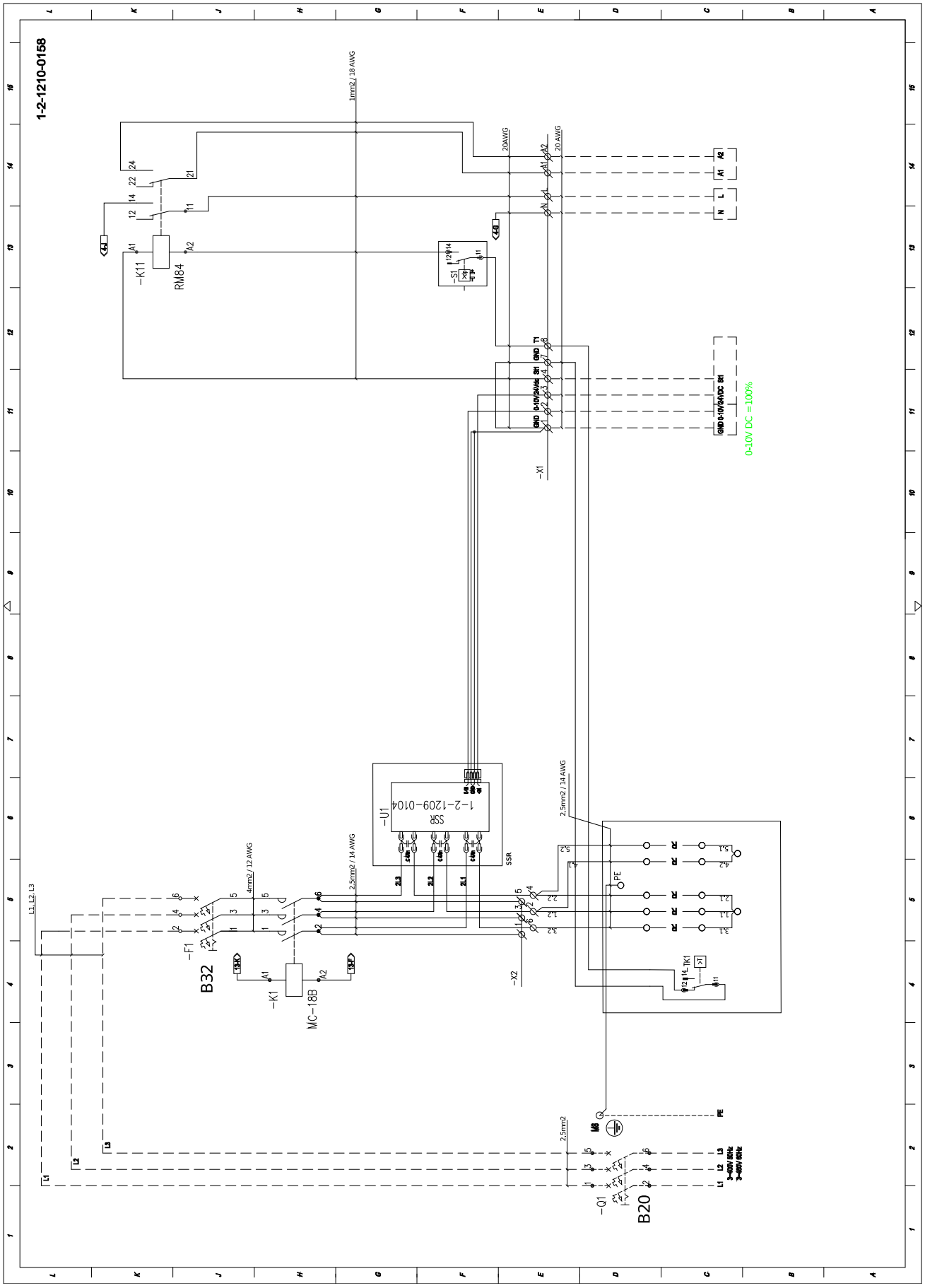
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.4 Low power – 6kW – VVS040



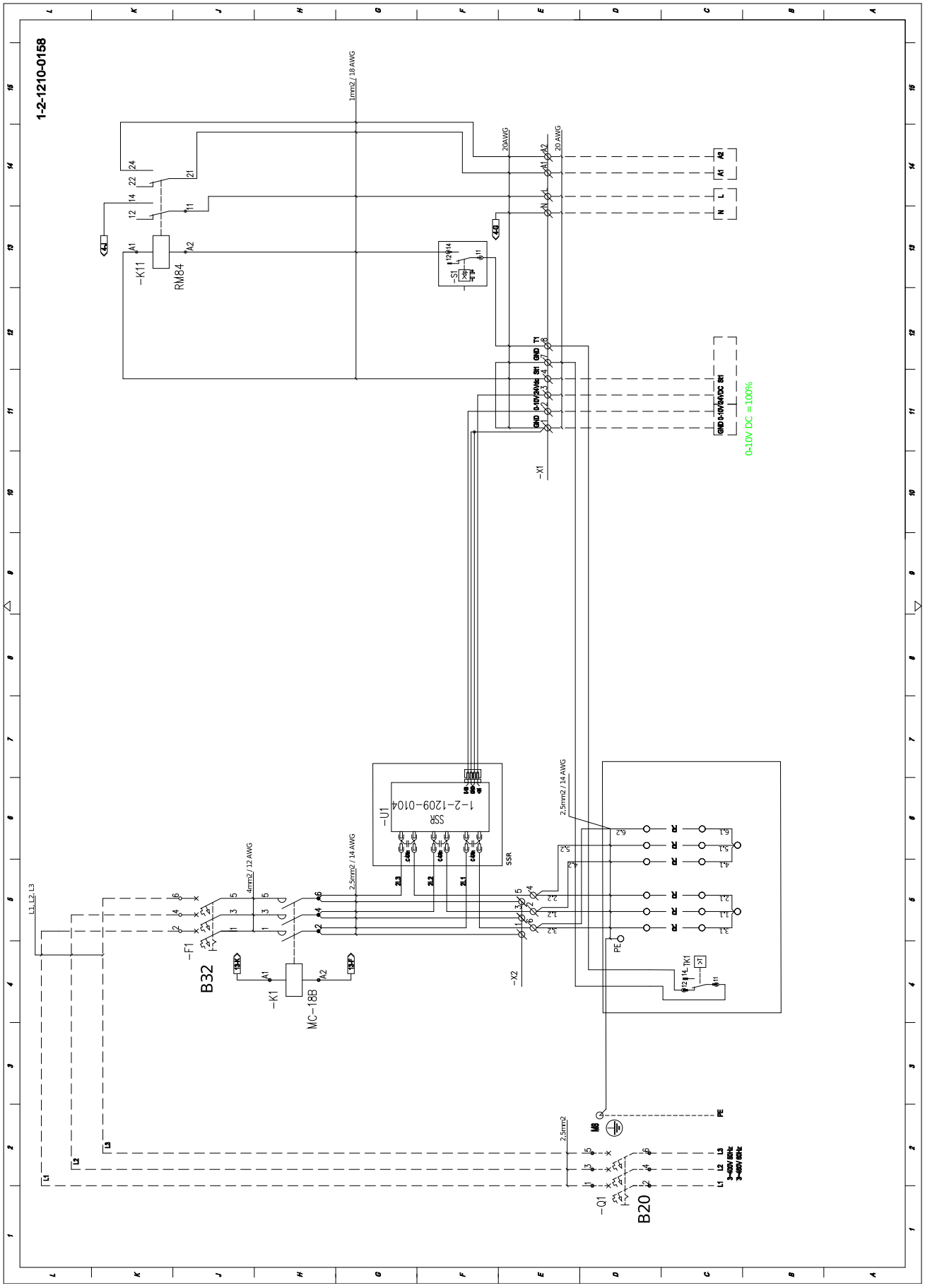
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.5 Low power – 9kW – VVS055 – VVS075



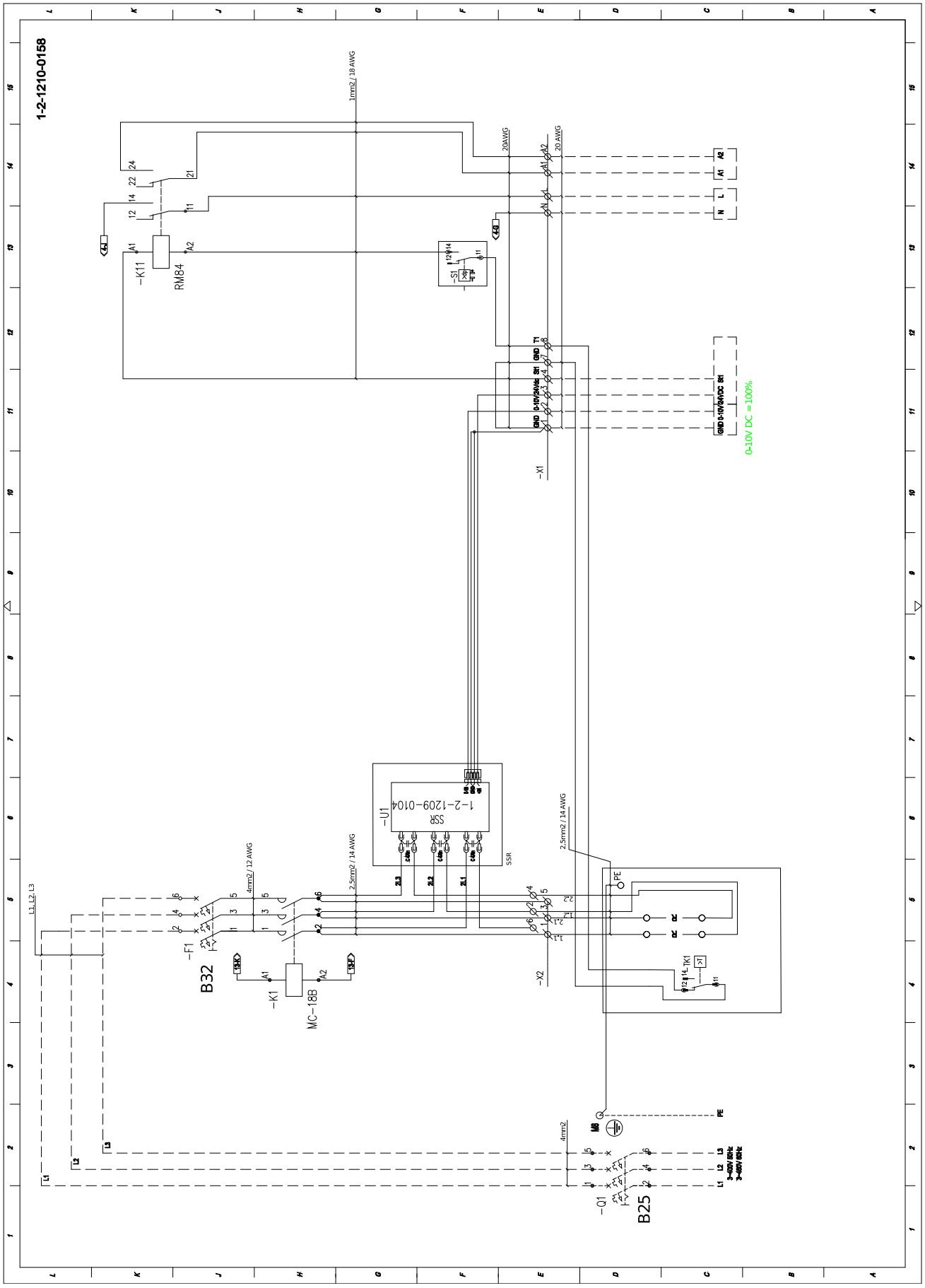
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.6 Low power – 12kW – VVS100 – VVS650



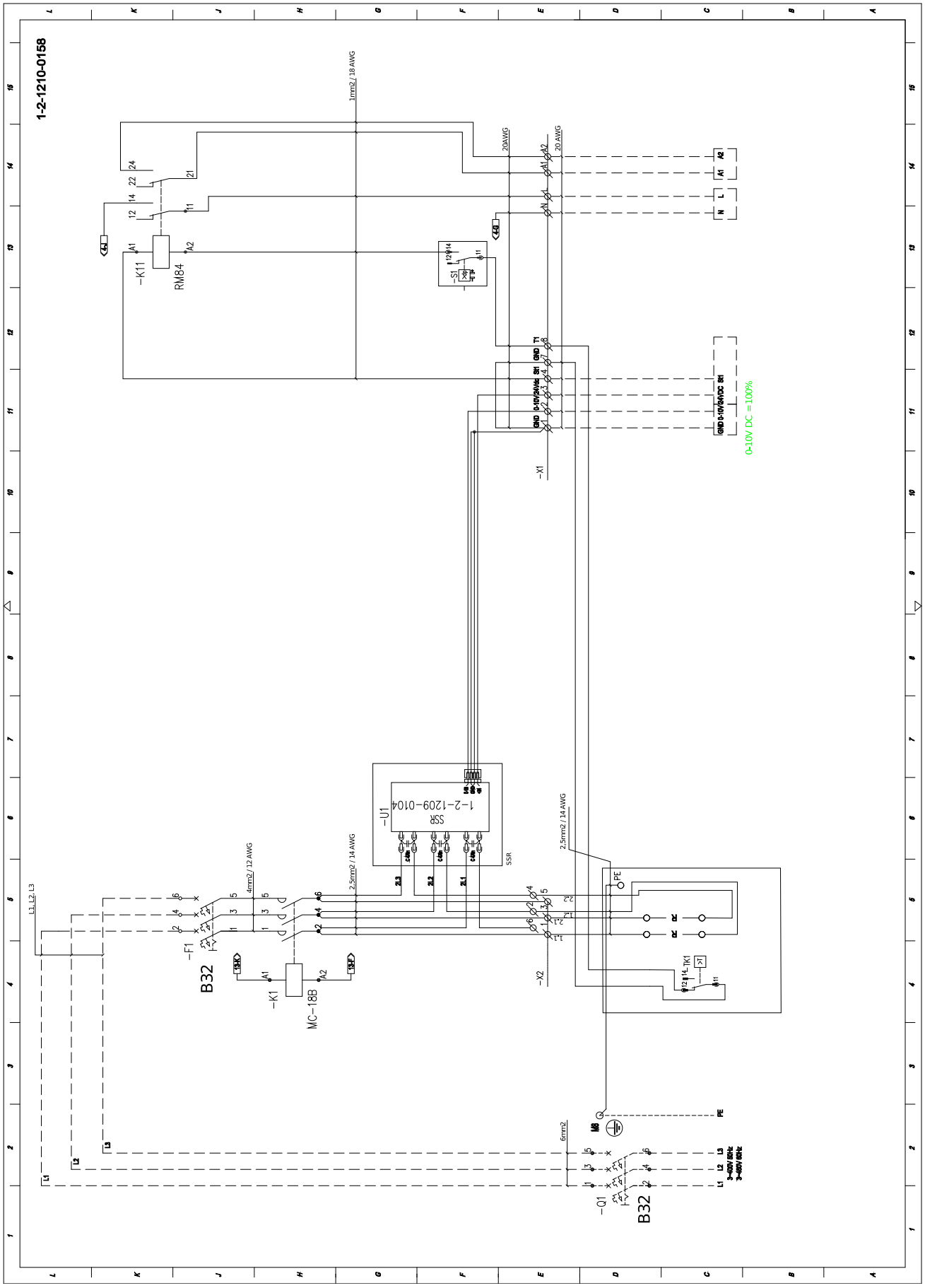
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.7 High power – 10kW – VVS005s



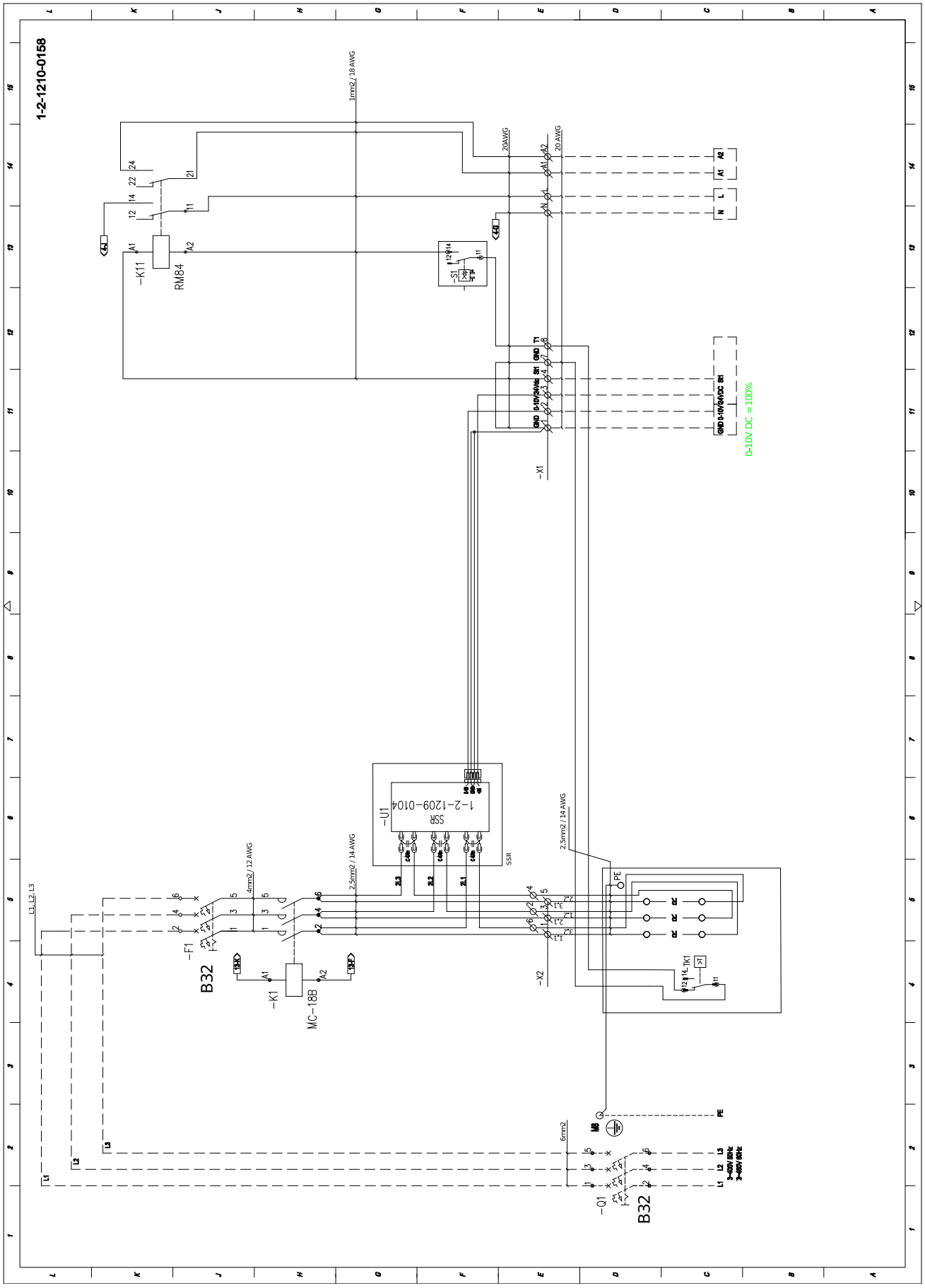
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.8 High power – 12kW – VVS010s



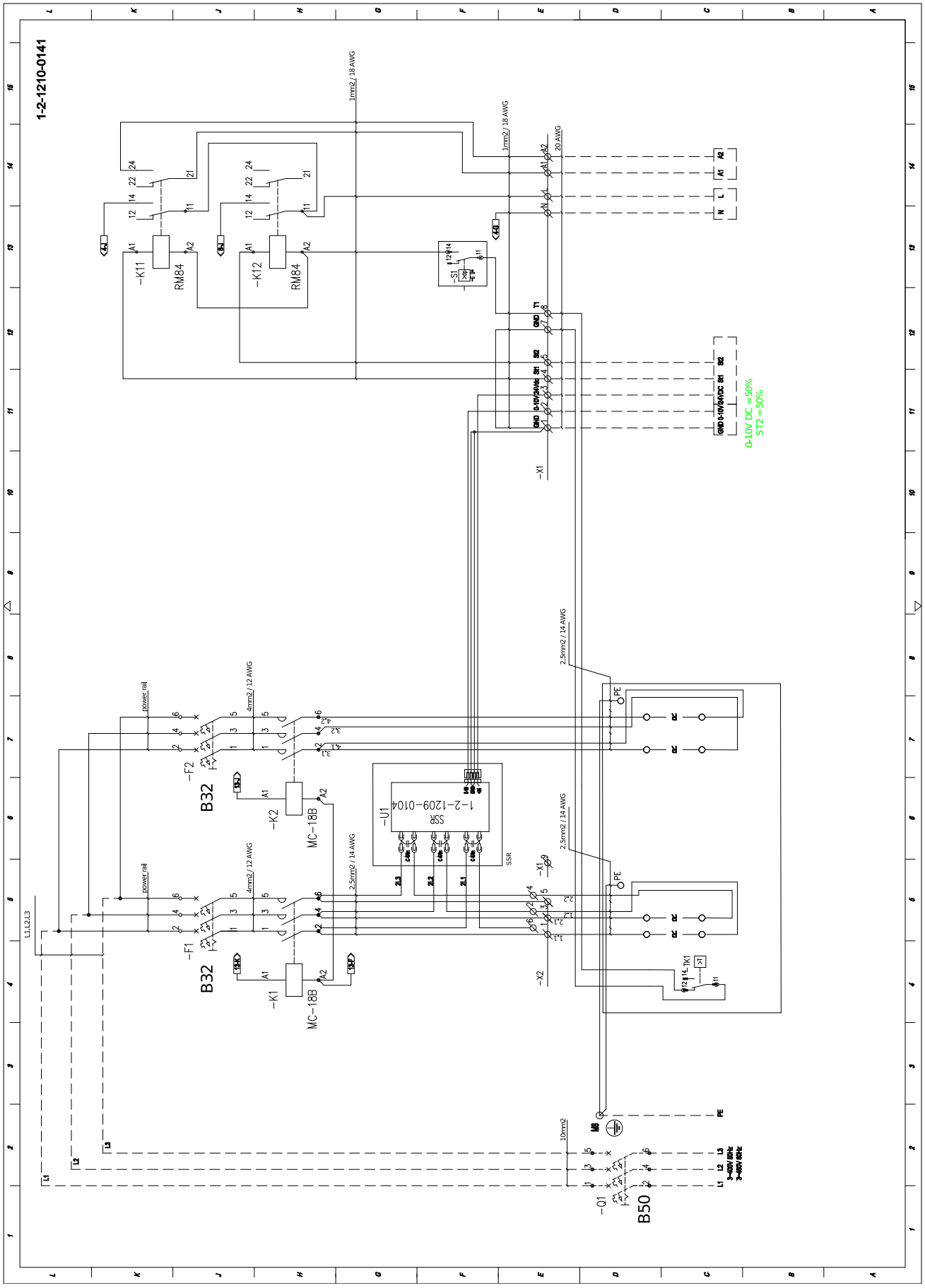
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.9 High power – 18kW – VVS015s – VVS030s, VVS021 – VVS030, NVS23



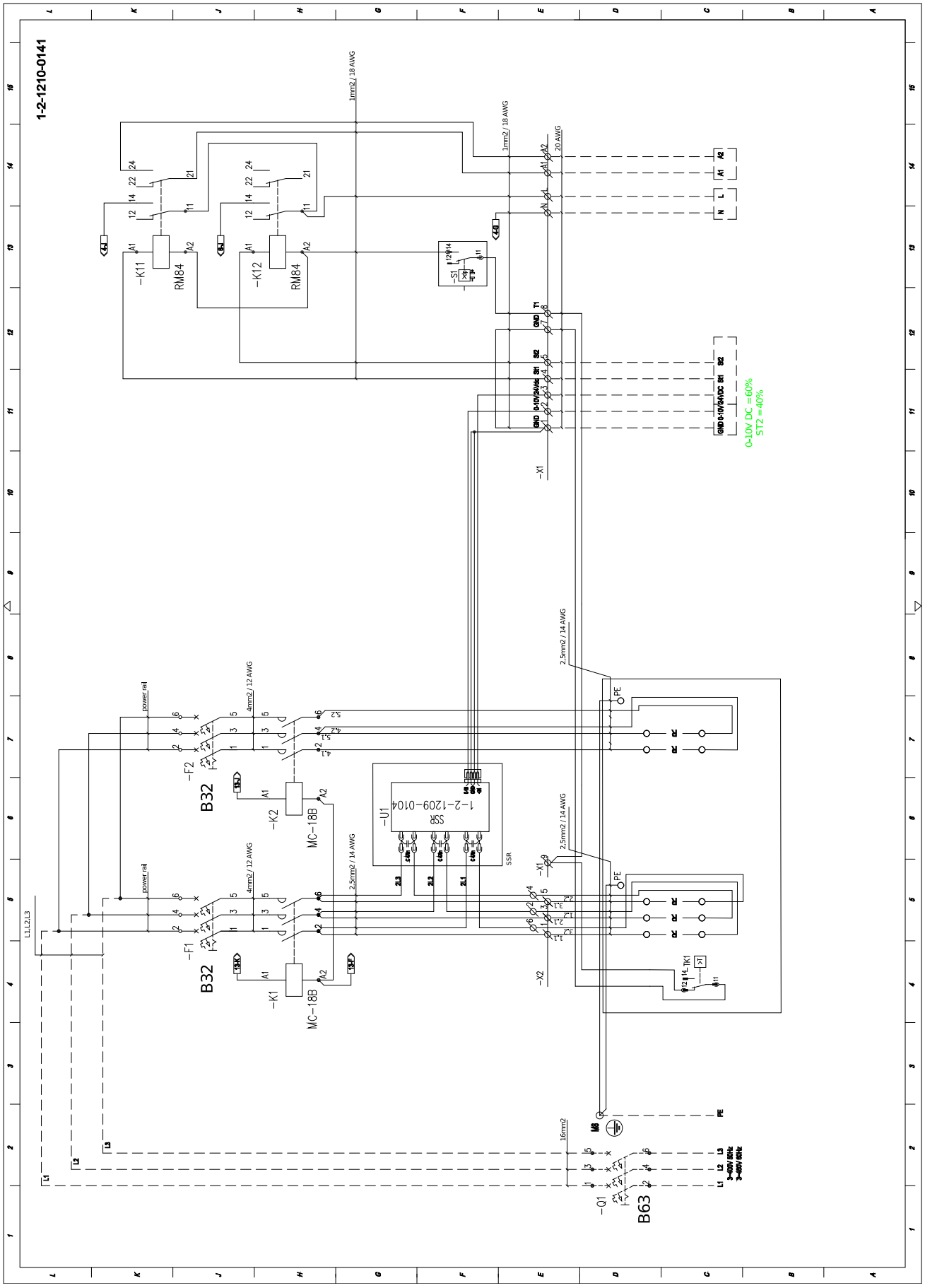
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.10 **High power – 24kW – VVS040**



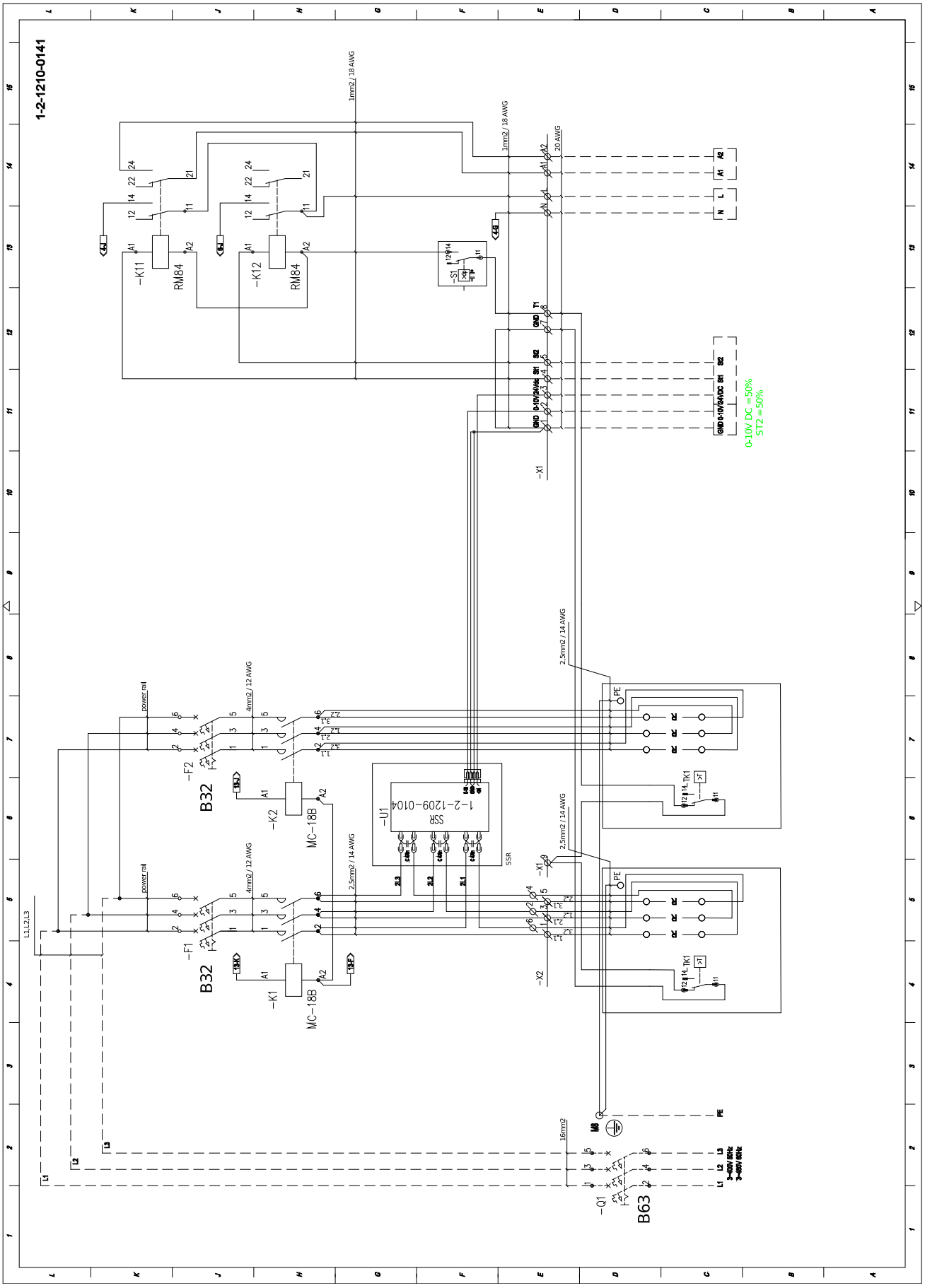
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.11 **High power – 30kW – VVS055 – VVS075**



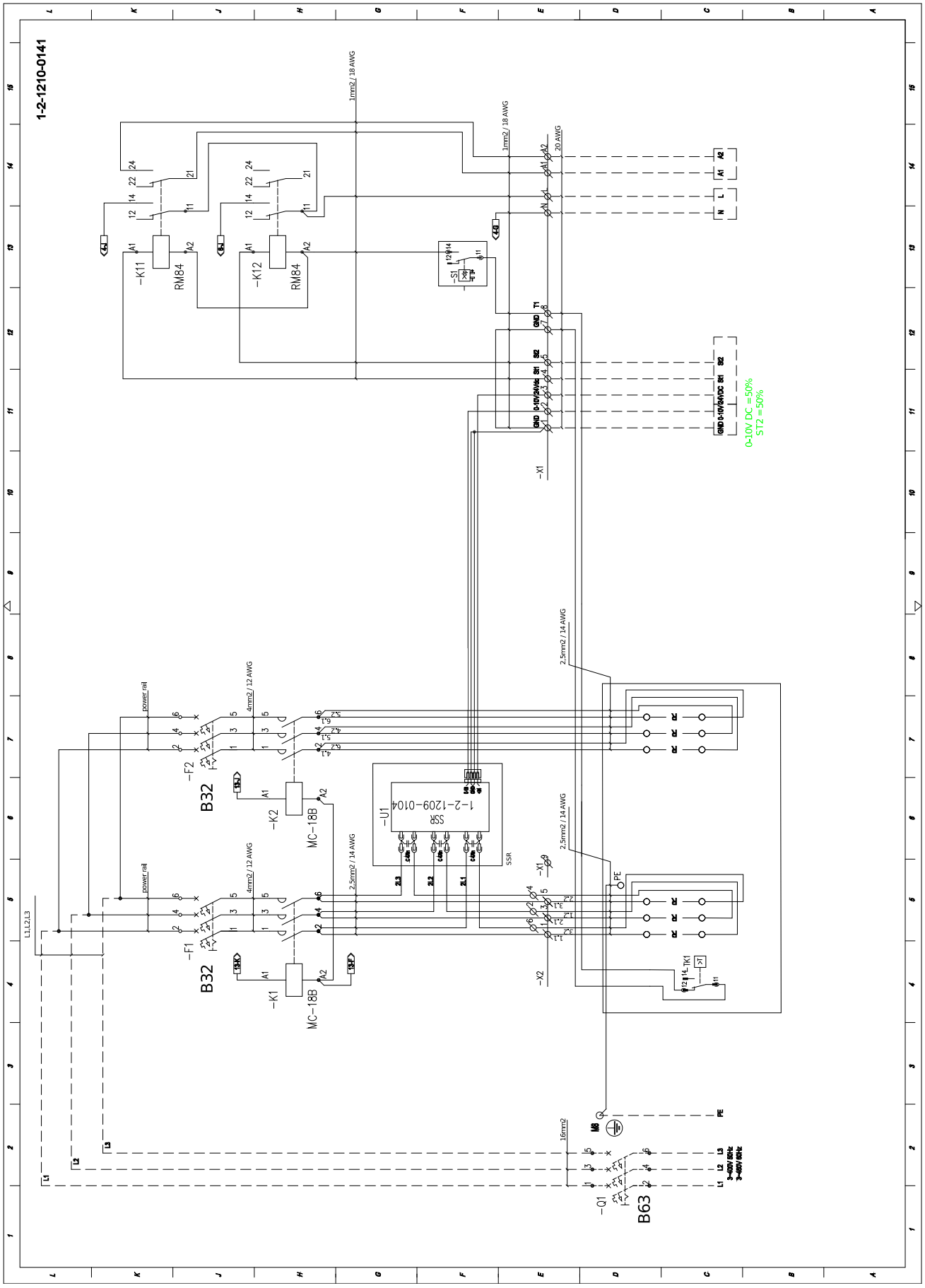
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.12 **High power – 36kW – VVS015s – VVS030s, VVS021 – VVS030, NVS39**



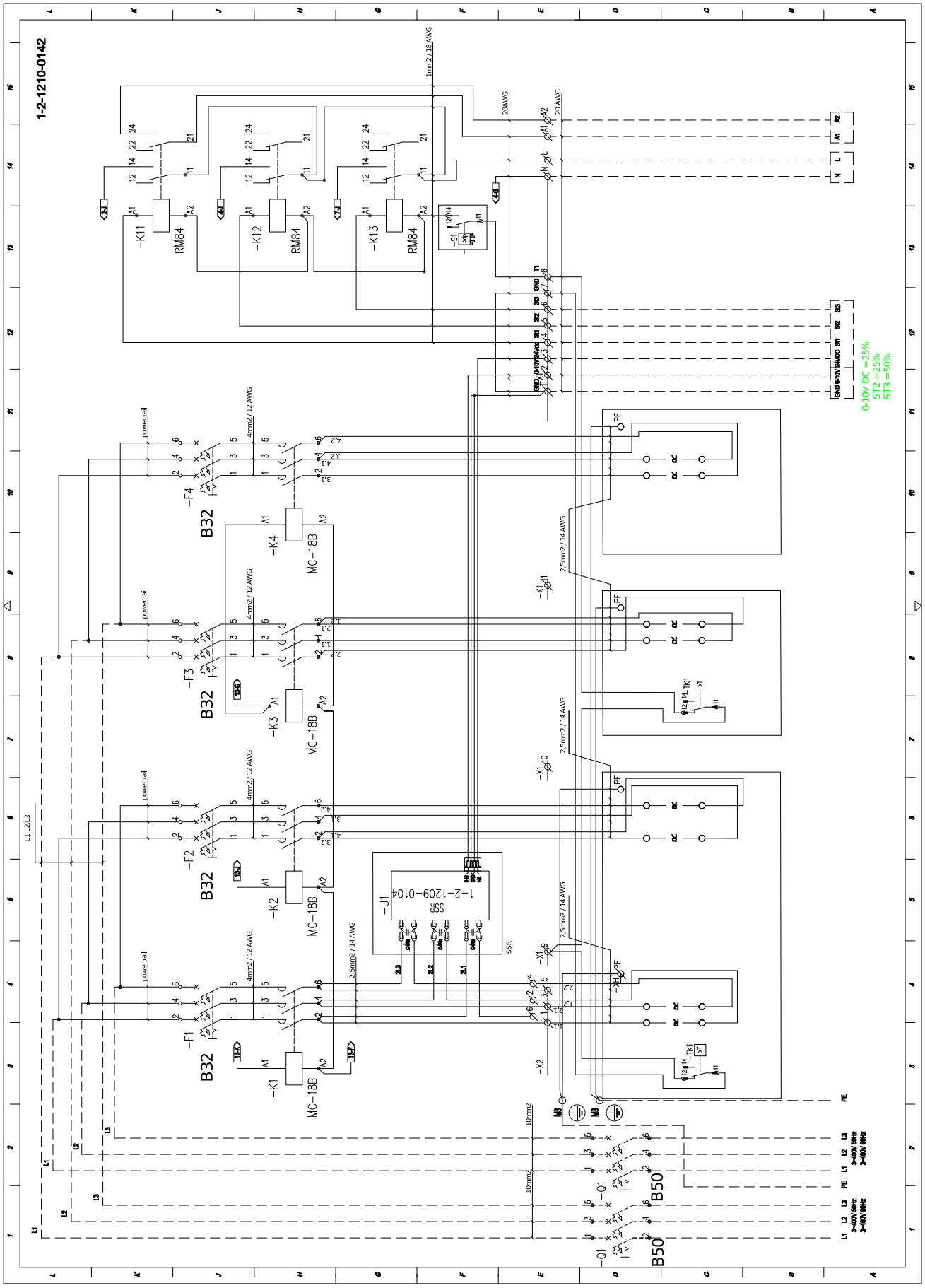
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.13 **High power – 36kW – VVS100 – VVS650**



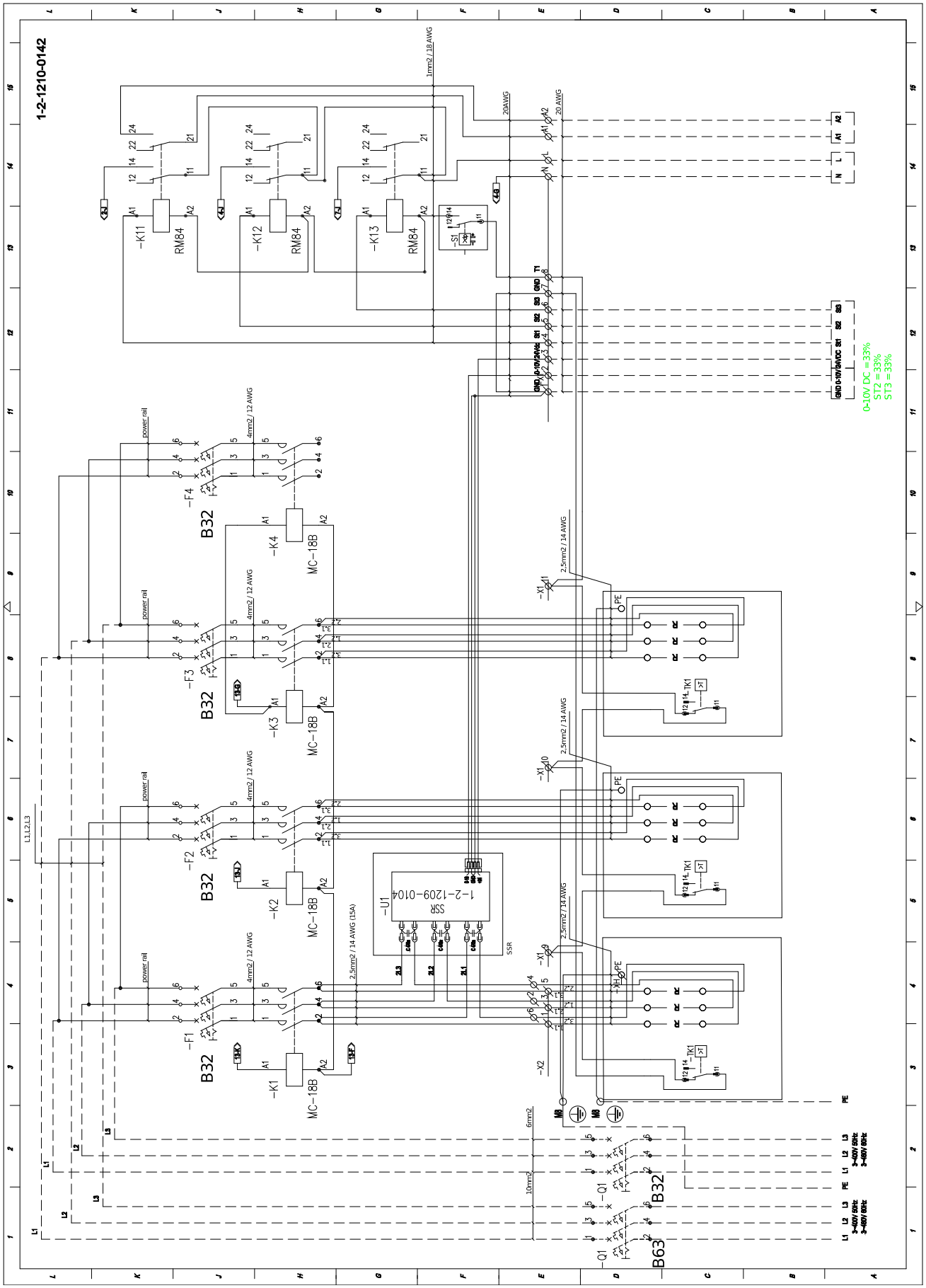
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

5.14 **High power – 48kW – VVS040**



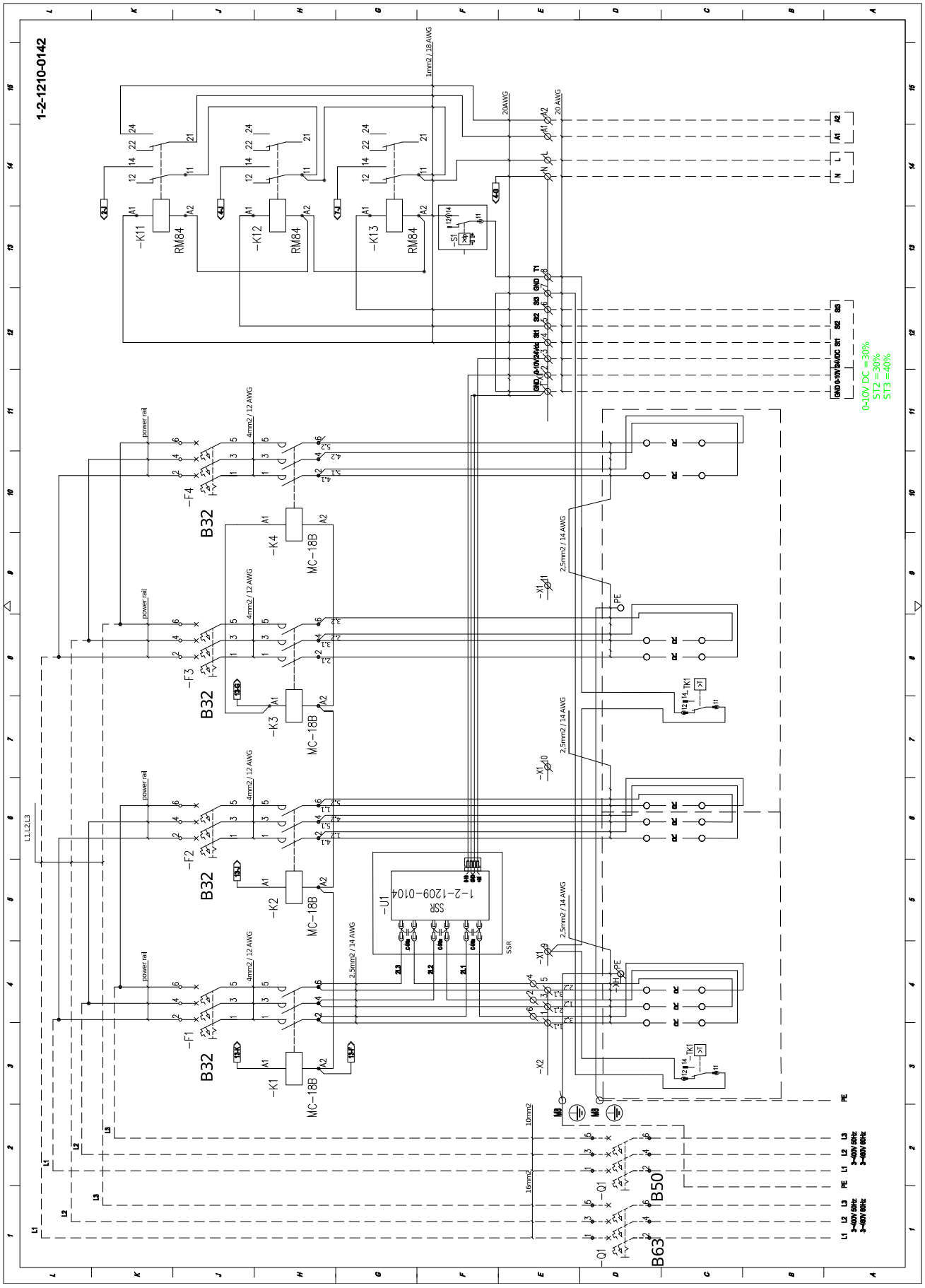
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer
note - in this configuration it is necessary to use two 3x400V power cables!

5.15 **High power – 54kW – VVS030, NVS65**



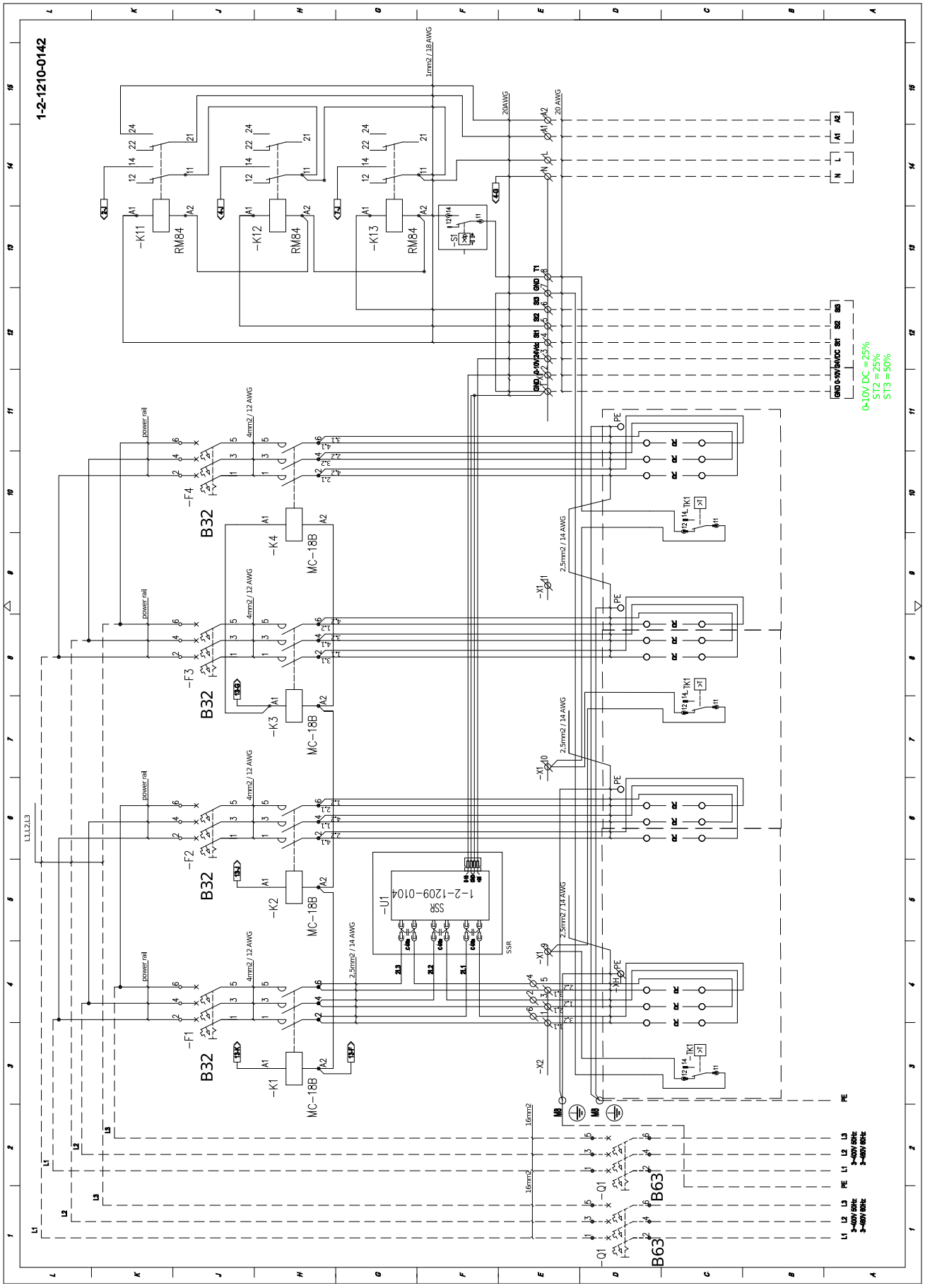
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer
note - in this configuration it is necessary to use two 3x400V power cables!

5.16 **High power – 60kW – VVS055 – VVS075**



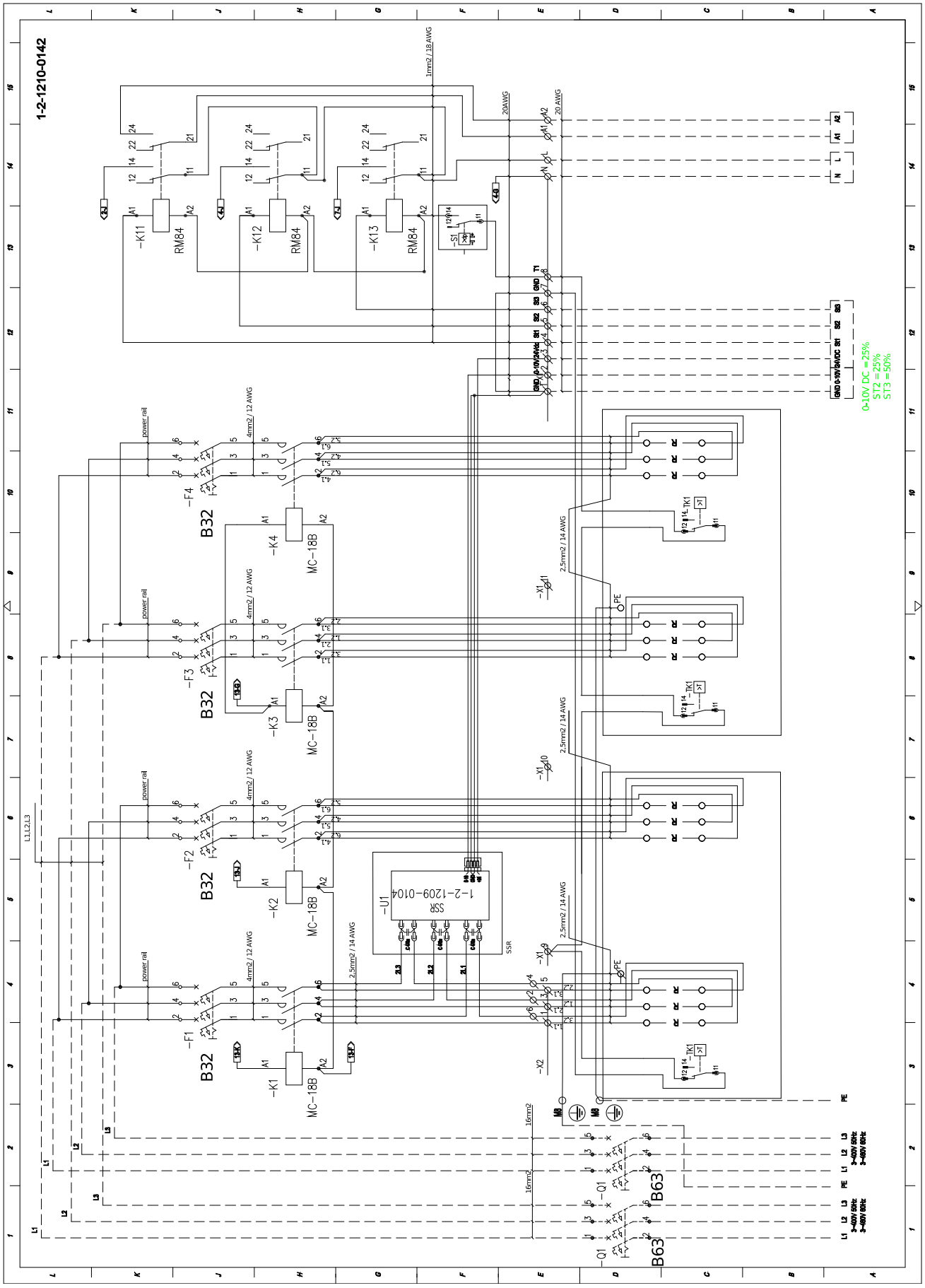
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer
note - in this configuration it is necessary to use two 3x400V power cables!

5.17 **High power – 72kW – VVS040, NVS80**



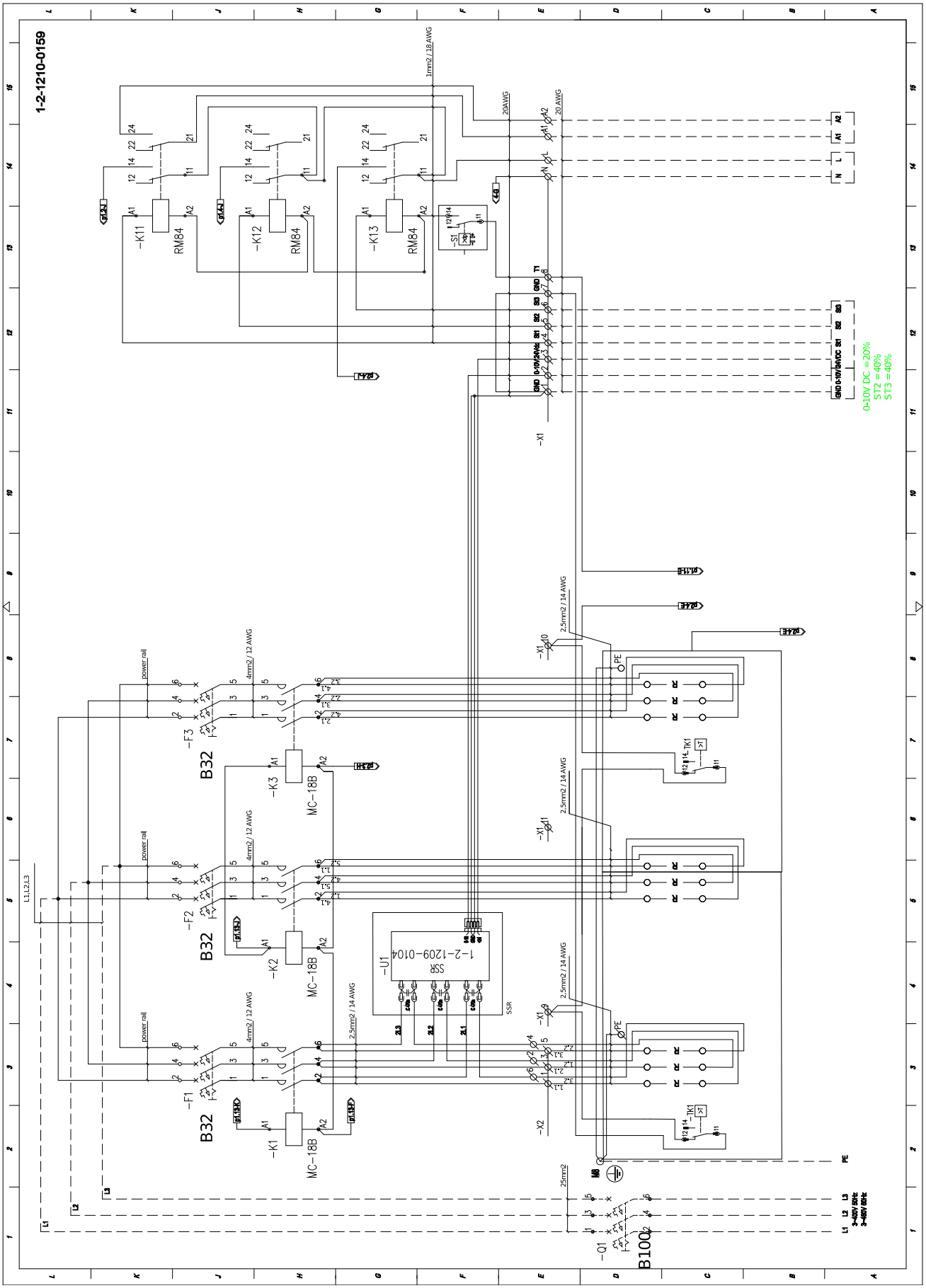
dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer
note - in this configuration it is necessary to use two 3x400V power cables!

5.18 **High power – 72kW – VVS100 – VVS650**



dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer
note - in this configuration it is necessary to use two 3x400V power cables!

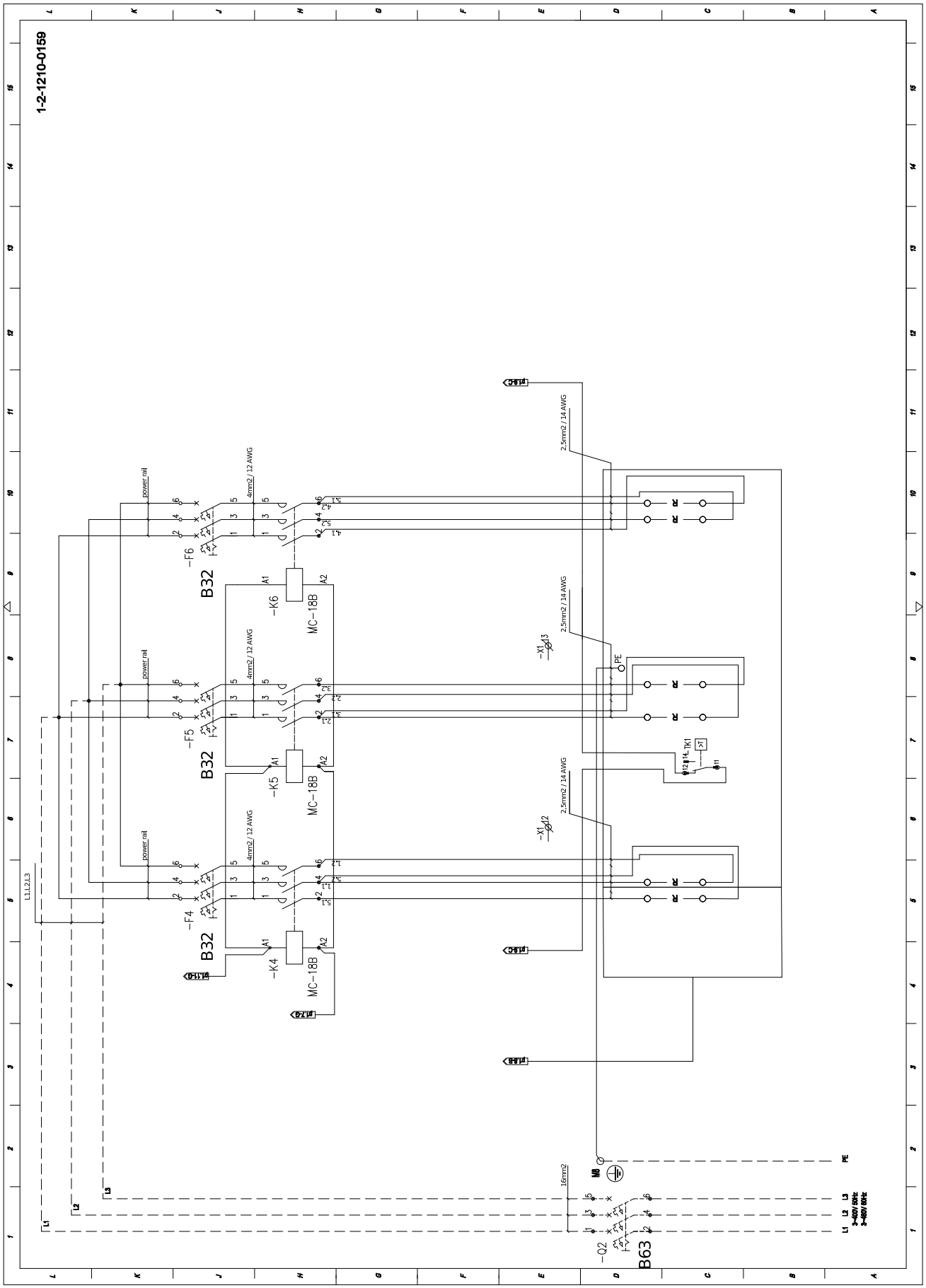
5.19 **High power – 90kW – VVS055 – VVS075**



dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

note - in this configuration it is necessary to use two 3x400V power cables!

note - in this configuration the 3x400V power cables must be connected to the terminals of the middle switches!

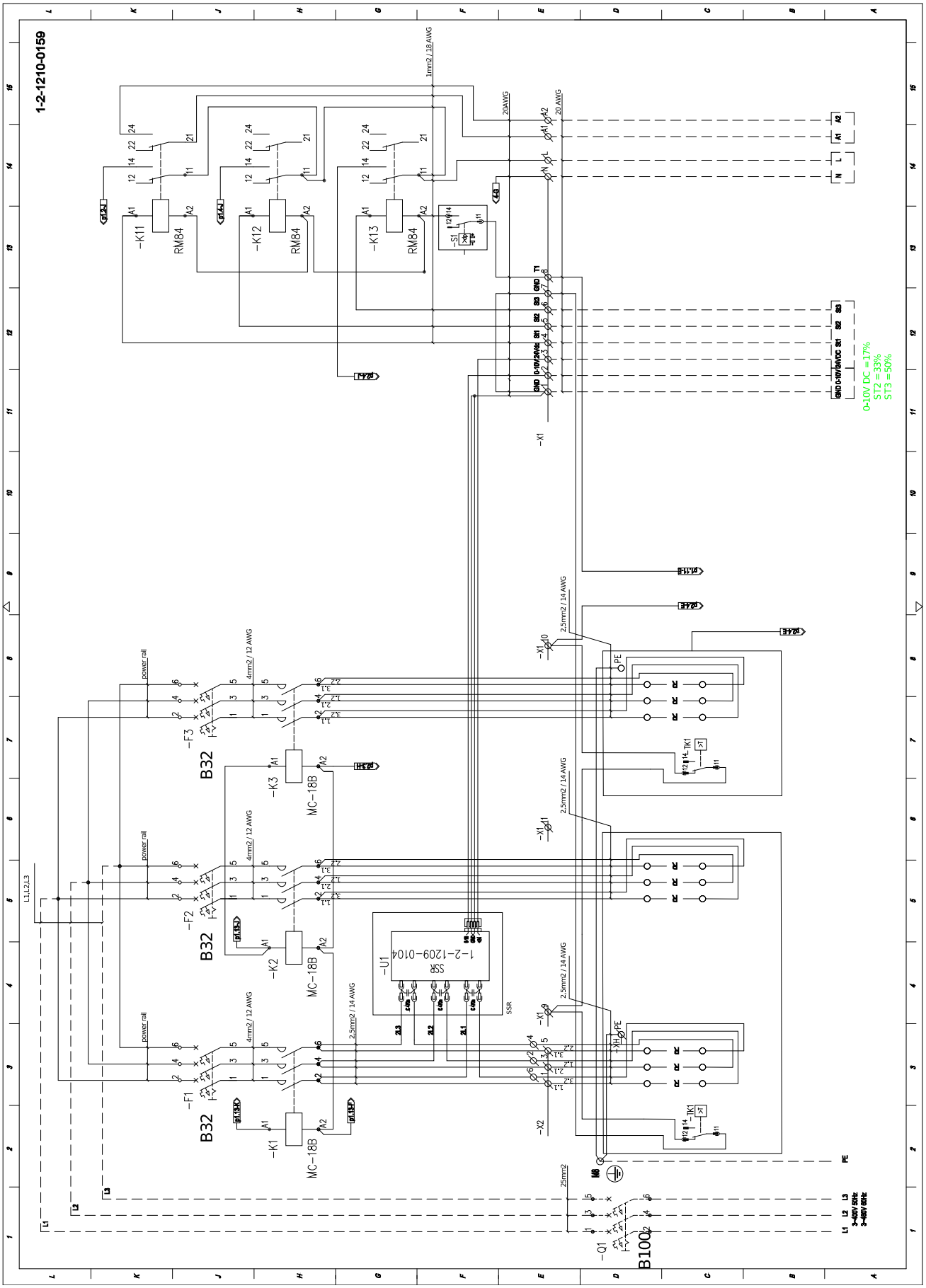


dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

note - in this configuration it is necessary to use two 3x400V power cables!

note - in this configuration the 3x400V power cables must be connected to the terminals of the middle switches!

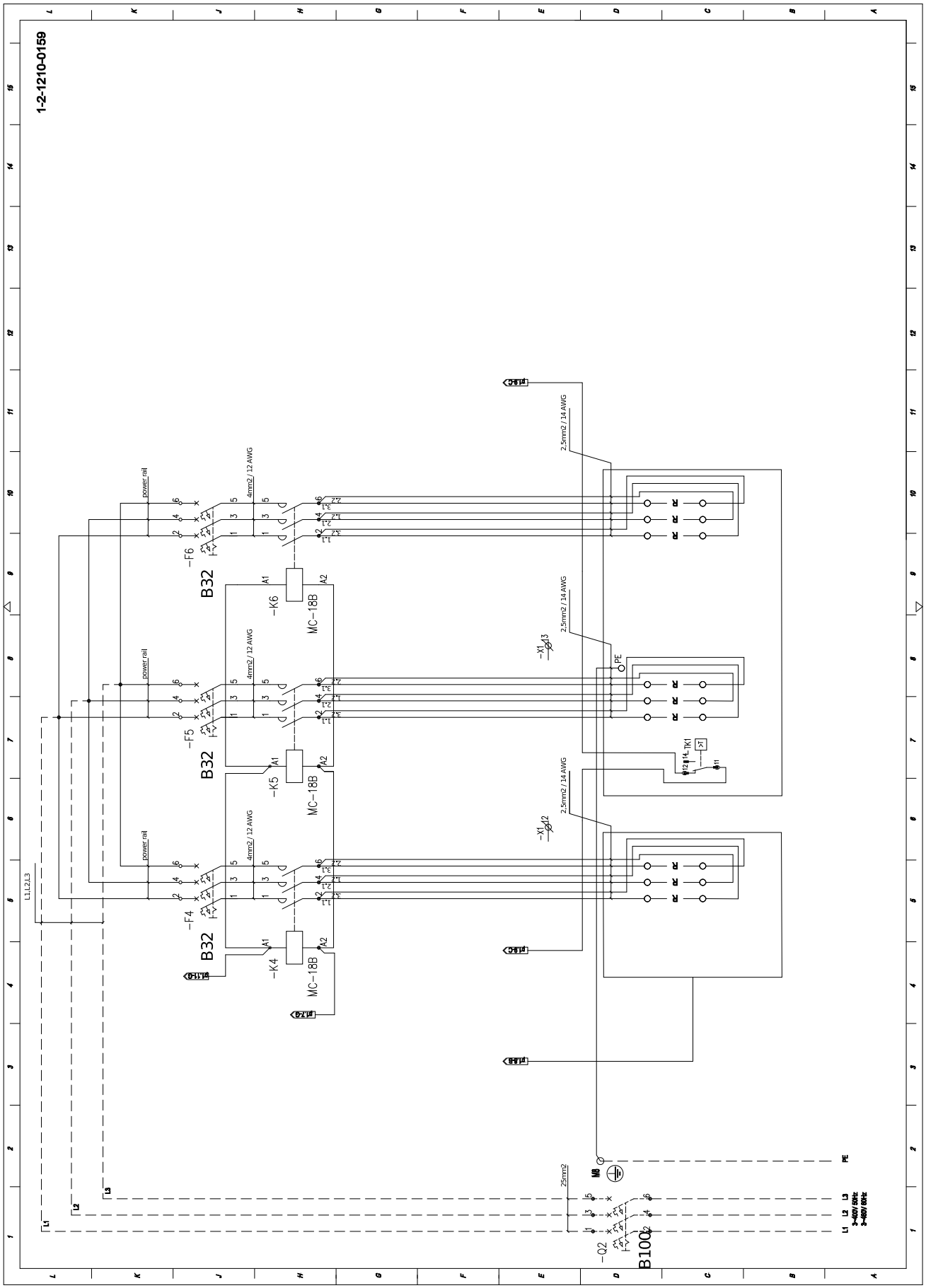
5.20 **High power – 108kW – VVS100 – VVS650**



dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

note - in this configuration it is necessary to use two 3x400V power cables!

note - in this configuration the 3x400V power cables must be connected to the terminals of the middle switches!



dashed line indicates connections made by the user, **solid line** - connections made by the manufacturer

note - in this configuration it is necessary to use two 3x400V power cables!

note - in this configuration the 3x400V power cables must be connected to the terminals of the middle switches!

6 Maintenance procedure

During the AHU operation (and also before its first start-up), when the heater is not working, dust may settle on the heating elements. When the heater is turned on again, heavy soiling may cause the smell of burning dust or even a fire hazard.

Regularly (annually), especially before the first start-up and before the beginning of the heating period, the condition of electrical connections, the condition of heating elements and the level of their soiling should be checked. Remove any contamination with a vacuum cleaner with a soft suction nozzle or compressed air.

The overheating protection and the pressure protection should also be checked regularly. The air velocity in the AHU during the heater operation should not be less than 1.5 m / s.