Borel
Standard Furnaces & Ovens
Switzerland

INSTRUCTION MANUAL

Models covered by this manual

- FI 550
- FI 600
- FI 1100
- FI 1250

CE

Appendices

Appendix A:	Data sheets
Appendix B:	Electrical diagrams
Appendix C:	Regulator instruction manuals (case by case)
Appendix D:	CE certification

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2.Introduction

This manual must be read before commissioning the equipment. This equipment has undergone a quality check and been tested before dispatch to ensure its correct functioning.

3.Equipment supplied

3.1 Packaging, unpacking, handling

The appliance must be transported in packaging that is suitable for its size and weight.
Ensure that the appliance has not been damaged in transit. If you note any abnormalities, we advise you to notify the carrier, and then inform us.
When handling the appliance, please ensure that no movable parts are contained within its cavity (shelves etc.). Beyond a certain size and a certain weight, the appliance can no longer be handled manually or using a pallet truck (refer to your handling equipment guide). A hoist may be required to move the appliance – hooks are provided for this purpose (refer to your equipment guide), or use slings. There is information on the weight and size of the appliance in chapter 8. After the appliance has been put in place, the movable parts can be put back in place. Retrofit the appliance for storage as for use.

3.2 Items supplied as standard

Please check that the contents delivered contain:

- The furnace
- Ceramic bottom hearth in one or more parts (only for: **FI 600***, **FI 1100***, **FI 1250***)**
- A shelving system (only for: **FI 550*** and **FI 600***)**
- User's guide

3.3 Product identification

There is a nameplate on the external surface of the appliance. The information shown on it must be strictly followed.

4.General use

This equipment is designed for industrial use. The maximum use temperature is suitable for intermittent use. For continuous use, this value must be lowered. Use is deemed to be continuous if the appliance is used for periods of more than 3 hours at a time.

This equipment requires an electrical power supply and must be stored and used indoors, under the following conditions:

- ambient temperature between 5 °C and 40 °C
- relative humidity: maximum of 80 % up to 31 °C, diminishing in linear fashion to 50 % at 40 °C.

Using any explosive or flammable products or any corrosive product inside the equipment is strictly prohibited.

- Appliances with an air inlet/outlet: take care never to alter circulation (do not block ventilation holes, do not overfill the appliance).
- Stoves and chamber furnaces, all types: the ideal volume used/working volume ratio is 1/3. Never exceed a proportion of 1/2.
- Crucible furnaces: never exceed 85 % of the crucible volume. The maximum allowable mass for a crucible is determined by the mass of copper for a crucible that is 85 % full. Therefore, for materials with a higher density, the crucible filling volume must be reduced.

♦ Electric network variation must not exceed 10 % of nominal voltage.

5.Conditions of use

Do not use this product for any other purpose other than that described above. Moreover, using it for certain purposes is prohibited:

- do not use this equipment for food-related operations,
- do not use solvents,
- do not place any living beings inside,
- do not modify the air inlet in any way,
- do not use to work in any atmosphere other than the ambient atmosphere,
- do not make any general modifications to the product without the manufacturer's consent.

6.Safety instructions

IMPORTANT! **Before installing the appliance, please read the instructions in the user guide.**

Only staff with who are competent in and aware of the applicable electrical guidelines, and who are aware of the relevant safety measures to be taken when working on the appliance, may handle this equipment.

For the electrical connection, only use one earthing contact socket.

Working with the appliance is strictly forbidden if it is not securely earthed.

To prevent burns during work in the cooling or product check phases, thermal protective clothing must be worn.

Should the appliance fail to work properly, it must be disconnected from the mains and the necessary steps must be taken to remove the fault.

Only carry out repair work after having disconnected the appliance from the power source.

- The appliance must rest on clean, flat and horizontal ground.
- If the items inserted into the appliance exude noxious chemicals (fumes), you must connect the extraction device to the outside of the building using a suitable pipe. We recommend setting this connection up whatever the intended use.
- This appliance must not be installed in any room that may contain an explosive atmosphere.
- Never modify the appliance's electrical installation (except with the manufacturer's written consent).
- Upkeep and maintenance operations must be performed by competent staff, equipped in accordance with the rules for use.
- The handling methods used (power lift trucks, cranes, operator pods, scaffolding, etc.) must comply with the applicable standards and be managed by authorised staff.
- Before any maintenance or servicing work, the appliance must be stopped and the various power sources must be turned off. The master switch must be locked out.
- Staff using the installation must be made fully aware that the equipment is being implemented.
- The appliance contains hot accessible external surfaces.

Workshop ventilation:

The furnace must be used in a sufficiently ventilated room. Ventilation must allow air renewal between 30 and 60 times the useful volume per hour. Make sure when operating the furnace that the ventilation is working properly

Safety symbols

The following symbols show important safety instructions; if they are not followed, this may lead to damage to the installation or harm to staff handling the installation. It is important to read and follow all safety instructions.

Communicate all safety instructions to staff working with the installation.

This symbol indicates a hot surface in the appliance.

Work safety

In order to avoid endangering staff, the following points must be followed:

- This appliance requires competent, trained staff who are able to use and maintain the installation.
- Using naked flames, incandescent objects or appliances inside the appliance is strictly forbidden.
- Storing flammable products or receptacles used to contain them, or any other material which has been in contact with these products (rags, papers, etc.) inside the appliance or in front of the doors is strictly forbidden.
- Competent staff are required for any maintenance, adjustment or repair work on the appliance.

Necessary Security at work under gas of protection (inert or not)

The gas of protection is not any more considered as inert but as flammable when the quantity of 5 % of flammable or explosive gas (H2) is exceeded in the gas mixture.

This is dangerous to work with a mixture containing more than 5 % of flammable gas if the device version is not equipped to work under flammable gas.
When the electric current is interrupted and returns, the cycle of heat treatment continues from where it was interrupted.
A sufficient aeration in the workshop must be assured. In the installation place, no air blowing must be present.
Prohibition to smoking near the installation.

For retort furnace

The closed retort with a temperature higher than 100°C must never contain a mixture of gas and air.
For each use under flammable gas the sealing of the retort must be checked. The joint must be regularly cleaned and greased from time to time with some fat of silicone.
During deterioration or imperfection, the joint must be replaced. The retort must be clean.
After cooling and before opening the retort, verify that there is no flame near.
The pressure of the gas does not have to exceed 0,8 bar.

Using the flammable gas for specially equipped versions:

Verify that the flame always burns at the gas burner level.
Above all treatment under flammable gas, the operator has to make sure to arrange enough gases.

During the use of a loading muffle

The loading muffle as removable muffle is used to work under gas of neutral protection (for flammable gas please contact us).
The heating elements must never experiment any mechanical shock, it is recommended to change any damaged element of protection
Loading muffle cannot be used in a temperature higher then 1100°C.

7.Technical features

Refer to appendix A containing the data sheet for the different models covered by this user guide.

8.Using the regulator

- The complete user guide of the temperature controller is provided in the appendix C:
  - Programmable temperature controller: Axron ECO 304H-P or MITSCO 3300/4 (For model: FI 600-60, FI 600-130, FI 1100-50 and FI 1100-120)

9.Commissioning

Preliminary checks – Ensure that:

- the supply voltage of the electrical network matches the wiring voltage of the appliance,
- the power supply cable is of the correct size,
- the power supply is properly connected to the control panel,
- the current absorbed by each component (resistor, motor…) matches the nominal intensities.
- Tighten all electrical connections (including in the cabinet). Some joints may have come loose in transit.

9.1 Using for the first time

When heating up for the first time, smoke or an unpleasant smell may be exuded. This is normal and is the residual moisture contained in the insulating material being released.

9.2 Starting up

- Connect electric cabinet to the main power supply (Must be done by an authorized electrician), respecting the electrical characteristics of the installation (Appendix A) and the electrical standards of your country. Please inform us in case of incompatibility.
- An appropriate sized electric plug must be used to avoid heating.
- Switch ON the main switch.
- For the first usage, we recommend to heat the furnace as follows, in order to extend its life span. Increase the temperature by 100°C every hour until it reaches to its maximum temperature.

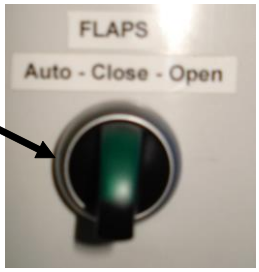
Temp. Controller (Depending on the model)

Heating Switch

Main Switch

- Models equipped with an air circulating monitor (FI 550* , FI 600* and FI 1100*):

Air circulation switch, 3 positions, **Auto** (flaps commanded by the temp. controller), **Close** ventilation flaps, **Open** ventilation flaps.



- Models equipped with gas control for furnace under inert protective gas (option):

Gas control, 3 positions:
- **Auto:** gas controlled by the temp. controller
- **OFF:** without gas
- **ON:** with gas (continuous)

- Models equipped with circulation fan (option):

The fan is automatically switch ON/OFF with the heating. The maximum furnace temperature is reduced (see nameplate).

10. Use

10.1 Operation

Carry out user checks.
Switch the appliance on.
Switch ON the furnace.
Switch on heating by turning the heating switch on the position I, the indicating lamp lights up.
Set the desired temperature on the temperature controller (Zone 1 only, Master).

Remark: The door opening switches off the heating.

Please note: never exceed the capacity of the appliance. Be aware of the nature of the product.

10.2 Maintenance

- To perform maintenance operations, the installation must be disconnected from the mains.
- Only qualified staff may carry out maintenance work on the appliance.
- Any major repair work on the appliance must be carried out by the manufacturer or after consultation.

Any abnormalities in the functioning of the installation must be reported to the person in charge immediately.

Before using, always check that the appliance's electrics are working properly, and that the components are mechanically sound.
Preventive maintenance must include a regular (even daily) general examination of the installation.

11. Installation

The appliance must be installed following the safety instructions stated above.

Connection to power networks

- For appliances delivered with a lead out wire + male plug: insert the male electrical plug into a standard female socket, having checked that the two are compatible.
- For appliances delivered with a cord: connect the cord to the appliance by inserting it into the power supply socket. Insert the male electrical plug into a standard female socket, having checked that the two are compatible.
- For appliances delivered with a lead out wire without a male plug: connect the cable with a suitable male electrical plug.
- For appliances without cords or lead out wires: bring the electricity to the control cabinet and set up a connection to it. This electrical line must be of the correct size, marked and made secure. The electrical power and the absorbed current are shown in the general diagram and in this guide.
- The electrical connection must be set up in accordance with the applicable guidelines.
- Check the network voltage.
- If the appliance is cooler than the ambient temperature, wait for 12 hours before switching on.

12. Analysing and solving problems

Breakdowns	Causes	Solutions
Nothing works	No current.	Restore the current.
	Disconnect switch or circuit breaker in open position.	Close it.
	Control transformer fuses burnt out.	Replace them.
Motors Motor fault (for fitted models)	Under-calibrated disconnect switch.	Calibrate according to the motor's ampere rating.
	Motor bearing is defective.	Change the motor.
	Phase missing.	Check fuses and clamps of the cabinet and motor lugs.
	Defective winding.	Change the motor.

Products for elimination :

The different products dismantling works and all the costs arising from the products elimination are the responsibility of the customer.

The product packaging has to be made according to the product manufacturer and has to respect the obligations provided by law of the country at the time of the product elimination.

Make sure you have all the official documents and authorisation for the special wastes transportation and to respect all the eliminations instructions in effect in the country.

BOREL SA remains available for the customer for any technical question regarding the products used for the manufacturing.

13. Manufacturer and after-sales department contact details

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A division of Solo Swiss Group

Borel
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Annexe A

Fiches techniques

Appendix A

Data sheets

Annexe A

Technisches Datenblatt

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Standard Furnaces & Ovens

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Photos for illustration purposes only

INDUSTRIAL FURNACES 550 °C
FI 550

Electric chamber furnace for all applications.

Construction: Main door includes 3 small doors with access to the removable modular shelves.

Insulation: Multilayer insulation. Interior in ceramic and refractory bricks.

Aeration: Air intake and exhaust controlled by temperature controller.

Heating: Shielded electrical resistors on 4 surfaces. The heating is turned off at the opening of the door.

Electricity: 3 x 400 VAC.

Regulation: Axron Swiss temperature controller/programmer, 30 programs of 15 segments with delayed start time setting function.

Documentation: CE marking and operating instructions in English.

Delivered with: 3 removable shelves.

Version: Model 2400 liters and above equipped with double doors.

MODEL	ITEM CODE	Int. Vol. (L)	Int. Dim. (WxHxD) (mm)	Ext. Dim. (WxHxD) (mm)	Power (kW)	Weight (kg)
FI 550-500	G201894	570	700 x 1000 x 820	1200 x 1895 x 1400	14	520
FI 550-700	G202024	720	800 x 1100 x 860	1440 x 1895 x 1500	17	600
FI 550-1000	G14893	1000	800 x 1100 x 1200	1300 x 1895 x 1800	21	680
FI 550-1600	G14898	1600	1200 x 1100 x 1200	1700 x 1895 x 1800	24	760
FI 550-2100	G14900	2100	1200 x 1200 x 1500	1700 x 1895 x 2100	30	900
FI 550-2400	G14902	2400	1650 x 1200 x 1200	2150 x 1895 x 1800	34	1100
FI 550-3700	G14904	3700	1650 x 1200 x 1900	2150 x 1895 x 2500	38	1300

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Borel

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Switzerland

INDUSTRIAL FURNACES 600 °C

FI 600

Electric chamber furnace for all applications.

Construction: Mechanically welded frame. Racks according to model.

Insulation: Multilayer insulation. Interior in ceramic and refractory bricks.

Aeration: Air intake and exhaust controlled by temperature controller.

Heating: Electrical coil resistors on 4-6 sides of the furnace. Resistors mounted on ceramic tubes and/or in grooves. The heating is turned off at the opening of the door.

Electricity: 3 x 400 VAC.

Regulation: Axron Swiss temperature controller/programmer.

Documentation: CE marking and operating instructions in English.

Delivered with: Removable ceramic sole.

Photos for illustration purposes only

MODEL	ITEM CODE	Int. Vol. (L)	Int. Dim. (WxHxD) (mm)	Ext. Dim. (WxHxD) (mm)	Power (kW)	Weight (kg)
FI 600-60	G14915	55	390 x 400 x 350	730 x 1680 x 840	5.2	190
FI 600-130	G201790	130	450 x 530 x 500	1000 x 1680 x 1070	9.0	230
FI 600-180	G201874	180	550 x 600 x 550	1160 x 1750 x 1190	12	320
FI 600-300	G14916	300	700 x 680 x 650	1160 x 1780 x 1240	17	440
FI 600-500	G14917	500	800 x 780 x 810	1200 x 1880 x 1400	24	600
FI 600-850	G14918	860	900 x 1150 x 830	1300 x 1980 x 1410	30	840
FI 600-1550	G14919	1550	1350 x 1200 x 960	1750 x 1980 x 1540	48	1300

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INDUSTRIAL FURNACES 1100 °C
FI 1100

Electric chamber furnace for all applications.

Construction: Mechanically welded frame. Racks according to model.

Insulation: Multilayer insulation. Interior in ceramic and refractory bricks.

Aeration: Air intake and exhaust controlled by temperature controller.

Heating: Electrical coil resistors on 4-6 sides of the furnace. Resistors mounted on ceramic tubes and/or in grooves. The heating is turned off at the opening of the door.

Electricity: 3 x 400 VAC.

Regulation: Axron Swiss temperature controller/programmer.

Documentation: CE marking and operating instructions in English.

Delivered with: Removable ceramic sole.

Photos for illustration purposes only

MODEL	ITEM CODE	Int. Vol. (L)	Int. Dim. (WxHxD) (mm)	Ext. Dim. (WxHxD) (mm)	Power (kW)	Weight (kg)
FI 1100-50	G14930	52	370 x 400 x 350	730 x 1680 x 840	5.2	220
FI 1100-120	G201872	120	450 x 500 x 500	1000 x 1680 x 1070	9.0	270
FI 1100-180	G201863	175	530 x 600 x 550	1160 x 1750 x 1190	12	270
FI 1100-250	G14931	245	680 x 680 x 530	1100 x 1780 x 1090	14	450
FI 1100-400	G14932	395	780 x 780 x 650	1200 x 1880 x 1240	21	590
FI 1100-740	G202103	740	840 x 1100 x 800	1300 x 1980 x 1410	30	950
FI 1100-1100	G14933	1110	1040 x 1150 x 930	1500 x 1980 x 1540	42	1310
FI 1100-1600	G14934	1610	1290 x 1200 x 1040	1750 x 1980 x 1650	52	1520

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INDUSTRIAL FURNACES 1250 °C
FI 1250

Electric chamber furnace for all applications.

Construction: Manually operated vertically-opening door, counterweighted for easy opening, avoids direct contact to the hot surface of the furnace.

Insulation: Multilayer insulation. Interior in ceramic and refractory bricks.

Heating: Electrical coil resistors. Resistors mounted on ceramic tubes and/or in grooves depending on the models. The heating is turned off at the opening of the door.

Electricity: 3 x 400 VAC.

Regulation: Axron Swiss temperature controller/programmer, 30 programs segments with delayed start time setting function.

Documentation: CE marking and operating instructions in English.

Delivered with: Removable ceramic sole.

Option: without counterweighted.

MODEL	ITEM CODE	Int. Vol. (L)	Int. Dim. (WxHxD) (mm)	Ext. Dim. (WxHxD) (mm)	Power (kW)	Weight (kg)
FI 1250-53	G201867	52.5	350 x 300 x 500	1295 x 1500 x 1480	12	345
FI 1250-63	G201873	63	350 x 300 x 600	1295 x 1500 x 1580	14	370
FI 1250-84	G14944	84	350 x 300 x 800	1295 x 1500 x 1780	21	400
FI 1250-120	G14560	120	500 x 400 x 600	1505 x 1600 x 1580	21	430
FI 1250-140	G14946	140	350 x 400 x 1000	1295 x 1600 x 1980	21	480
FI 1250-160	G14947	160	500 x 400 x 800	1505 x 1600 x 1780	24	530
FI 1250-200	G201817	200	500 x 400 x 1000	1505 x 1600 x 1980	30	570
FI 1250-280	G202050	280	700 x 500 x 800	1705 x 1700 x 1780	33	890
FI 1250-350	G14698	350	700 x 500 x 1000	1705 x 1700 x 1980	33	930
FI 1250-420	G14948	420	700 x 500 x 1200	1705 x 1700 x 2180	37	980
FI 1250-490	G14949	490	700 x 700 x 1000	1705 x 1900 x 1980	40	1050
FI 1250-640	G14868	640	800 x 800 x 1000	1805 x 2000 x 1980	52	1120

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Annexe B

Schémas électriques

Appendix B

Electric diagrams

Annexe B

Schaltplan

E1-G201894

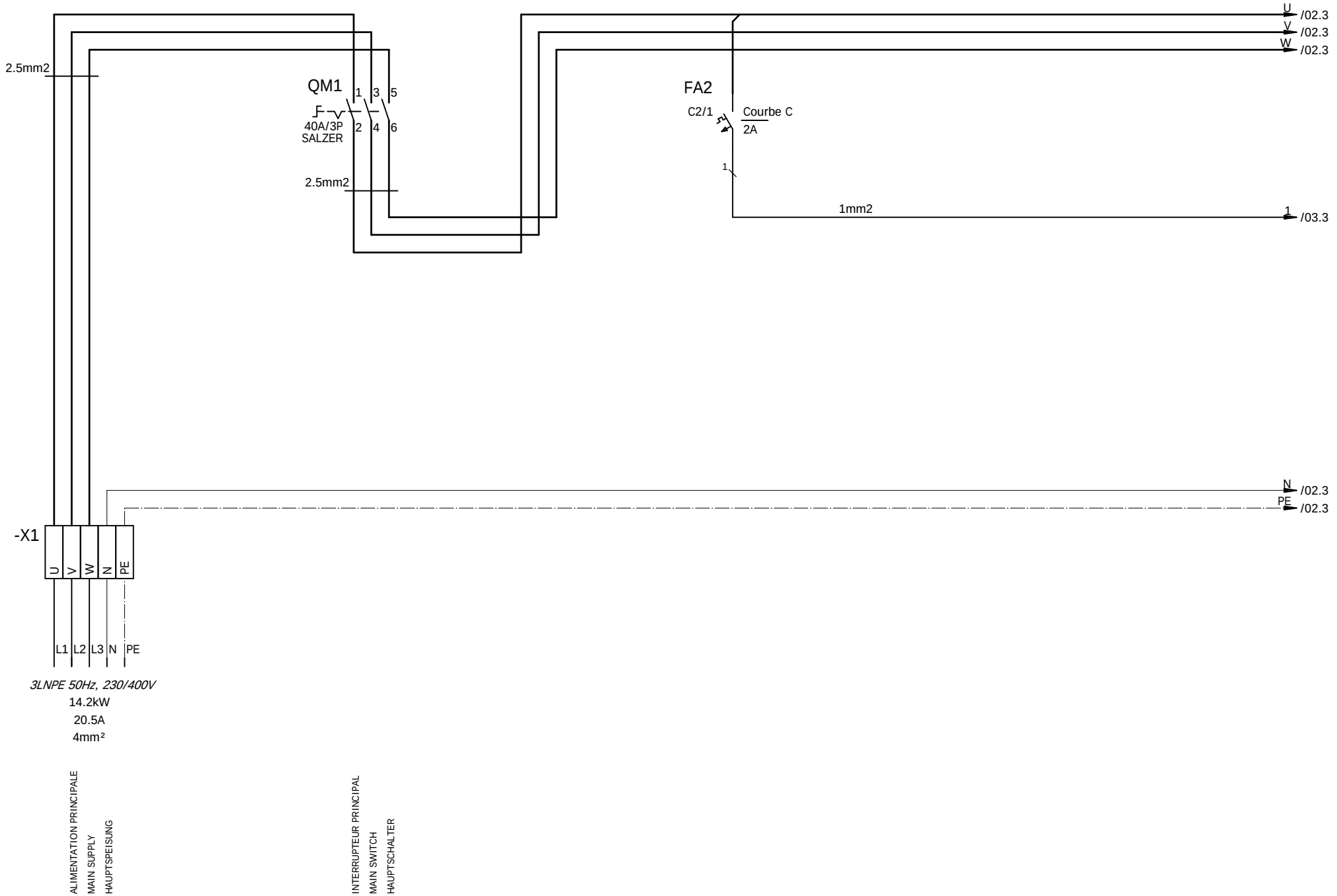
Fours industriels 550°C
Industrial furnaces 550°C
Industrielle Öfen 550°C

FI 550-500

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Solo Swiss SA, (CH)

Norme: IEC	Solo Swiss SA		Drawn Dessiné	17.08.2012	DRE		Printed : 19.10.2017 15:33:21	Page : Folio : 1	Previous page : Next page :
N° CDE:	CH 2900 PORRENTRUY		Checked Controlé				E1-G201894	Station :	Lieu :
Installation: FI 550-500			Modified Modifié						
550 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 550-500 / 00 Page de garde		



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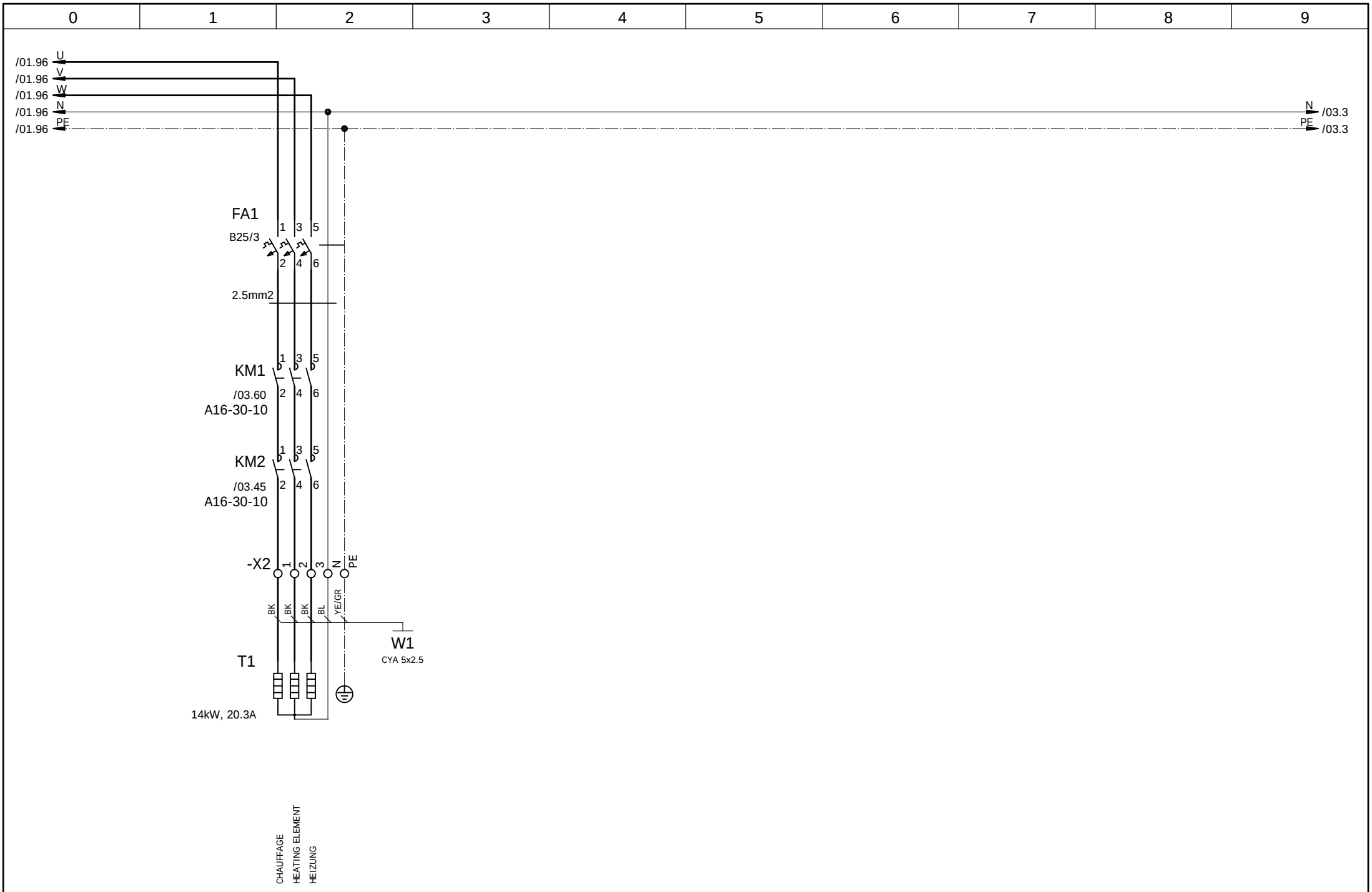
N° CDE:	CH 2900 PORRENTRUY		Checked Controlé			MAIN SUPPLY	E1-G201894	Station : Lieu :
Installation: FI 550-500			Modified Modifié			HAUPTSPEISUNG		
550 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 550-500 / 02 Schémas élect.	



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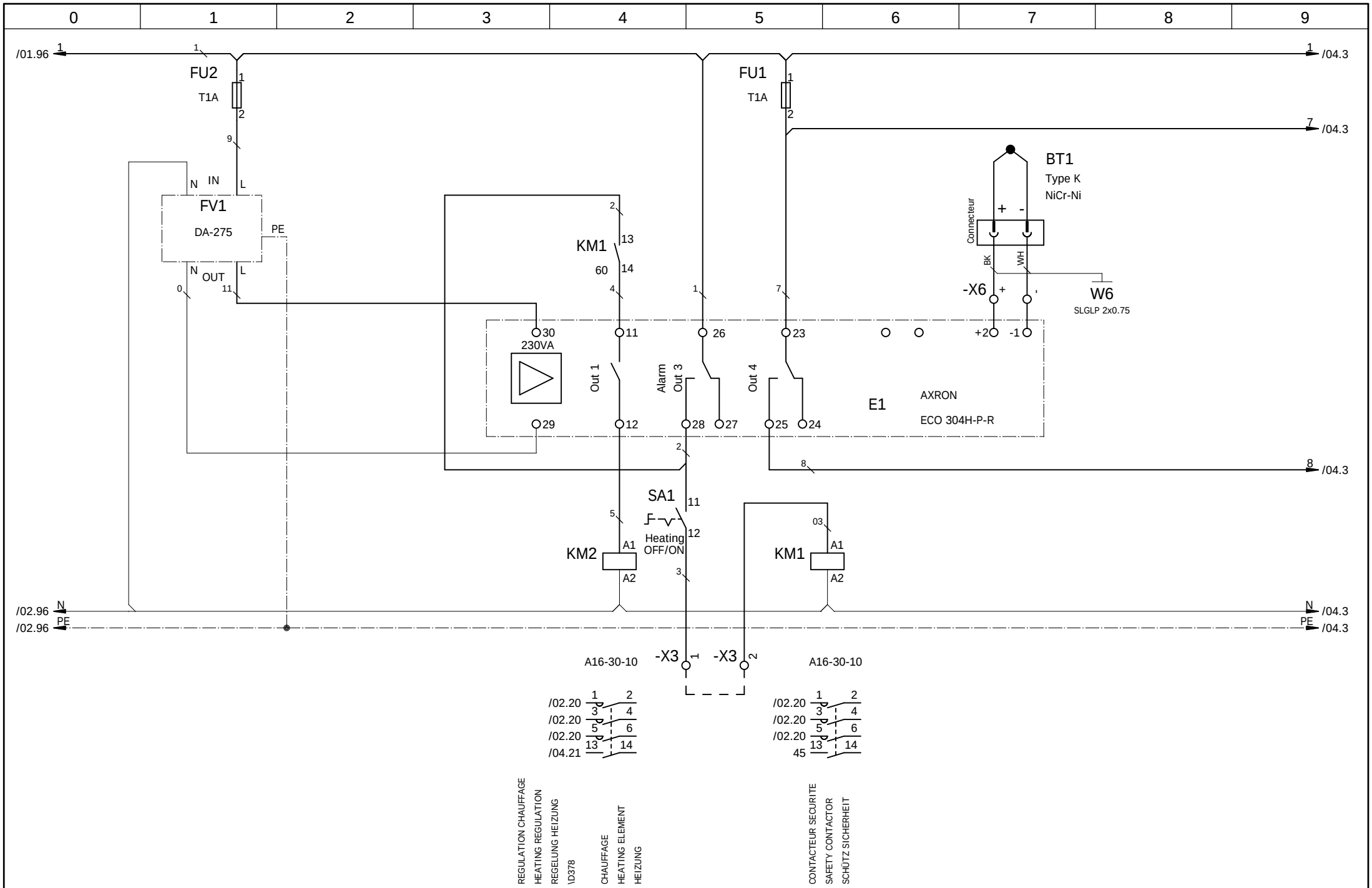
N° CDE:	CH 2900 PORRENTRUY		Checked Controlé			HEATING	E1-G201894	Station :	Lieu :
Installation: FI 550-500			Modified Modifié			HEIZUNG			
550 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 550-500 / 02 Schémas élect.		



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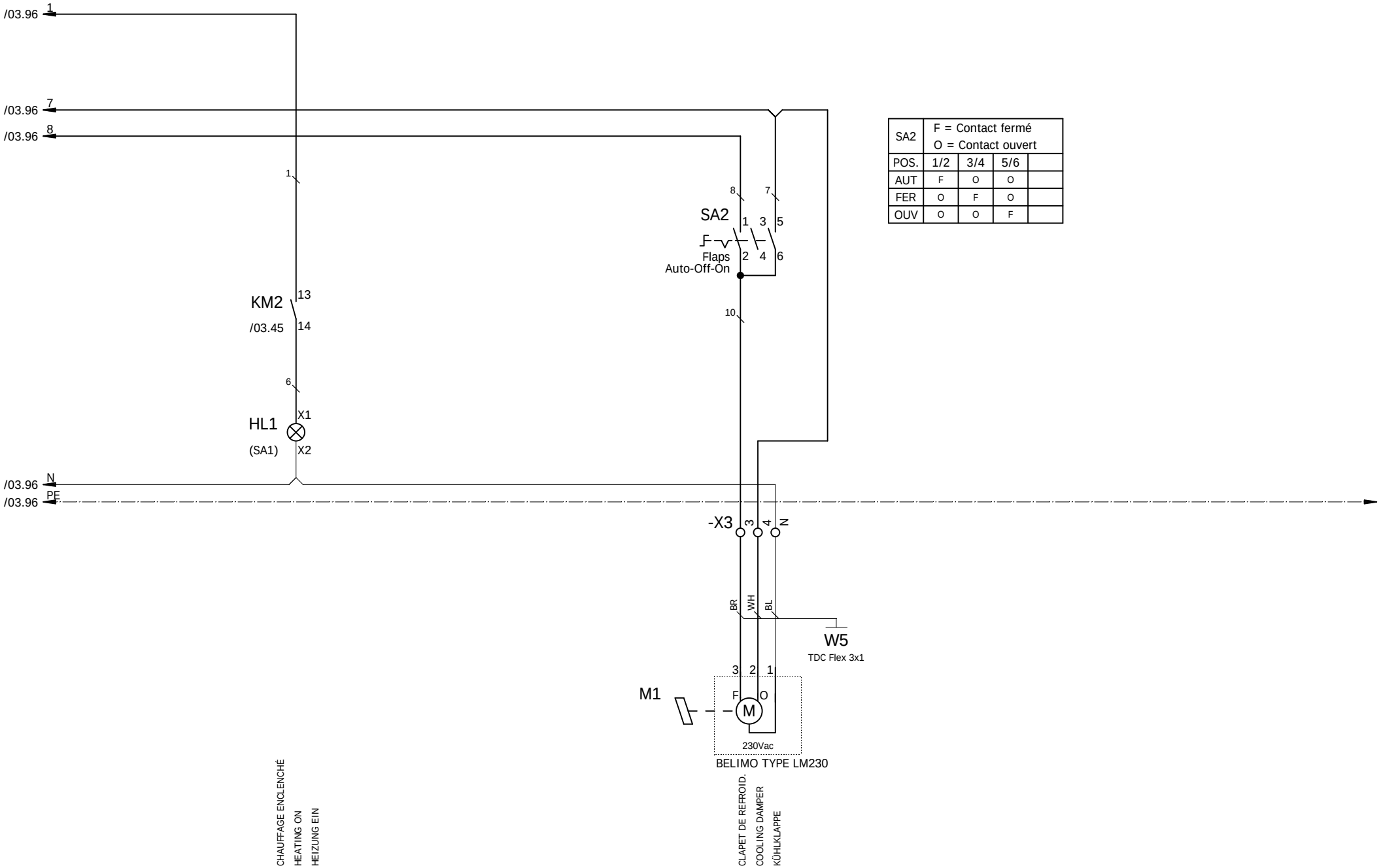
N° CDE:	CH 2900 PORRENTRUY		Checked Controlé			MAIN CONTROL	E1-G201894	Station :	Lieu :
Installation: FI 550-500			Modified Modifié			HAUPTSTEUERUNG			
550 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 550-500 / 02 Schémas élect.		



SA2	F = Contact fermé O = Contact ouvert			
POS.	1/2	3/4	5/6	
AUT	F	O	O	
FER	O	F	O	
OUV	O	O	F	

Norme: IEC	Solo Swiss SA CH 2900 PORRENTRUY		Drawn Dessiné	17.08.2012	DRE
N° CDE:			Checked Controlé		
Installation: FI 550-500			Modified Modifié		
550 C° 3x400VAC/50Hz 14.2kW			Seen Vu		

COMMANDE PRINCIPALE
MAIN CONTROL
HAUPTSTEUERUNG

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E1-G201894

Station : Lieu :

FI 550-500 / 02 Schémas élect.

E1-G201894

Fours industriels 550°C
Industrial furnaces 550°C
Industrielle Öfen 550°C

FI 600-180

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Solo Swiss SA, (CH)

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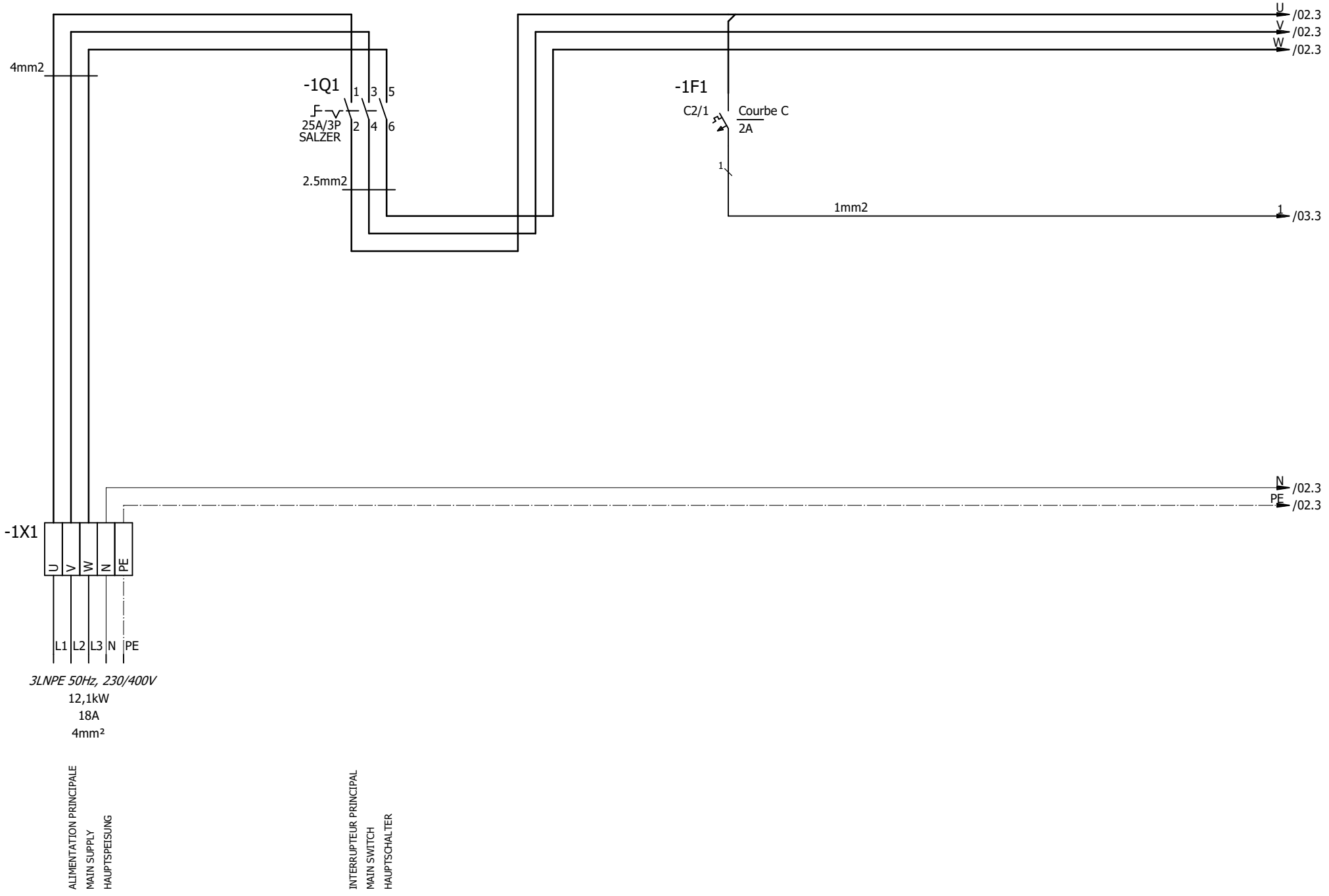
Installation: FI 600-180			Modified Modifié					
600 C° 3x400VAC/50Hz 14.2kW			Seen Vu			FI 600-180 / 00 Page de garde		



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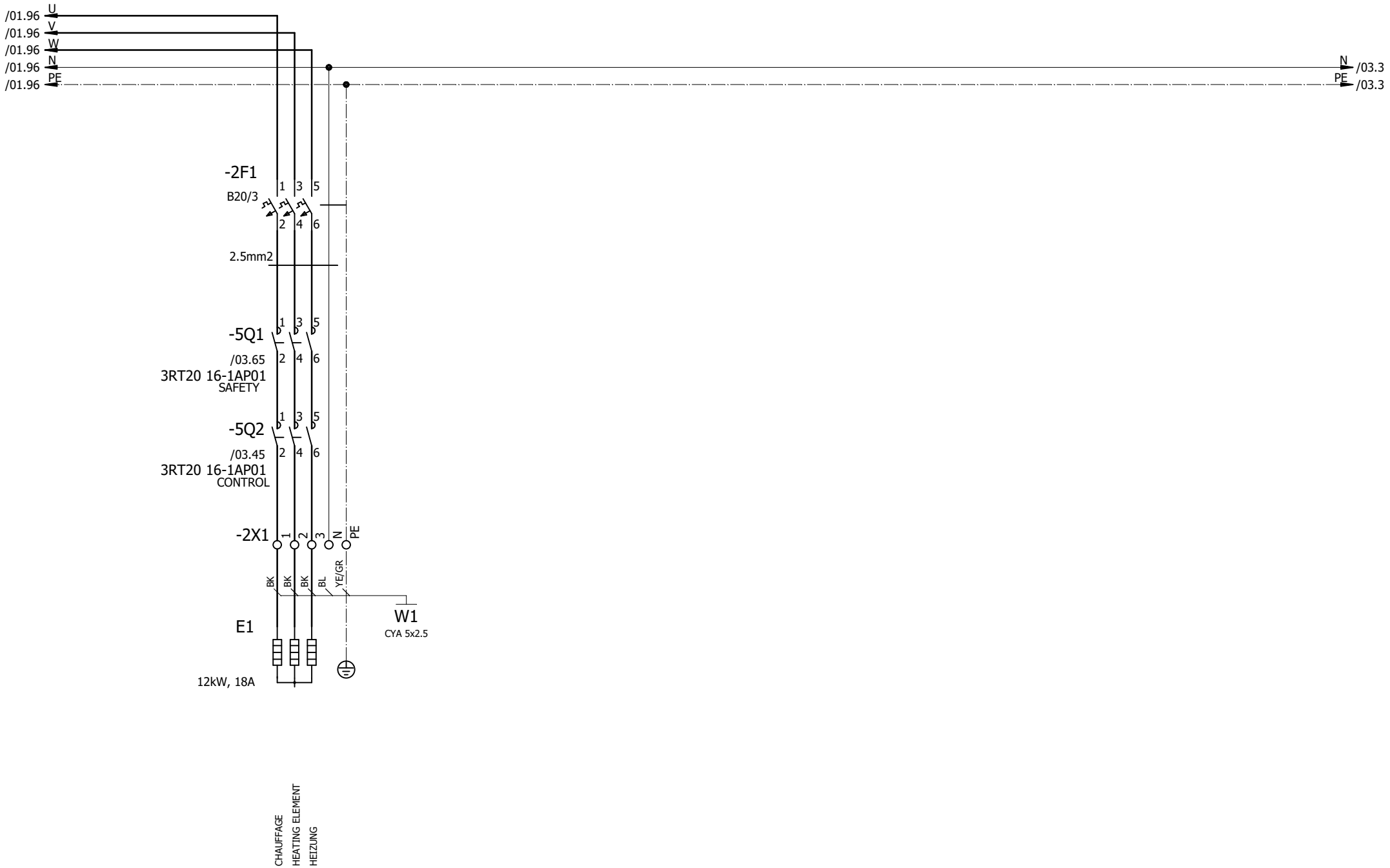
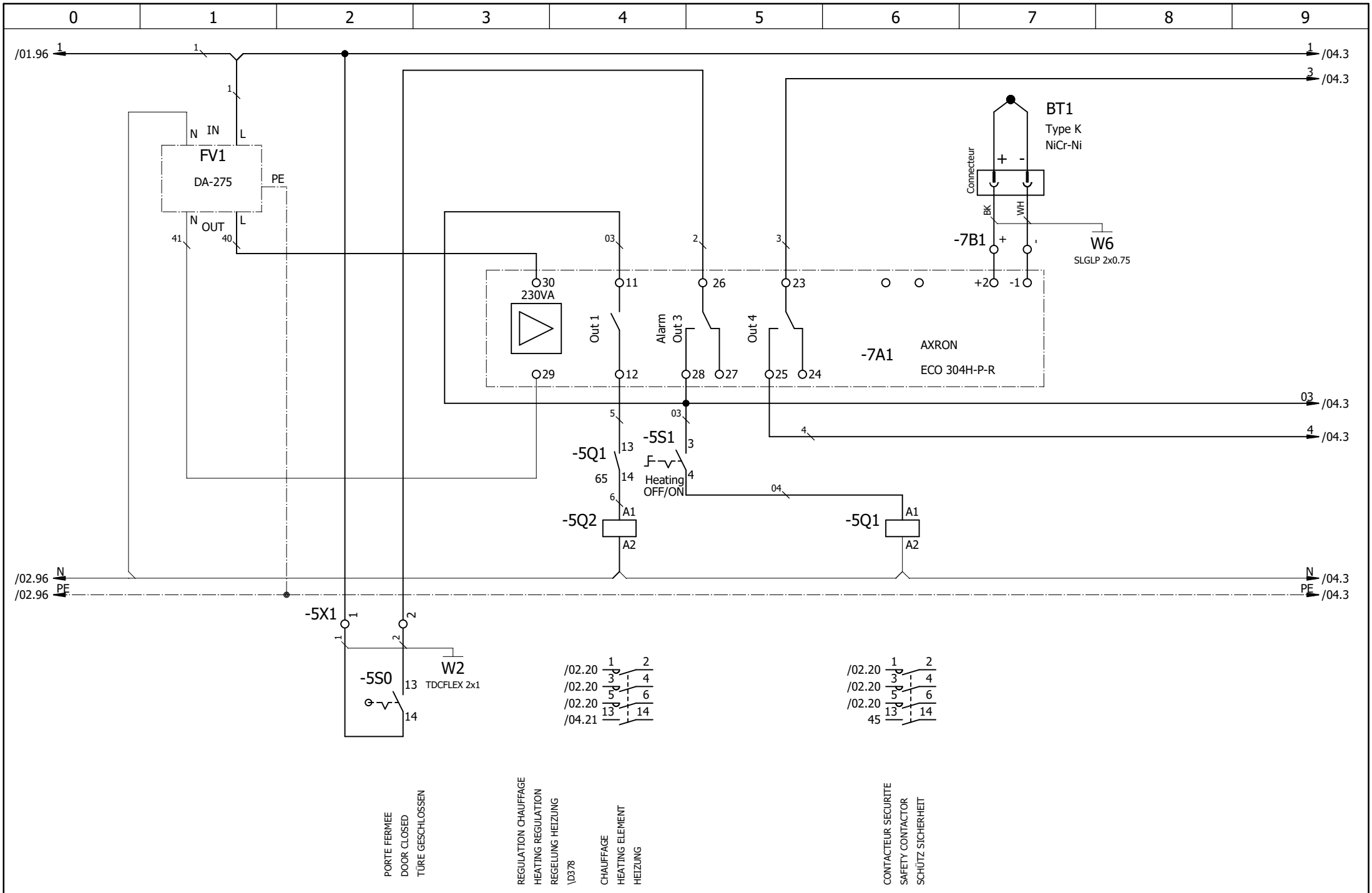
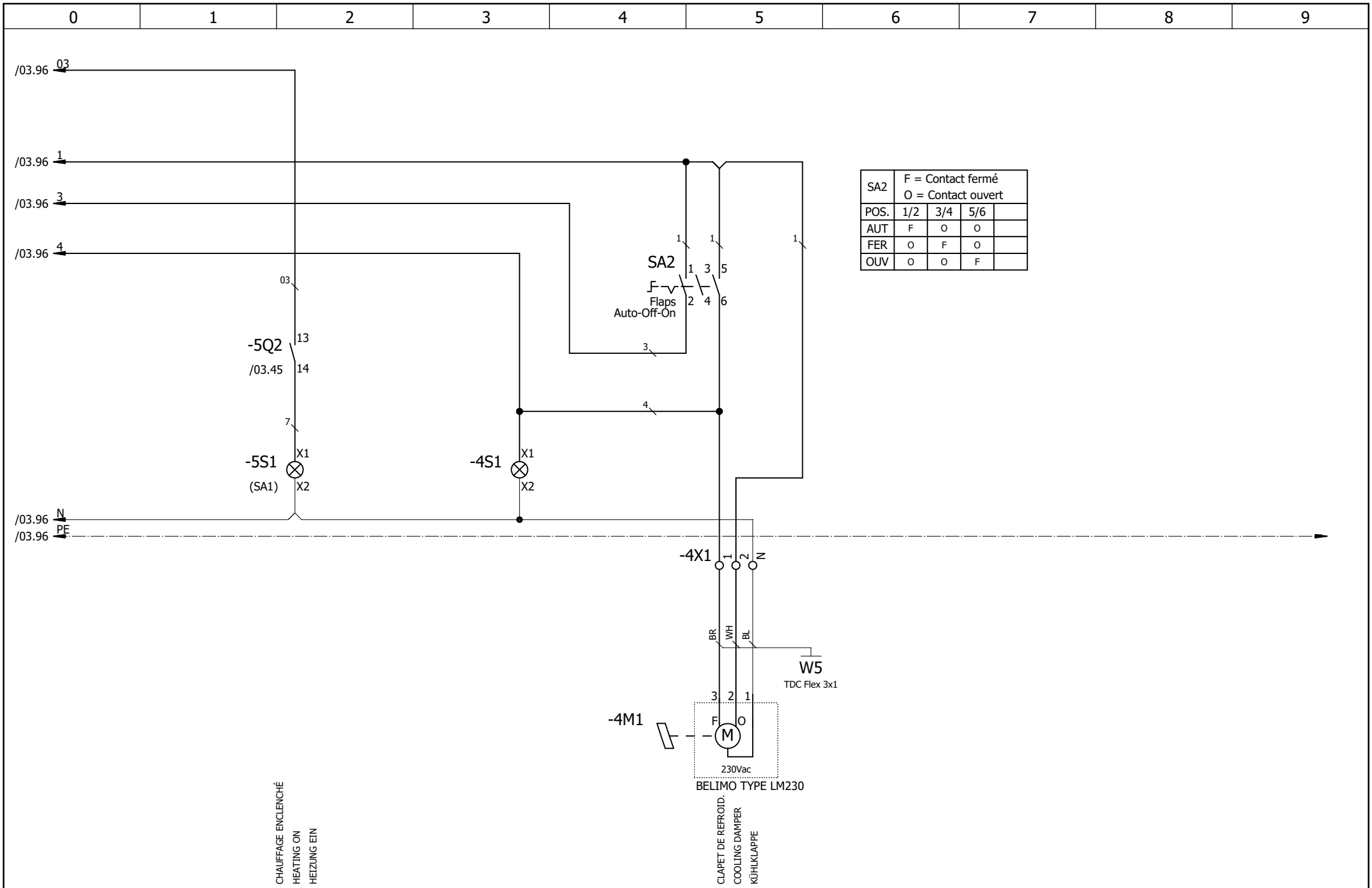
Installation: FI 600-180			Modified Modifié			HAUPTSPEISUNG			
600 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 600-180 / 02 Schémas élect.		



Norme: IEC	Solo Swiss SA		Drawn Dessiné	11.01.2023		CHAUFFAGE	Printed : 11.01.2023 8:34:55	Page : Folio : 02	Previous page : 01 Next page : 03
N° CDE:	CH 2900 PORRENTRUY		Checked Controlé			HEATING	E1-G201894	Station :	Lieu :
Installation: FI 600-180			Modified Modifié			HEIZUNG			
600 C° 3x400VAC/50Hz 14.2kW			Seen Vu				FI 600-180 / 02 Schémas élect.		



Norme: IEC	Solo Swiss SA		Drawn / Dessiné	11.01.2023		COMMANDE PRINCIPALE	Printed : 11.01.2023 8:34:55	Page / Folio : 03	Previous page : 02 / Next page : 04
N° CDE:	CH 2900 PORRENTRUY		Checked / Controlé			MAIN CONTROL	E1-G201894	Station :	Lieu :
Installation: FI 600-180			Modified / Modifié			HAUPTSTEUERUNG			
600 C° 3x400VAC/50Hz 14.2kW			Seen / Vu				FI 600-180 / 02 Schémas élect.		



SA2	F = Contact fermé O = Contact ouvert			
POS.	1/2	3/4	5/6	
AUT	F	O	O	
FER	O	F	O	
OUV	O	O	F	

Norme: IEC	Solo Swiss SA CH 2900 PORRENTRUY		Drawn Dessiné	11.01.2023	COMMANDE PRINCIPALE MAIN CONTROL HAUPTSTEUERUNG
N° CDE:			Checked Controlé		
Installation: FI 600-180			Modified Modifié		
600 C° 3x400VAC/50Hz 14.2kW			Seen Vu		

Printed : 11.01.2023 8:34:55 | Page : Folio : 04 | Previous page : 03 Next page :

E1-G201894 | Station : | Lieu :

FI 600-180 / 02 Schémas élect.

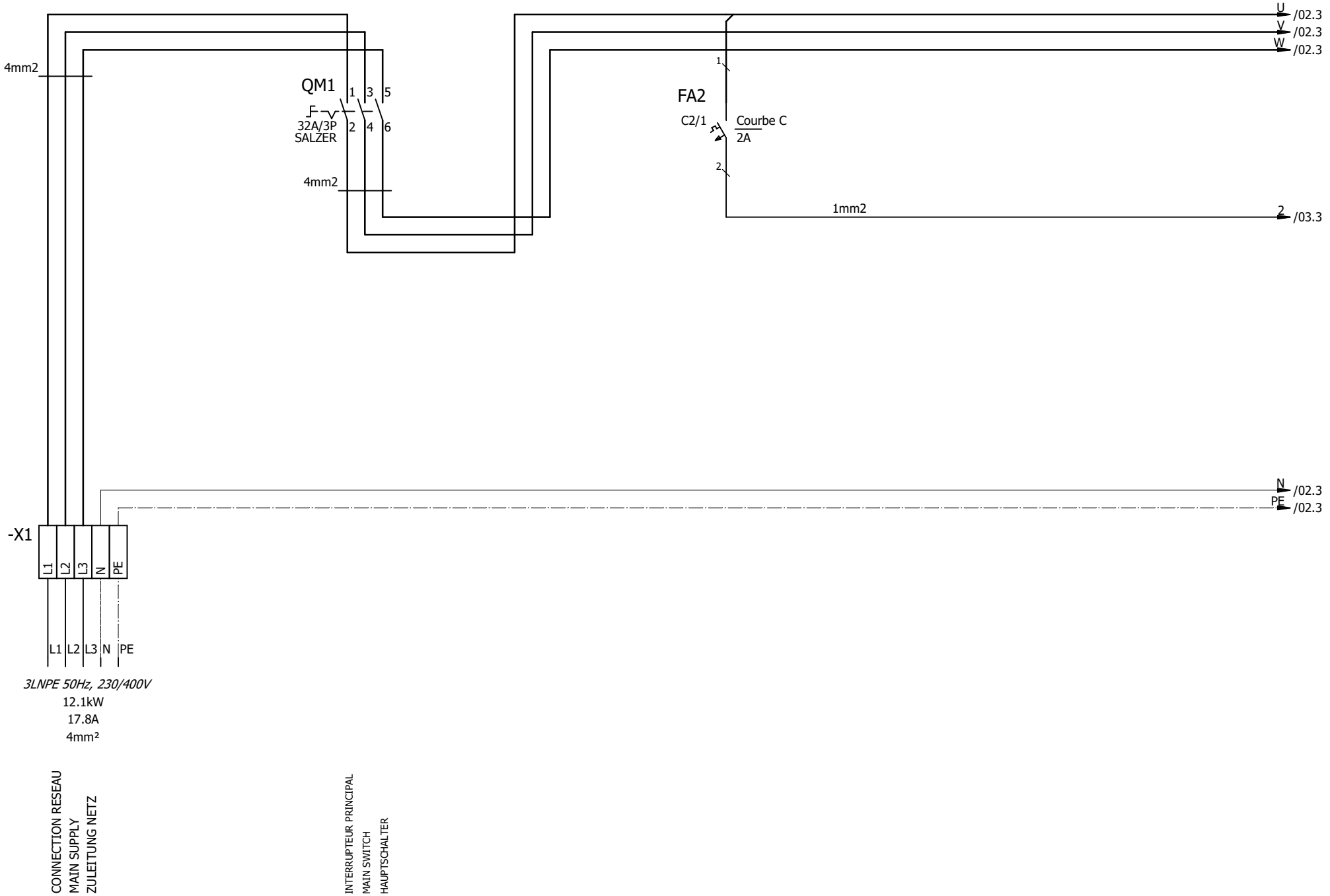
E1-G201863

Fours industriels 1100°C
Industrial furnaces 1100°C
Industrielle Öfen 1100°C

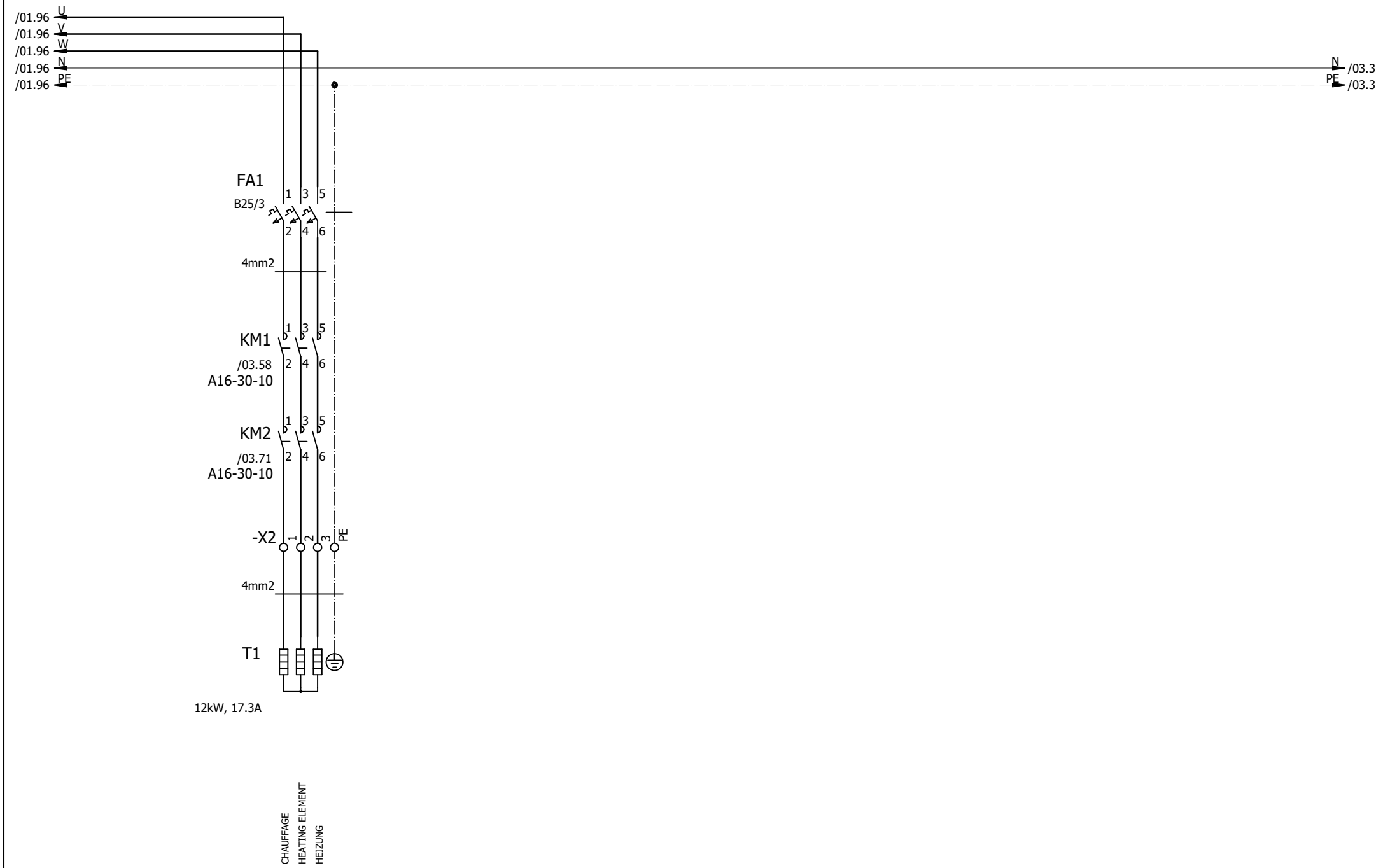
FI 1100-180

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

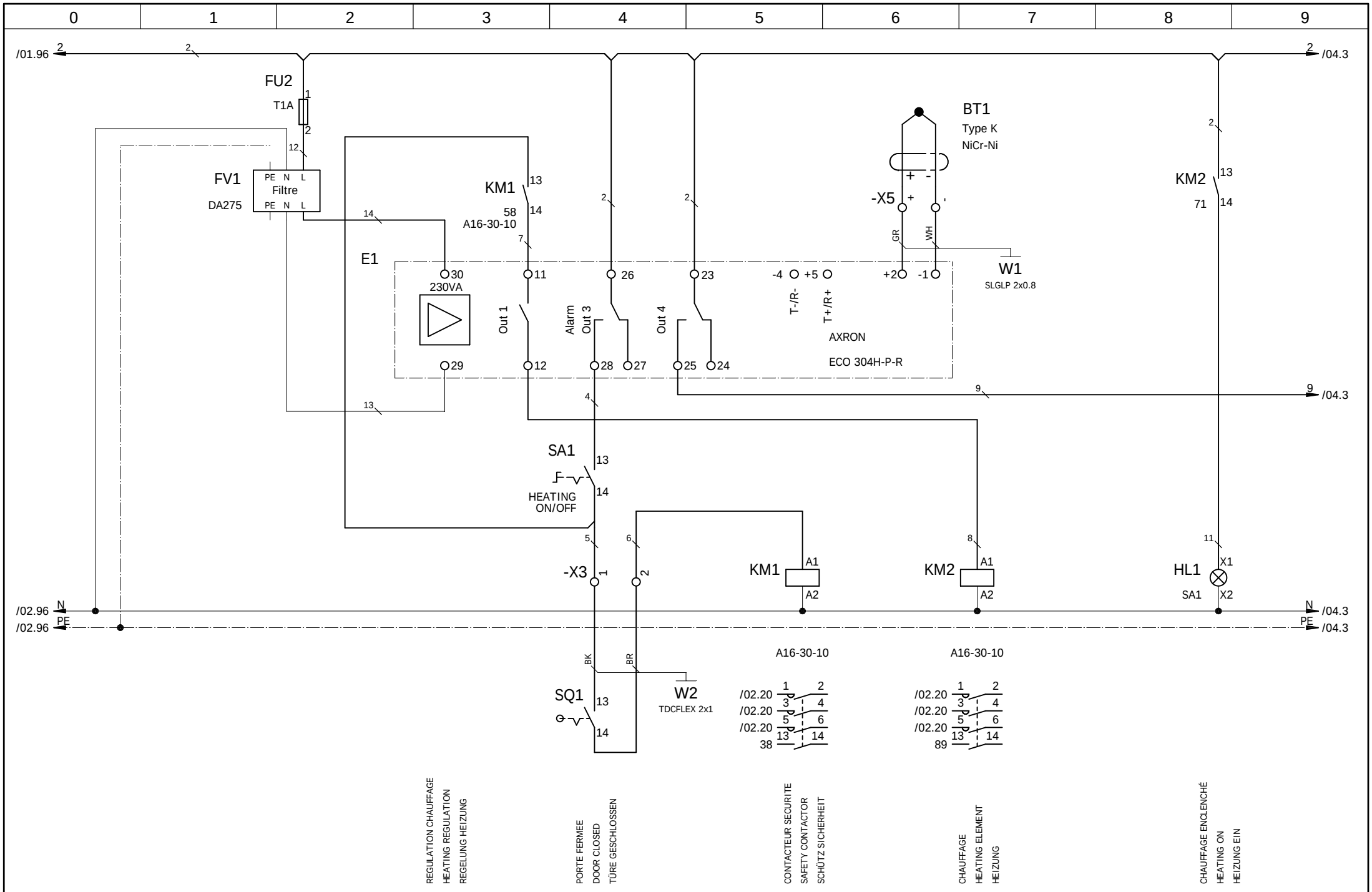
Norme: IEC	SOLO SWISS		Drawn Dessiné	31.03.17	BP		Printed : 31.03.2017 13:21:16	Page : Folio : 1	Previous page : Next page :
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé				E1-G201863	Station :	Lieu :
Installation: FI 1100-180			Modified Modifié						
1100 C° 3x400VAC/50Hz 12.1kW			Seen Vu				FI 1100-180 / 00 Page de garde		



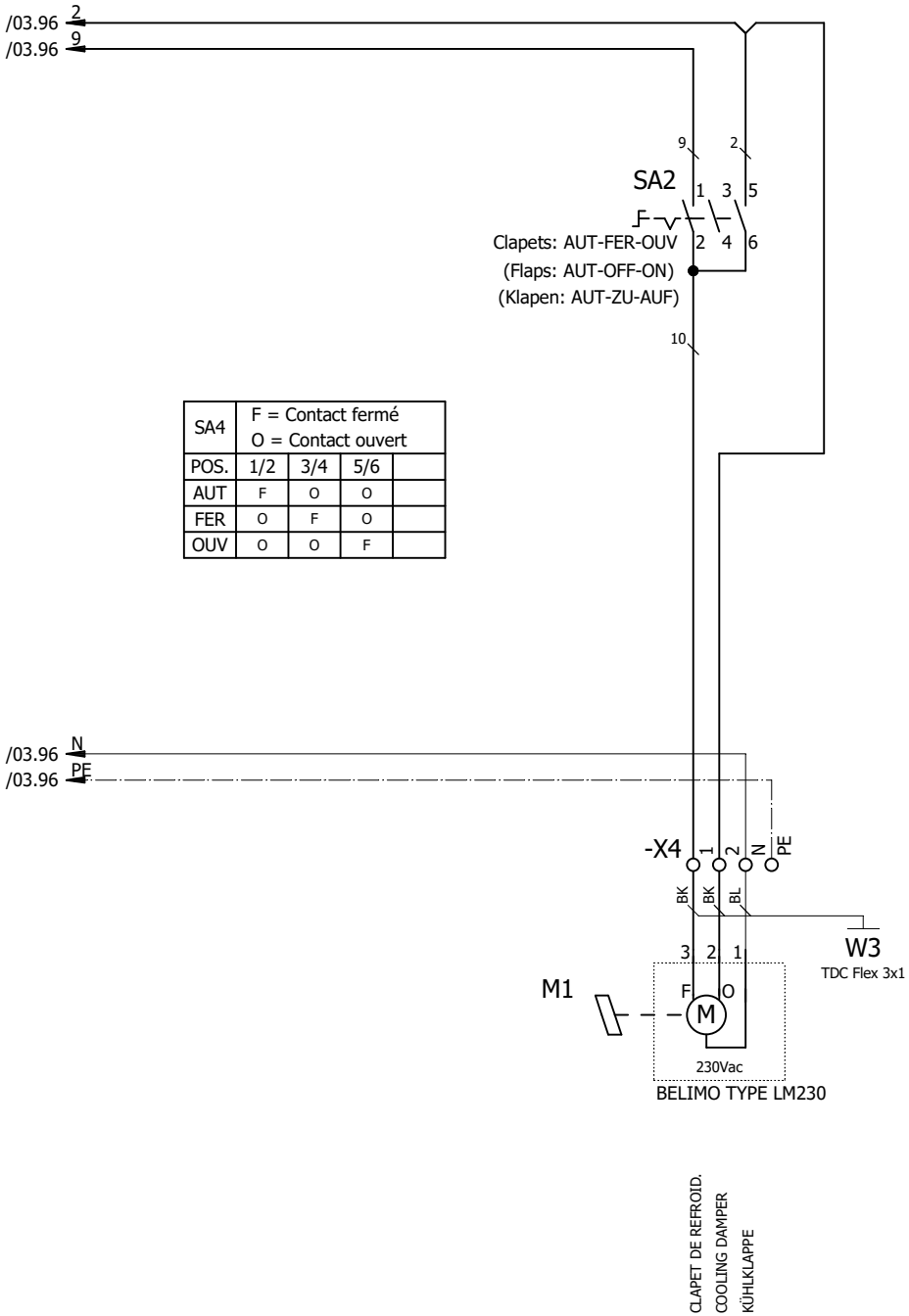
Norme: IEC	SOLO SWISS		Drawn Dessiné	31.03.17	BP	ALIMENTATION PRINCIPALE	Printed : 31.03.2017 13:21:39	Page : Folio : 01	Previous page : Next page : 02
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			MAIN SUPPLY	E1-G201863	Station :	Lieu :
Installation: FI 1100-180			Modified Modifié			HAUPTSPEISUNG			
1100 C° 3x400VAC/50Hz 12.1kW			Seen Vu				FI 1100-180 / 02 Schémas élect.		



Norme: IEC	SOLO SWISS		Drawn Dessiné	31.03.17	BP	CHAUFFAGE	Printed : 31.03.2017 13:21:40	Page : Folio : 02	Previous page : 01 Next page : 03
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			HEATING	E1-G201863	Station :	Lieu :
Installation: FI 1100-180			Modified Modifié			HEIZUNG			
1100 C° 3x400VAC/50Hz 12.1kW			Seen Vu				FI 1100-180 / 02 Schémas élect.		

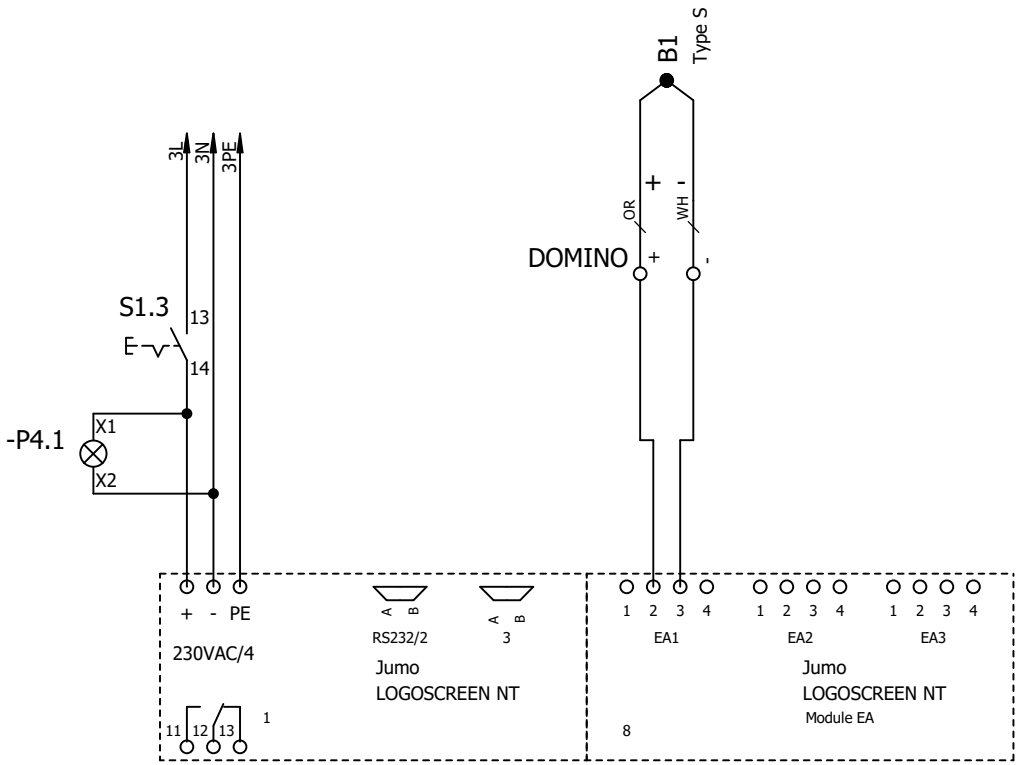


Norme: IEC	SOLO SWISS		Drawn Dessiné	31.03.17	BP	COMMANDE PRINCIPALE	Printed : 15.09.2017 11:29:59
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			MAIN CONTROL	Page : 03 / Folio : 03 — Previous page : 02 / Next page : 04
Installation: FI 1100-180			Modified Modifié			HAUPTSTEUERUNG	E1-G201863
1100 C° 3x400VAC/50Hz 12.1kW			Seen Vu				Station : Lieu :
							FI 1100-180 / 02 Schémas élect.



SA4	F = Contact fermé O = Contact ouvert			
POS.	1/2	3/4	5/6	
AUT	F	O	O	
FER	O	F	O	
OUV	O	O	F	

Norme: IEC N° CDE: Installation: FI 1100-180 1100 C° 3x400VAC/50Hz 12.1kW	SOLO SWISS CH-2900 PORRENTRUY		Drawn Dessiné	31.03.17	BP	COMMANDE PRINCIPALE MAIN CONTROL HAUPTSTEUERUNG	Printed : 31.03.2017 13:21:40 E1-G201863 FI 1100-180 / 02 Schémas élect.	Page : Folio : 04 Station : Lieu :	Previous page : 03 Next page : 05
			Checked Controlé						
			Modified Modifié						
			Seen Vu						



OPTION

ENCLENCHEMENT ENREGISTREUR
SWITCHING ON RECORDER
SCHREIBER EIN

ENREGISTREUR
RECORDER
SCHREIBER

Norme: IEC	SOLO SWISS		Drawn Dessiné	31.03.17	BP	ENREGISTREUR	Printed : 31.03.2017 13:21:41	Page : Folio : 05	Previous page : 04
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			RECORDER	E1-G201863	Station :	Lieu :
Installation: FI 1100-180			Modified Modifié			SCHREIBER			
1100 C° 3x400VAC/50Hz 12.1kW			Seen Vu				FI 1100-180 / 02 Schémas élect.		

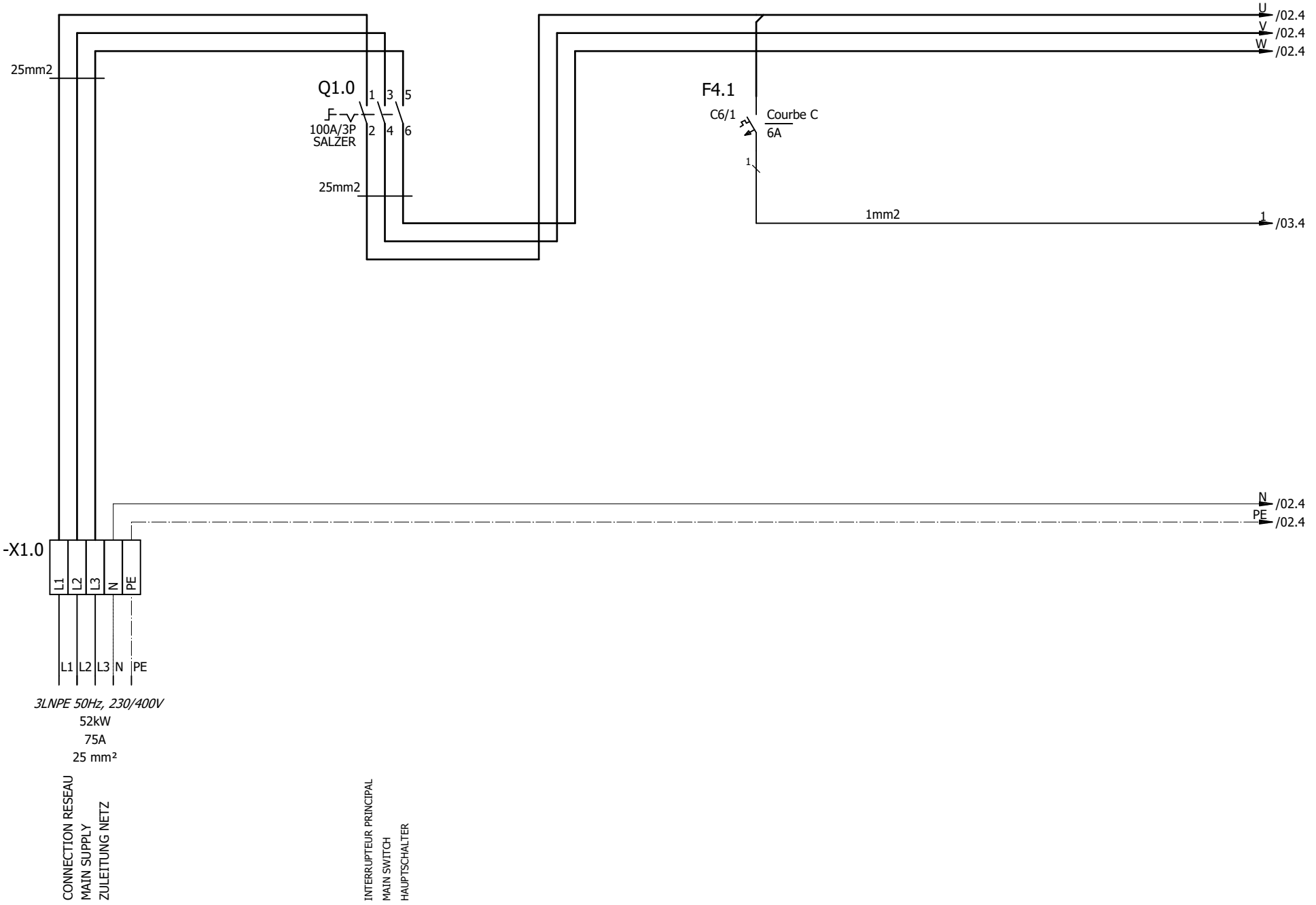
E1-G202103

Fours industriels 1100 °C
Industrial furnaces 1100 °C
Industrielle Öfen 1100 °C

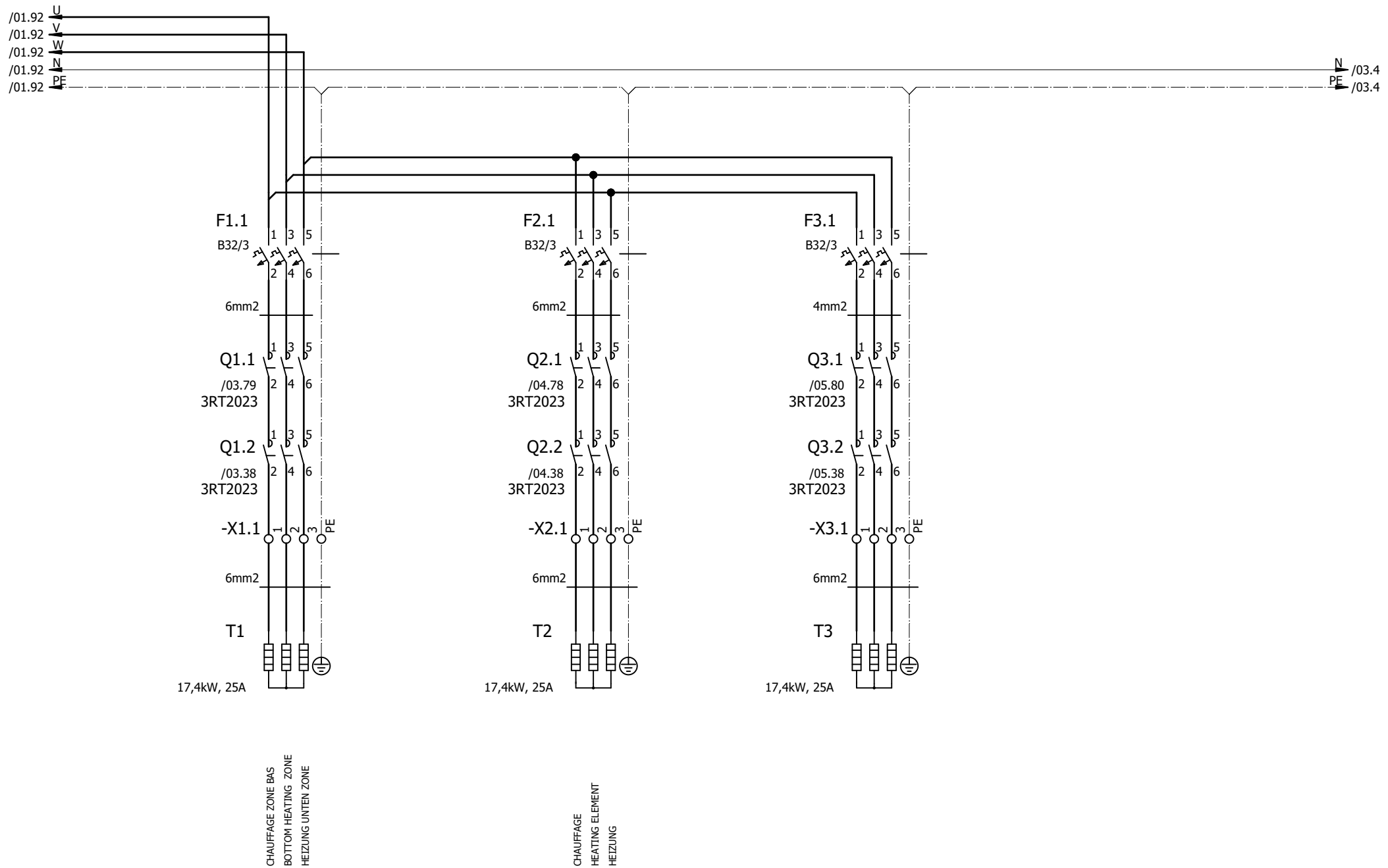
FI 1100-1600

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Norme: IEC	SOLO Swiss SA		Gezeichnet Dessiné	03.10.2017	B.P		Imprimé le :23.11.2017 9:14:01	Seite : Folio : 01	Page précédente : Page suivante :
N° CDE:	CH 2900 PORRENTRUY		Geprueft Controle				E1-G14934	Station :	Lieu :
Installation: FI 1100-1600			Aenderung Modifié						
1100 C° 3x400VAC/50Hz 52kW			Gesehen Vu				FI 1100-1600 / 00 Page de garde		



Norme: IEC	SOLO Swiss SA		Drawn Dessiné	03.10.2017	B.P	ALIMENTATION PRINCIPALE	Printed : 23.11.2017 9:14:19	Page : Folio : 01	Previous page : Page suivante : 02
N° CDE:	CH 2900 PORRENTRUY		Checked Controle			MAIN SUPPLY	E1-G14934	Station :	Lieu :
Installation: FI 1100-1600			Modified Modifié			HAUPTSPEISUNG			
1100 C° 3x400VAC/50Hz 52kW			Seen Vu				FI 1100-1600 / 01 Schémas élect.		



Norme: IEC	SOLO Swiss SA	Drawn Dessiné	03.10.2017	B.P	CHAUFFAGE HEATING HEIZUNG
N° CDE:	CH 2900 PORRENTRUY	Checked Controle			
Installation: FI 1100-1600		Modified Modifié			
1100 C° 3x400VAC/50Hz 52kW		Seen Vu			

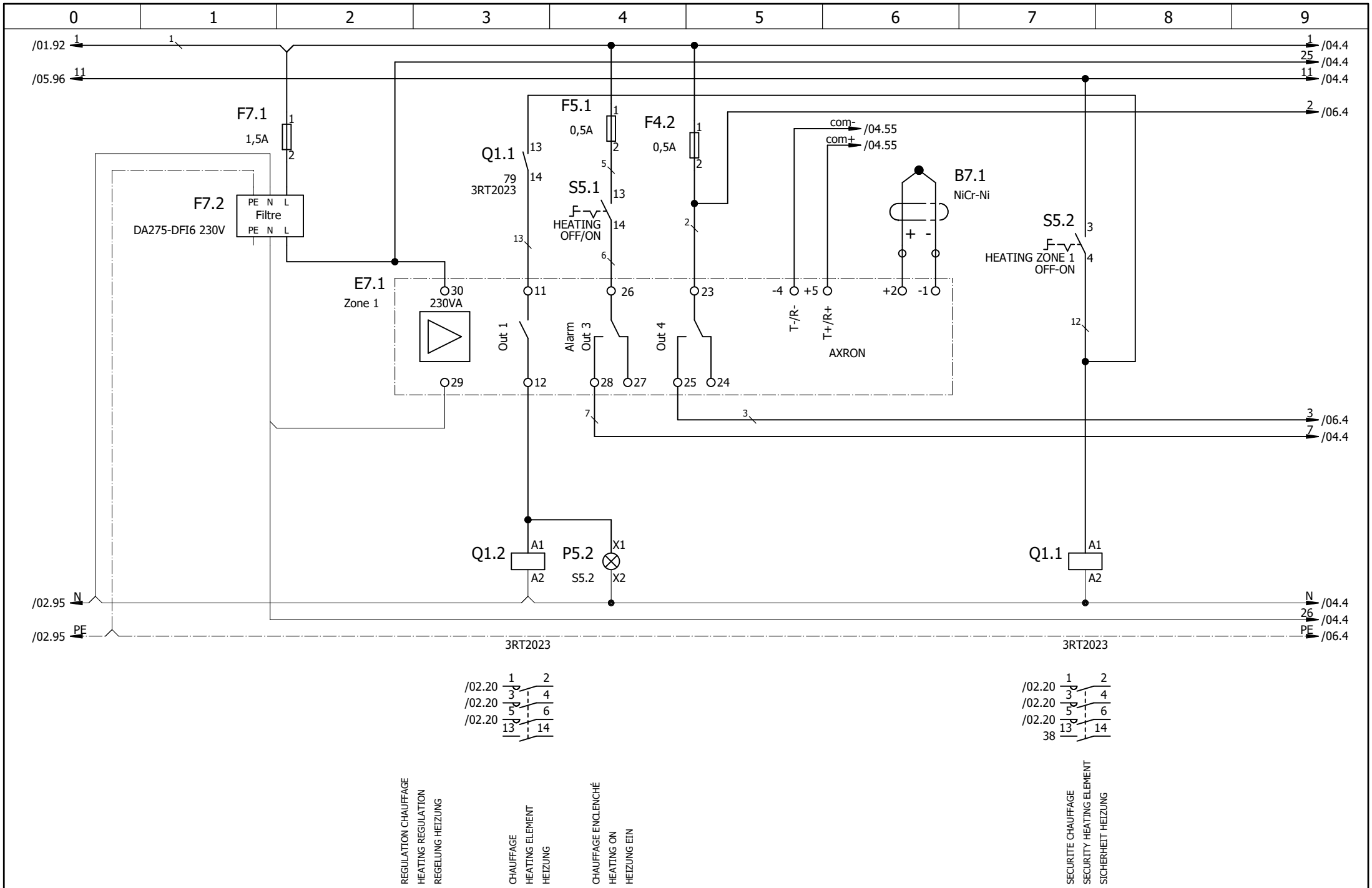
Printed : 23.11.2017 9:14:20

Page : Folio : 02 | Previous page : 01 | Page suivante : 03

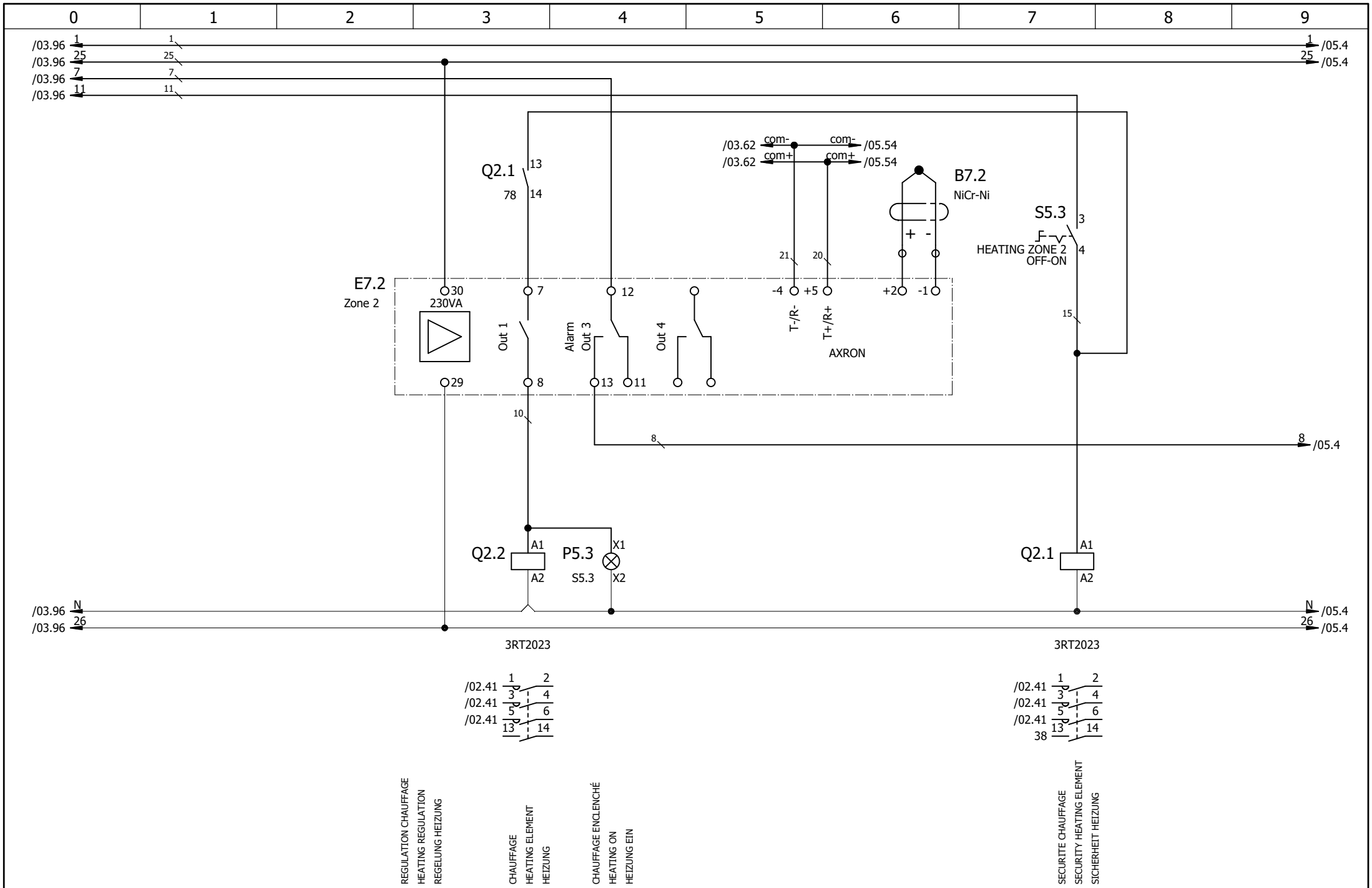
E1-G14934

Station : Place :

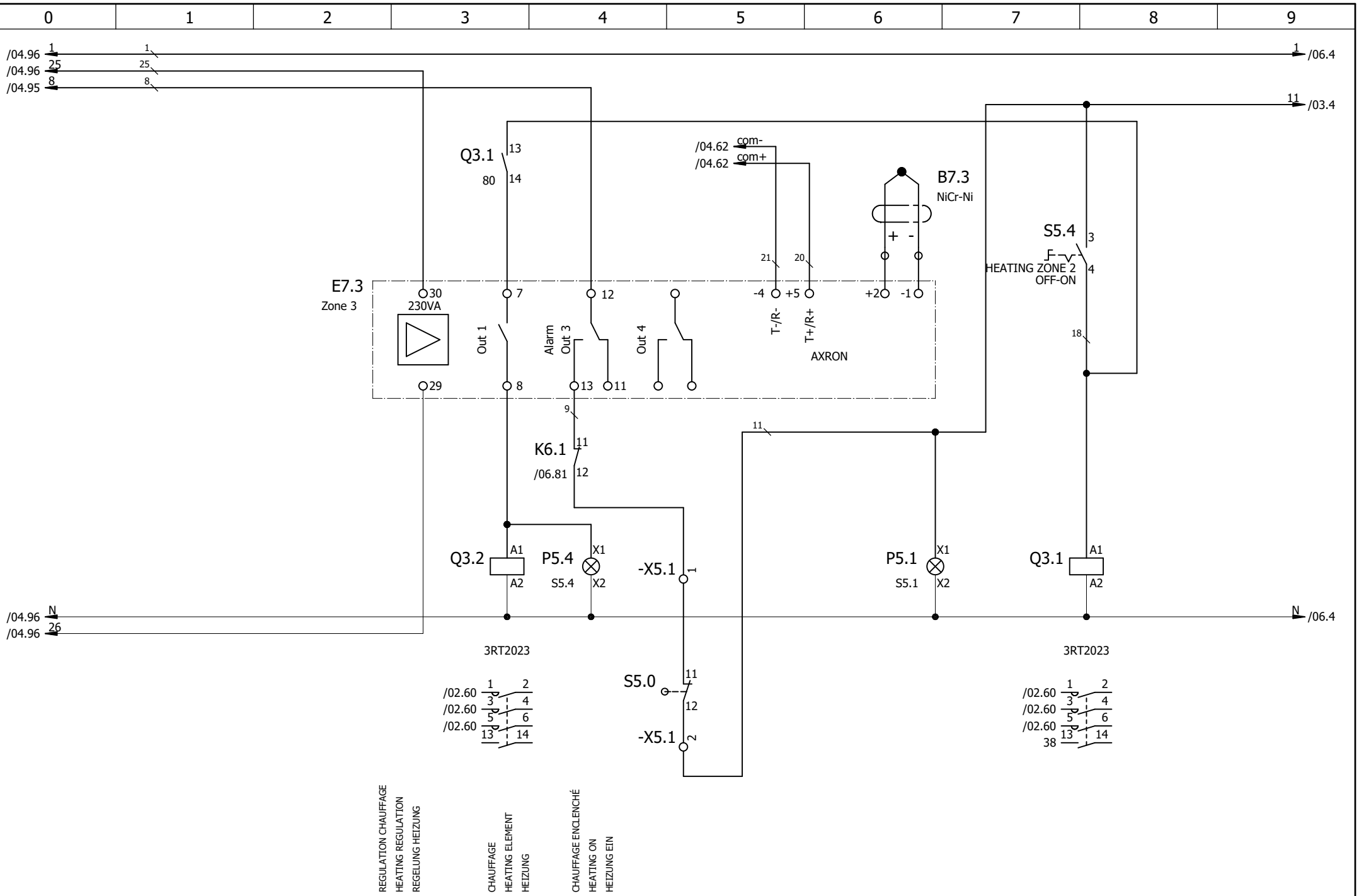
FI 1100-1600 / 01 Schémas élect.



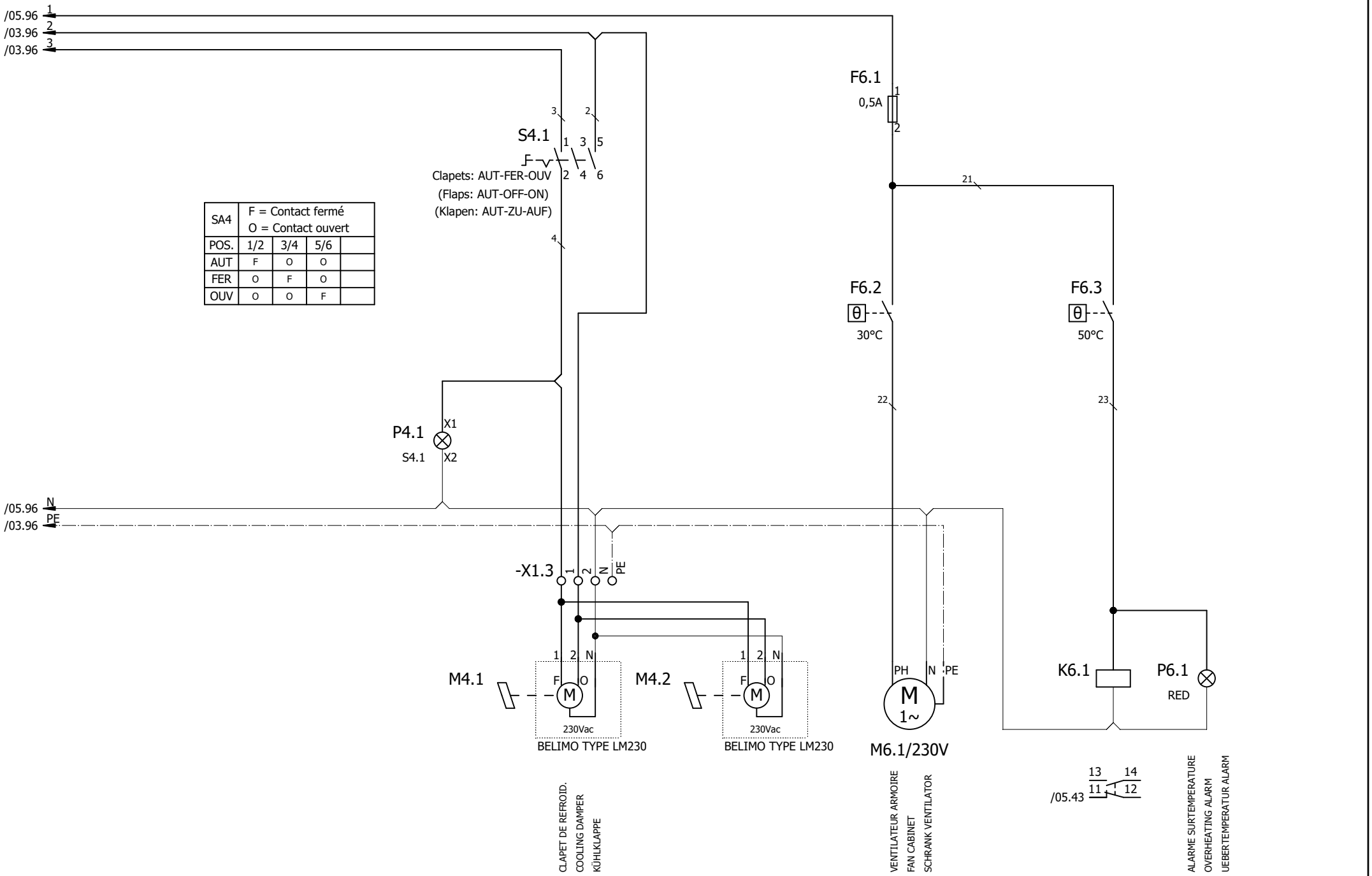
Norme: IEC	SOLO Swiss SA CH 2900 PORRENTRUY		Drawn Dessiné	03.10.2017	B.P	Printed : 23.11.2017 9:14:20	Page : Folio : 03 — Previous page : 02 Page suivante : 04
N° CDE:			Checked Controle			E1-G14934	Station : Place :
Installation: FI 1100-1600			Modified Modifié				
1100 C° 3x400VAC/50Hz 52kW			Seen Vu			FI 1100-1600 / 01 Schémas élect.	



Norme: IEC	SOLO Swiss SA	Drawn Dessiné	03.10.2017	B.P	Printed : 23.11.2017 9:14:21
N° CDE:	CH 2900 PORRENTRUY	Checked Controle			Page : Folio : 04
Installation: FI 1100-1600		Modified Modifié			Previous page : 03 Page suivante : 05
1100 C° 3x400VAC/50Hz 52kW		Seen Vu			Station : Place :
					E1-G14934
					FI 1100-1600 / 01 Schémas élect.



Norme: IEC	SOLO Swiss SA	Drawn Dessiné	03.10.2017	B.P	Printed : 23.11.2017 9:14:21
N° CDE:	CH 2900 PORRENTRUY	Checked Controle			Page : Folio : 05 — Previous page : 04 — Page suivante : 06
Installation: FI 1100-1600		Modified Modifié			E1-G14934 — Station : — Place :
1100 C° 3x400VAC/50Hz 52kW		Seen Vu			FI 1100-1600 / 01 Schémas élect.



Norme: IEC	SOLO Swiss SA CH 2900 PORRENTRUY	Drawn Dessiné	03.10.2017	B.P	Printed : 23.11.2017 9:14:21
N° CDE:		Checked Controle			Page : Folio : 06 — Previous page : 05 Page suivante :
Installation: FI 1100-1600		Modified Modifié			E1-G14934 — Station : Place :
1100 C° 3x400VAC/50Hz 52kW		Seen Vu			FI 1100-1600 / 01 Schémas élect.

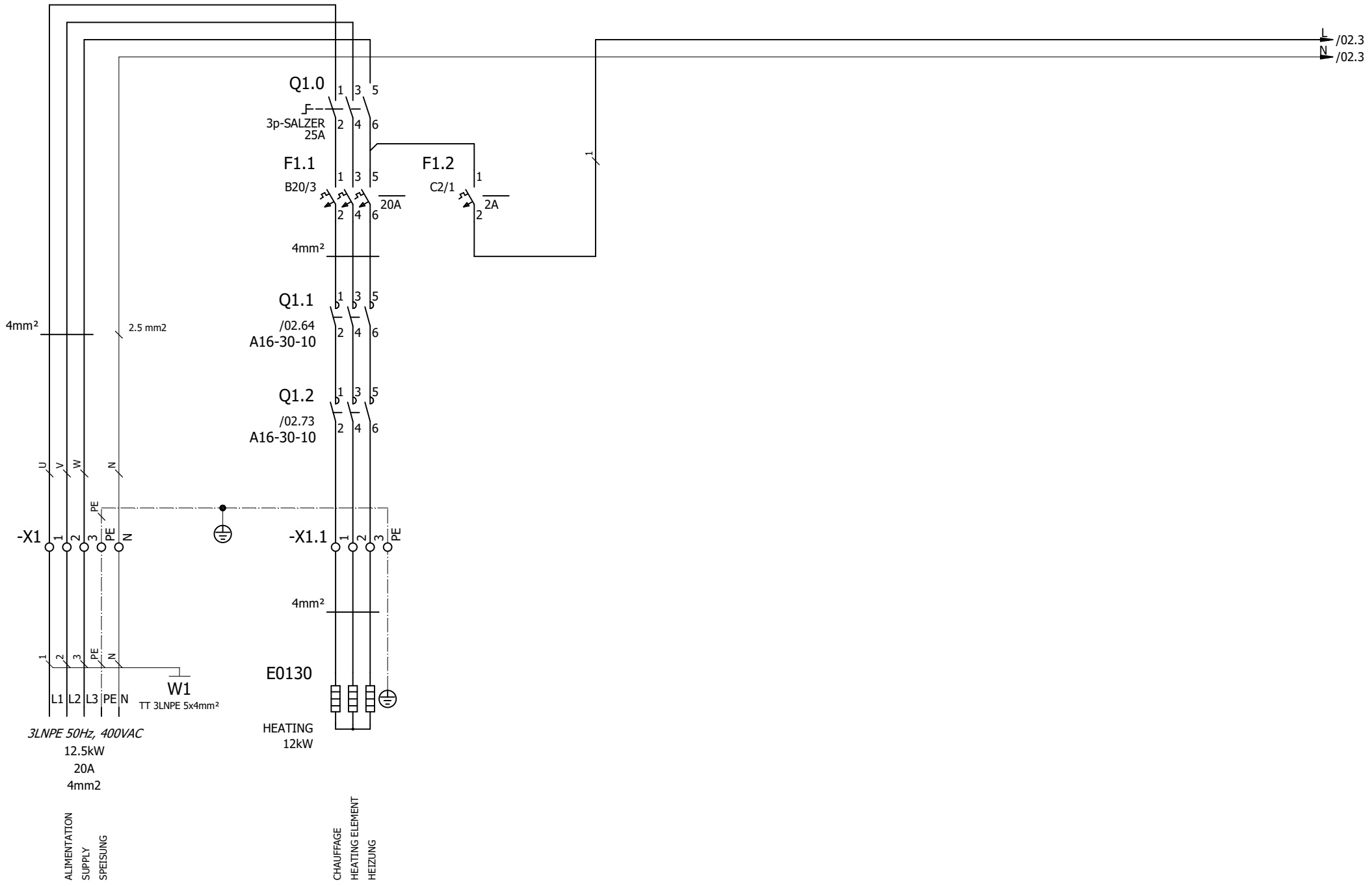
E1-G201867-1

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

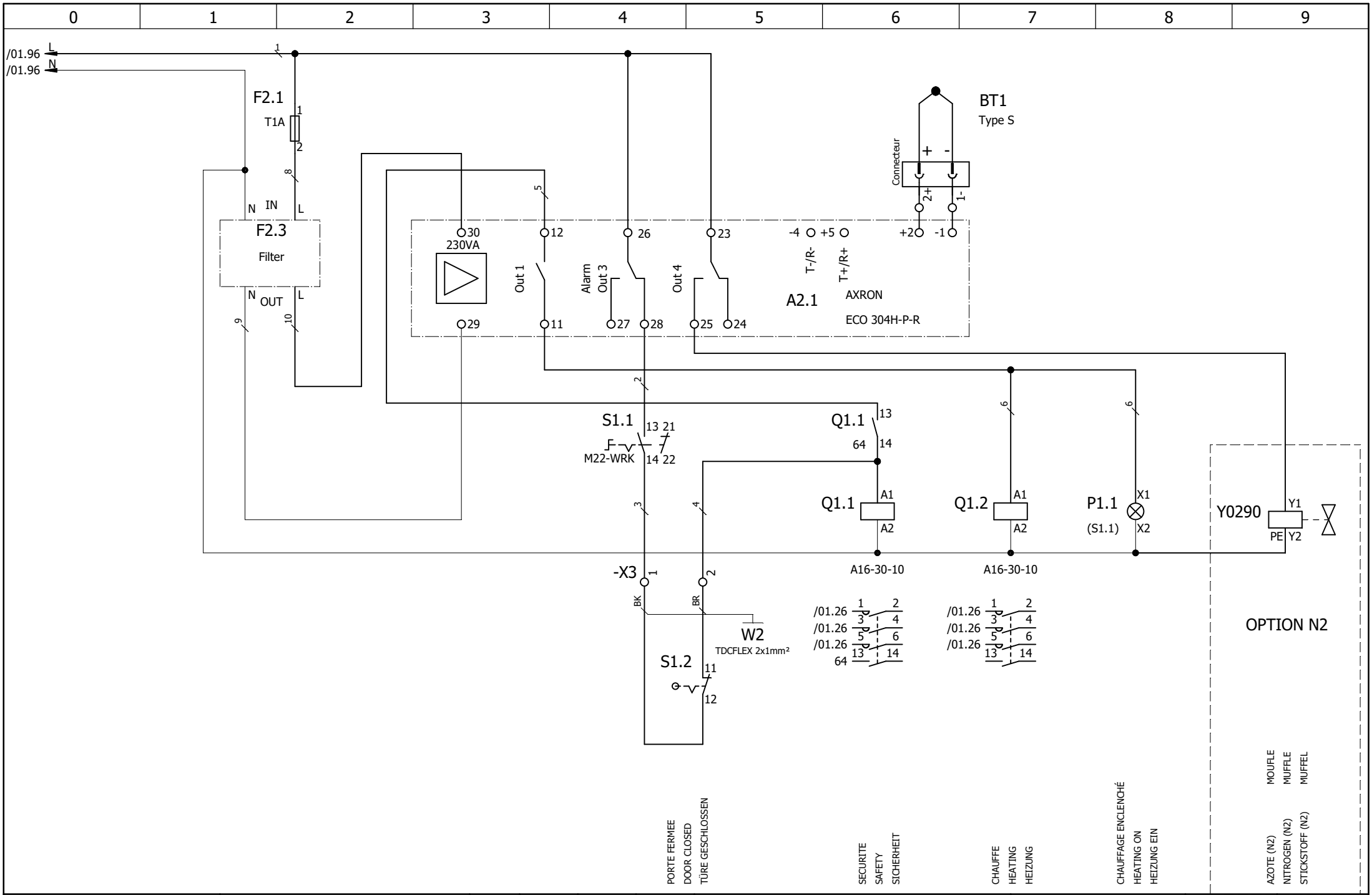
FI 1250-53

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

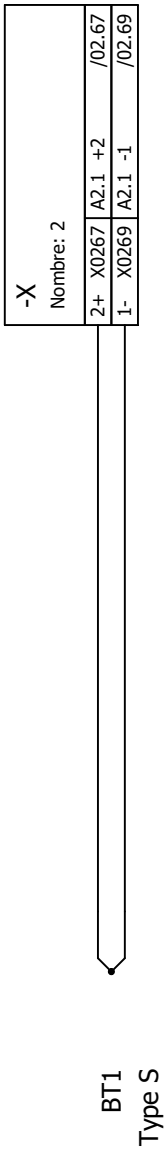
Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:09	Page : Folio : 1	Previous page : Next page :
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :	Lieu :
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA			
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu			FI 1250-53 / 00 Page de garde		



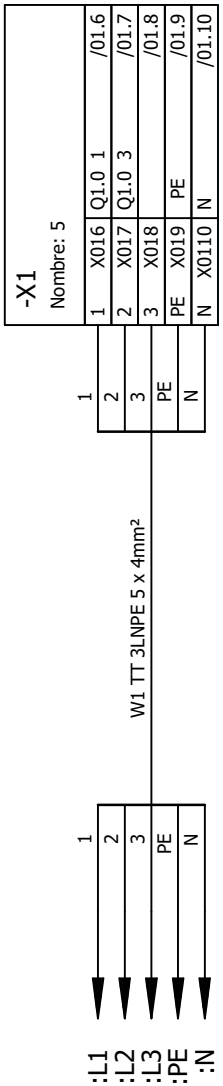
Norme: IEC	SOLO SWISS		Drawn / Dessiné	12.07.2012	DRE	ALIMENTATION PRINCIPALE	Printed : 05.10.2018 13:23:23	Page : / Folio : 01	Previous page : / Next page : 02
N° CDE:	CH-2900 PORRENTRUY		Checked / Controlé			MAIN SUPPLY	E1-G201867-1	Station :	Lieu :
Installation: FI 1250-53			Modified / Modifié	18.03.2015	THA	HAUPTSPEISUNG			
1250 C° 3x400VAC/50Hz 12.5kW			Seen / Vu				FI 1250-53 / 02 Schémas élect.		



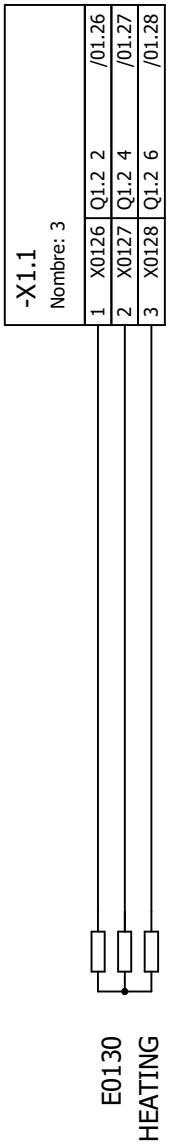
Norme: IEC	SOLO SWISS		Drawn / Dessiné	12.07.2012	DRE	REGULATION CHAUFFAGE	Printed : 18.05.2020 14:10:45
N° CDE:	CH-2900 PORRENTRUY		Checked / Controlé			HEATING REGULATION	Page / Folio : 02
Installation: FI 1250-53			Modified / Modifié	18.03.2015	THA	HEIZUNG REGELUNG	Previous page : 01 / Next page :
1250 C° 3x400VAC/50Hz 12.5kW			Seen / Vu			E1-G201867-1	Station : Lieu :
						FI 1250-53 / 02 Schémas élect.	



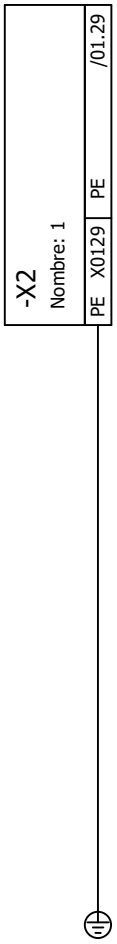
Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:37	Page : Folio : 01	Previous page : Next page : 02
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :=	Lieu :+
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA			
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu			FI 1250-53 / 18 Plan de racc.		



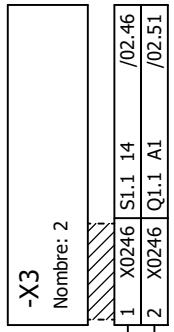
Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:38	Page : Folio : 02	Previous page : 01 Next page : 03
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :=	Lieu :+
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA			
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu			FI 1250-53 / 18 Plan de racc.		



Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:38	Page : Folio : 03	Previous page : 02 Next page : 04
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :=	Lieu :+
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA			
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu			FI 1250-53 / 18 Plan de racc.		



Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:40	Page : Folio : 04	Previous page : 03 Next page : 05
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :=	Lieu :+
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA	FI 1250-53 / 18 Plan de racc.		
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu					



S1.2

Norme: IEC	SOLO SWISS		Drawn Dessiné	12.07.2012	DRE	Printed : 05.10.2018 13:23:40	Page : Folio : 05	Previous page : 04 Next page :
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			E1-G201867-1	Station :=	Lieu :+
Installation: FI 1250-53			Modified Modifié	18.03.2015	THA	FI 1250-53 / 18 Plan de racc.		
1250 C° 3x400VAC/50Hz 12.5kW			Seen Vu					

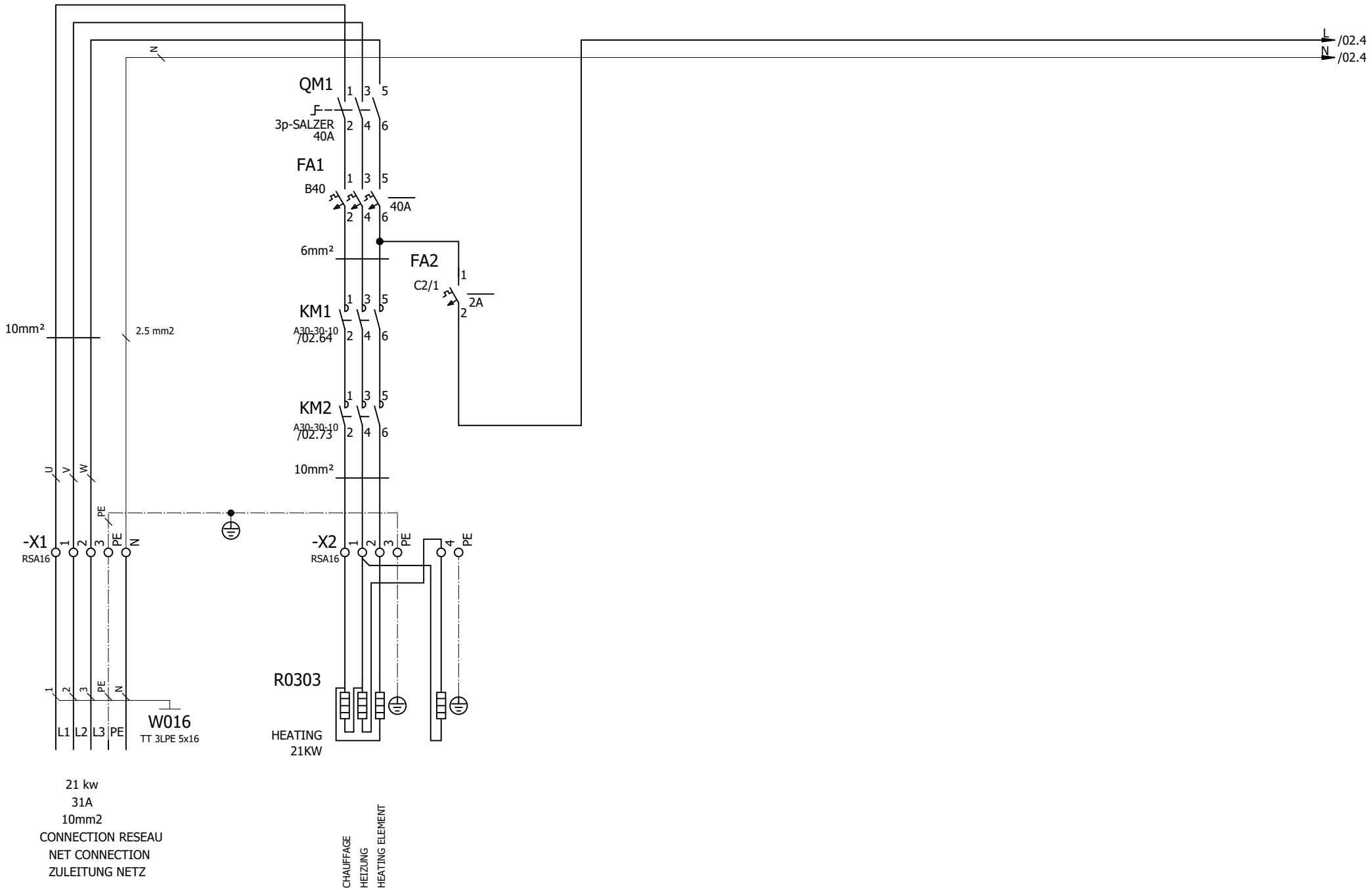
E1-G14944

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

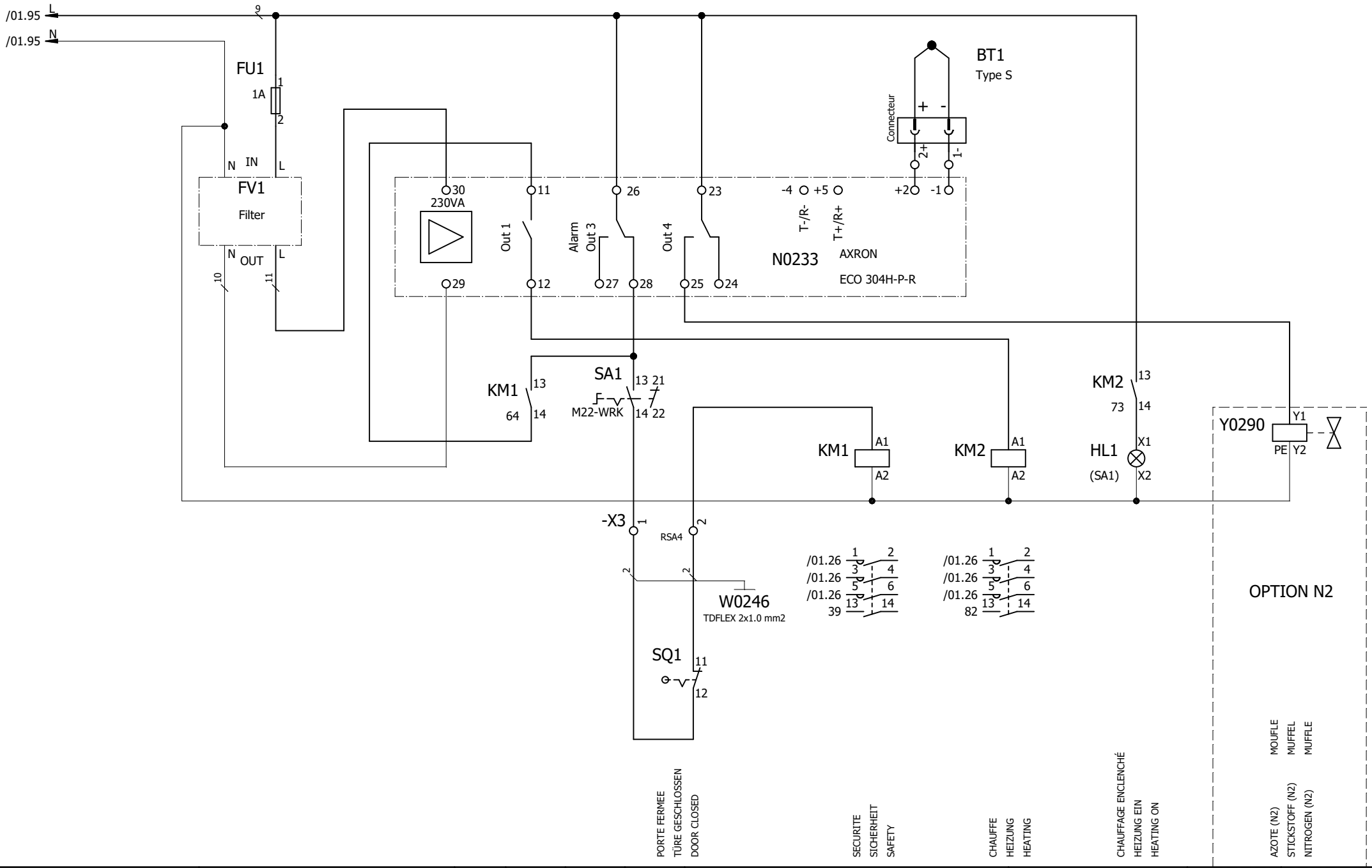
FI 1250-84

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

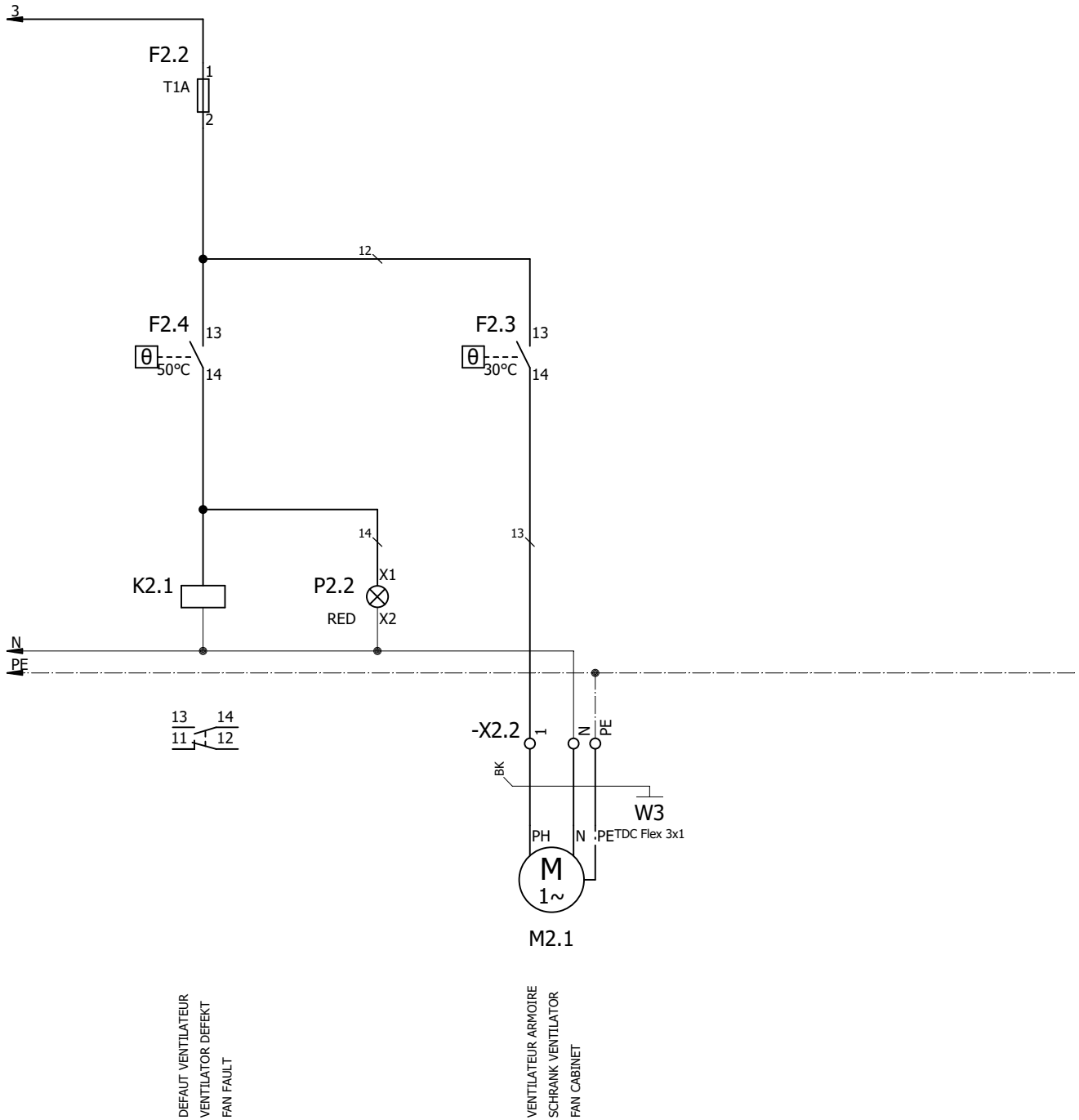
Norme: IEC	SOLO SWISS SA CH-2900 PORRENTRUY		Gezeichnet Dessiné	15.07.22	B.P	FOUR INDUSTRIEL 1250°C INDUSTRIAL FURNACE 1250°C INDUSTRIEOFEN 1250°C	Imprimé le :22.09.2022 10:54:02	Seite : Folio : 1	Page précédente : Page suivante :
N° CDE:			Geprueft Controle				E1-G14944	Station :	Lieu :
Installation: FI 1250-84			Aenderung Modifié						
1250 C° 3x400VAC/50Hz 21kW			Gesehen Vu				FI 1250-84 / 0-FLYLEAF		



Norme: IEC	SOLO SWISS SA		Drawn Dessiné	15.07.22	B.P	ALIMENTATION PRINCIPALE	Printed : 22.09.2022 10:54:02	Page : Folio : 01 / Previous page : Page suivante : 02
N° CDE:	CH-2900 PORRENTRUY		Checked Controle			MAIN SUPPLY	E1-G14944	Station : Lieu :
Installation: FI 1250-84			Modified Modifié			HAUPTSPEISUNG		
1250 C° 3x400VAC/50Hz 21kW			Seen Vu				FI 1250-84 / 2-ELECTRICAL DIAGRAM	



Norme: IEC	SOLO SWISS SA		Drawn Dessiné	15.07.22	B.P	REGULATION CHAUFFAGE	Printed : 22.09.2022 10:54:02	Page : 02 Previous page : 01
N° CDE:	CH-2900 PORRENTRUY		Checked Controle			HEATING REGULATION	E1-G14944	Folio : Page suivante : 03
Installation: FI 1250-84			Modified Modifié			HEIZUNG REGELUNG		Station : Lieu :
1250 C° 3x400VAC/50Hz 21kW			Seen Vu				FI 1250-84 / 2-ELECTRICAL DIAGRAM	



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Installation: FI 1250-84			Modified Modifié			HEIZUNG REGELUNG	FI 1250-84 / 2-ELECTRICAL DIAGRAM	
1250 C° 3x400VAC/50Hz 21kW			Seen Vu					

E1-G202050-1

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

FI 1250-280

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Norme: IEC	SOLO Swiss SA		Drawn Dessiné	25.11.2011	DRE	Printed : 12.06.2017 9:01:17	Page : Folio : 1	Previous page : Next page :
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Installation: FI 1250-280			Modified Modifié	11.11.2014	THA			
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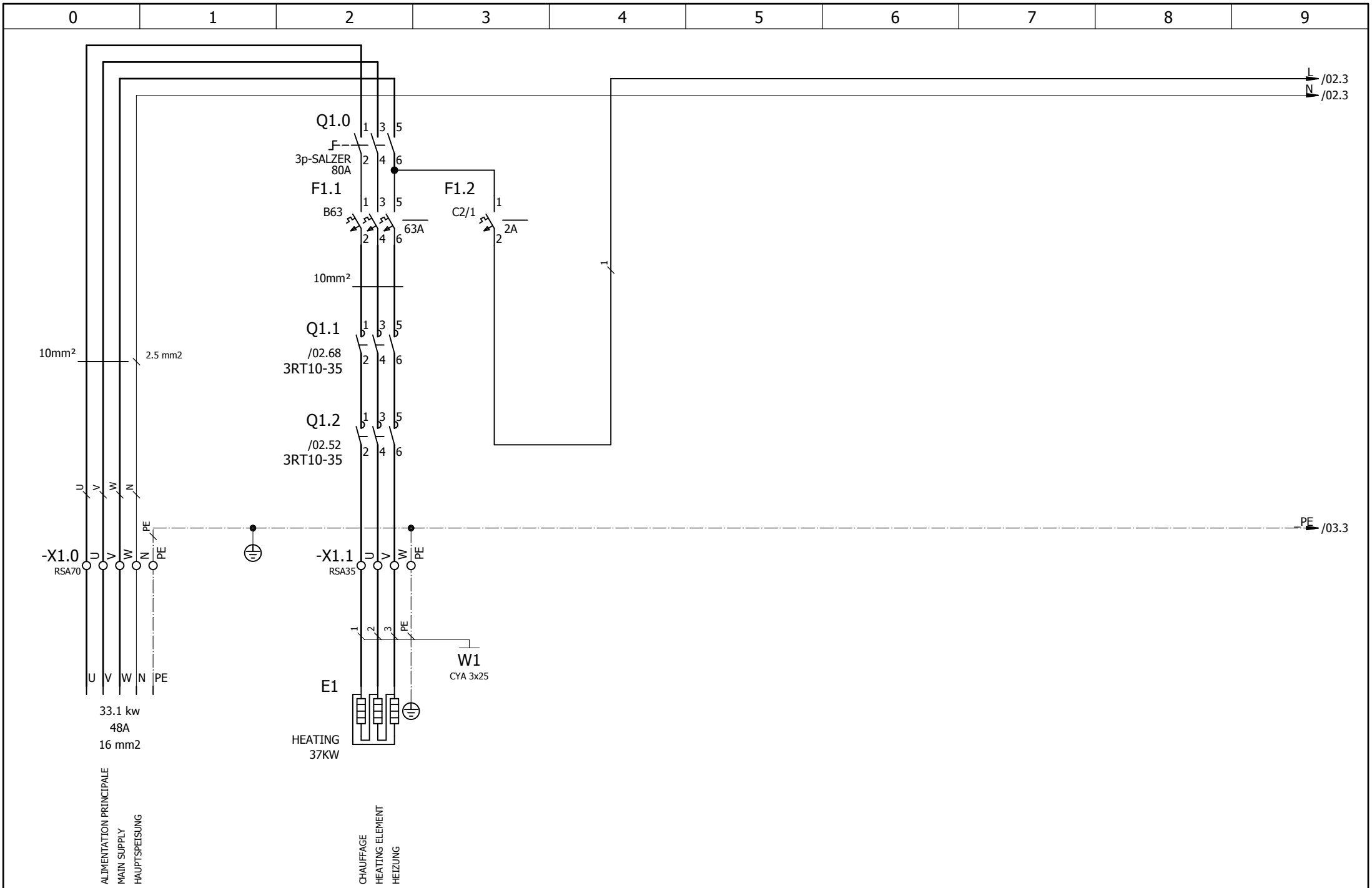

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Installation: FI 1250-280			Modified Modifié	11.11.2014	THA	HAUPTSPEISUNG		
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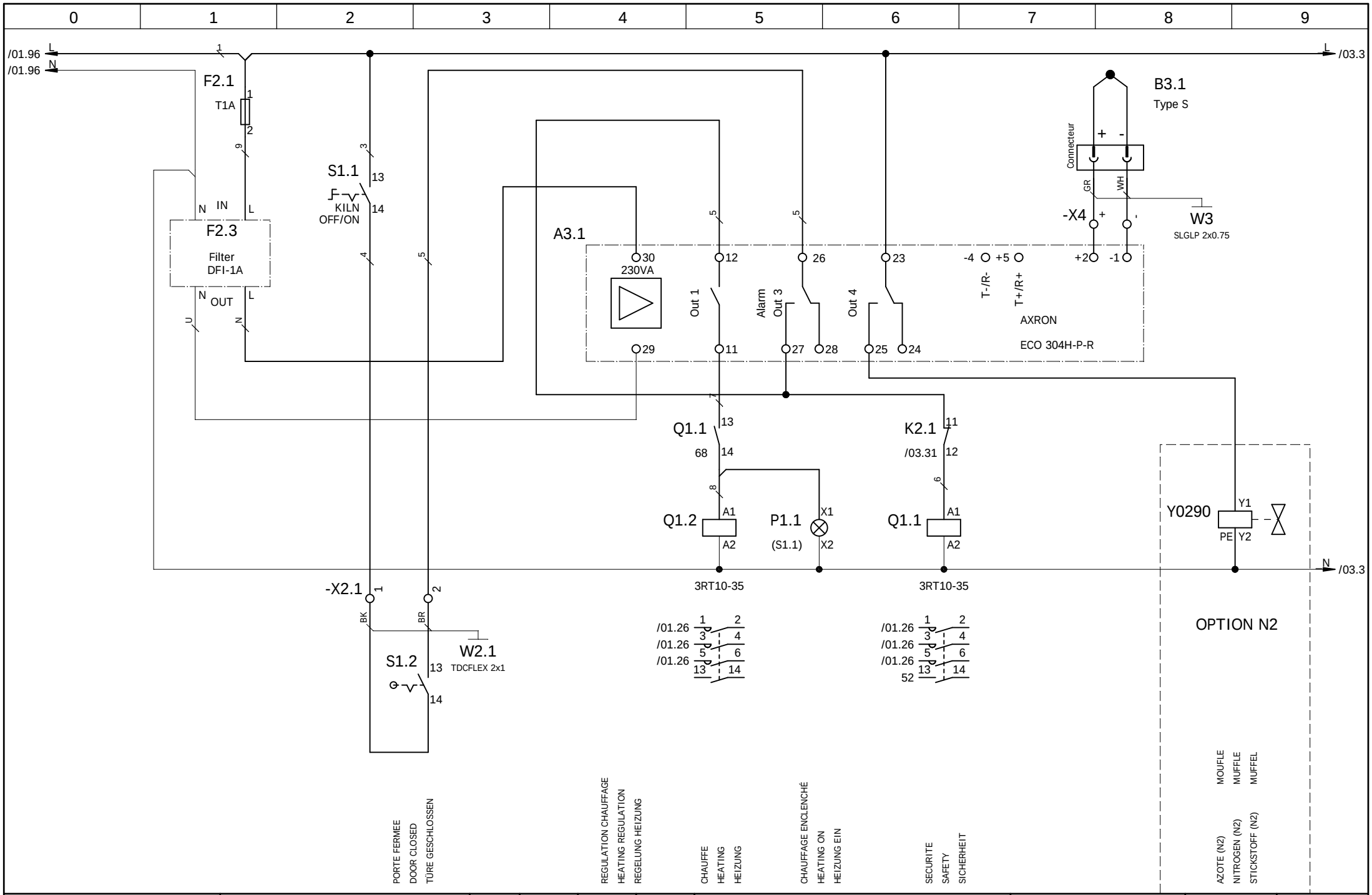

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Installation: FI 1250-280			Modified Modifié	11.11.2014	THA		Previous page : 01 Next page : 03
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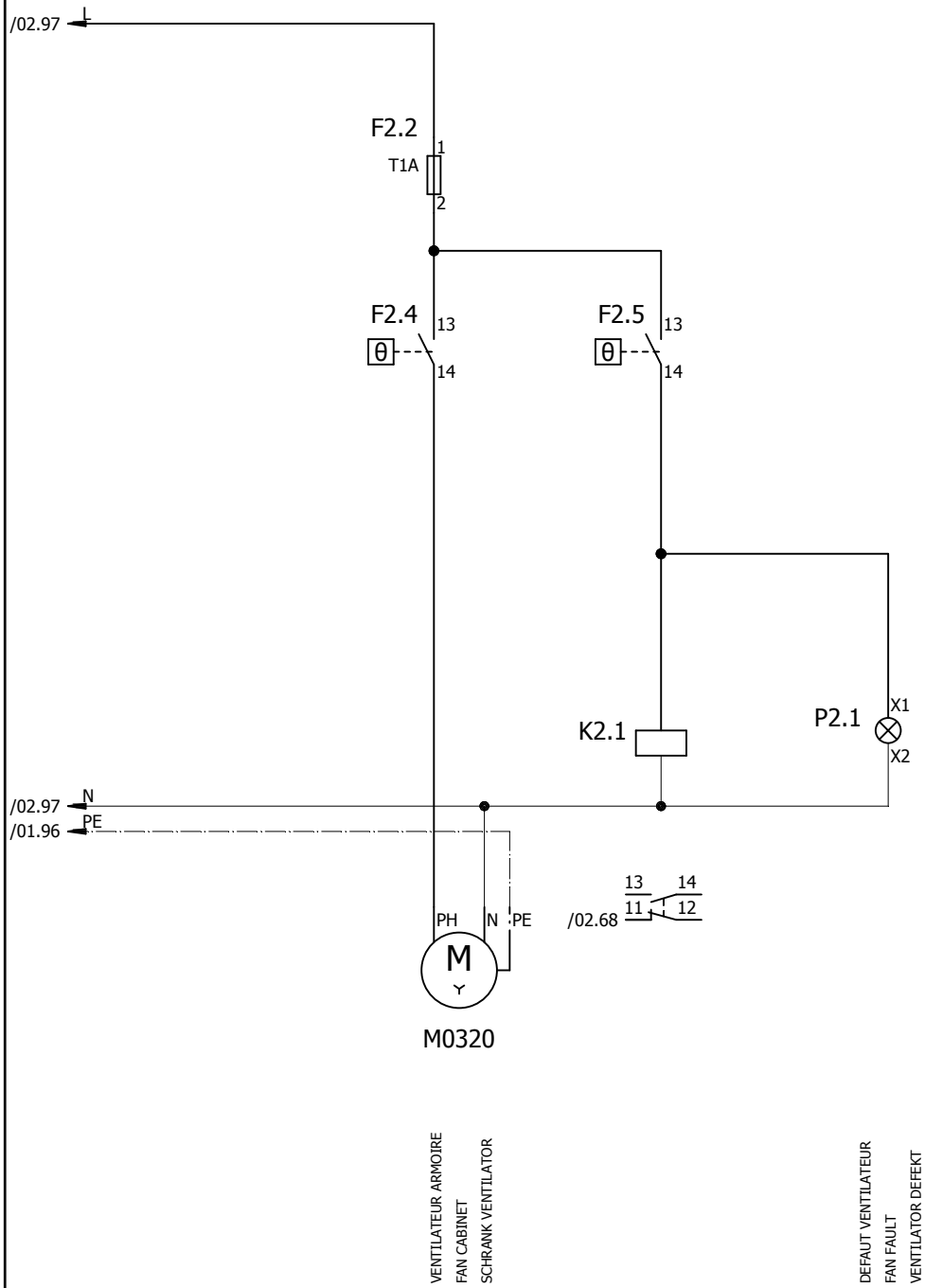
							FI 1250-280 / 02 Schémas élect.



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Installation: FI 1250-280		Modified Modifié	11.11.2014	THA	
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Printed : 12.06.2017 9:01:36

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Next page :

E1-G202050-1

Station :

Lieu :

FI 1250-280 / 02 Schémas élect.

E8-G202050-1

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

FI 1250-280

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

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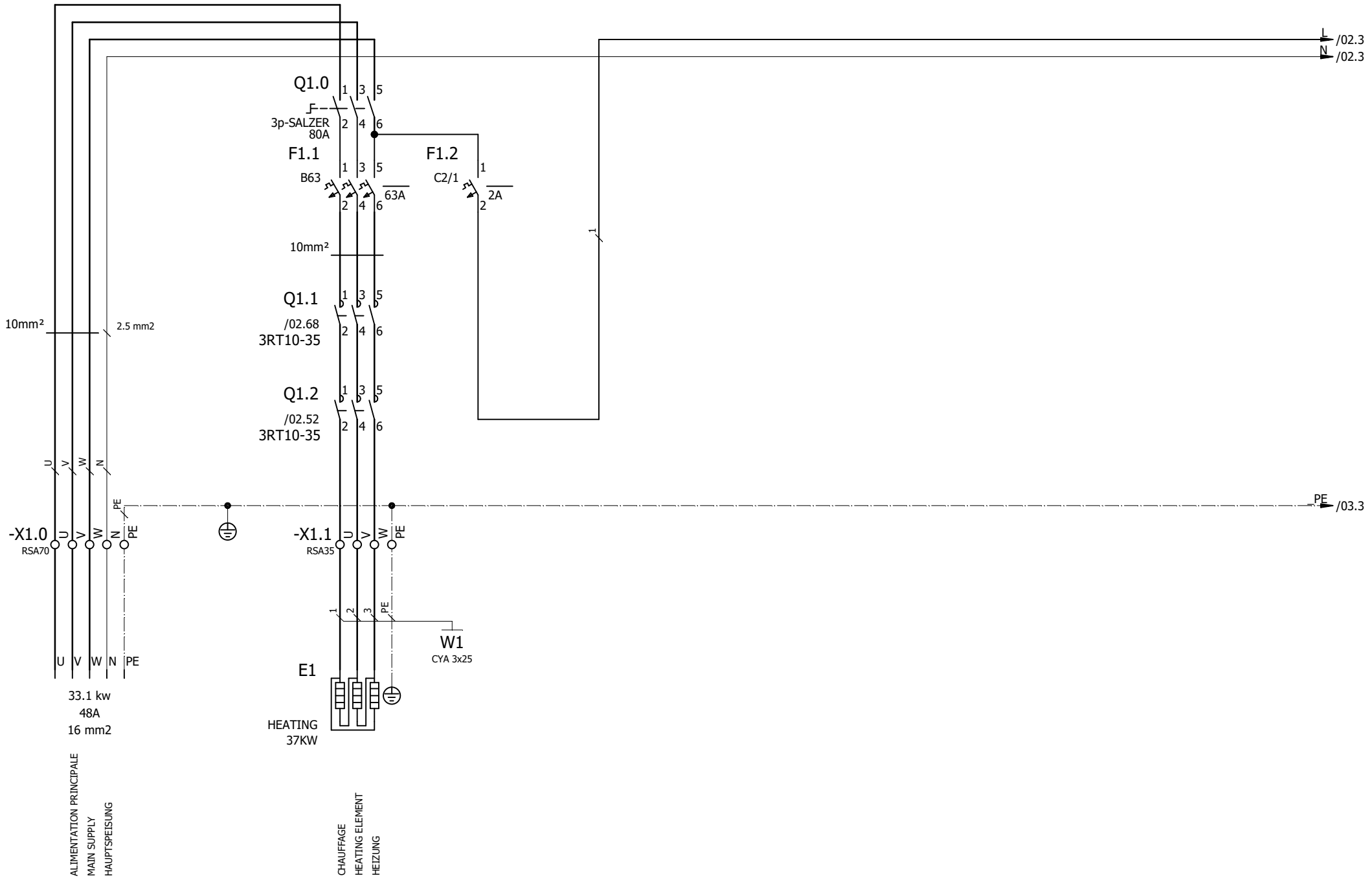

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Installation: FI 1250-280			Modified Modifié			HAUPTSPEISUNG			
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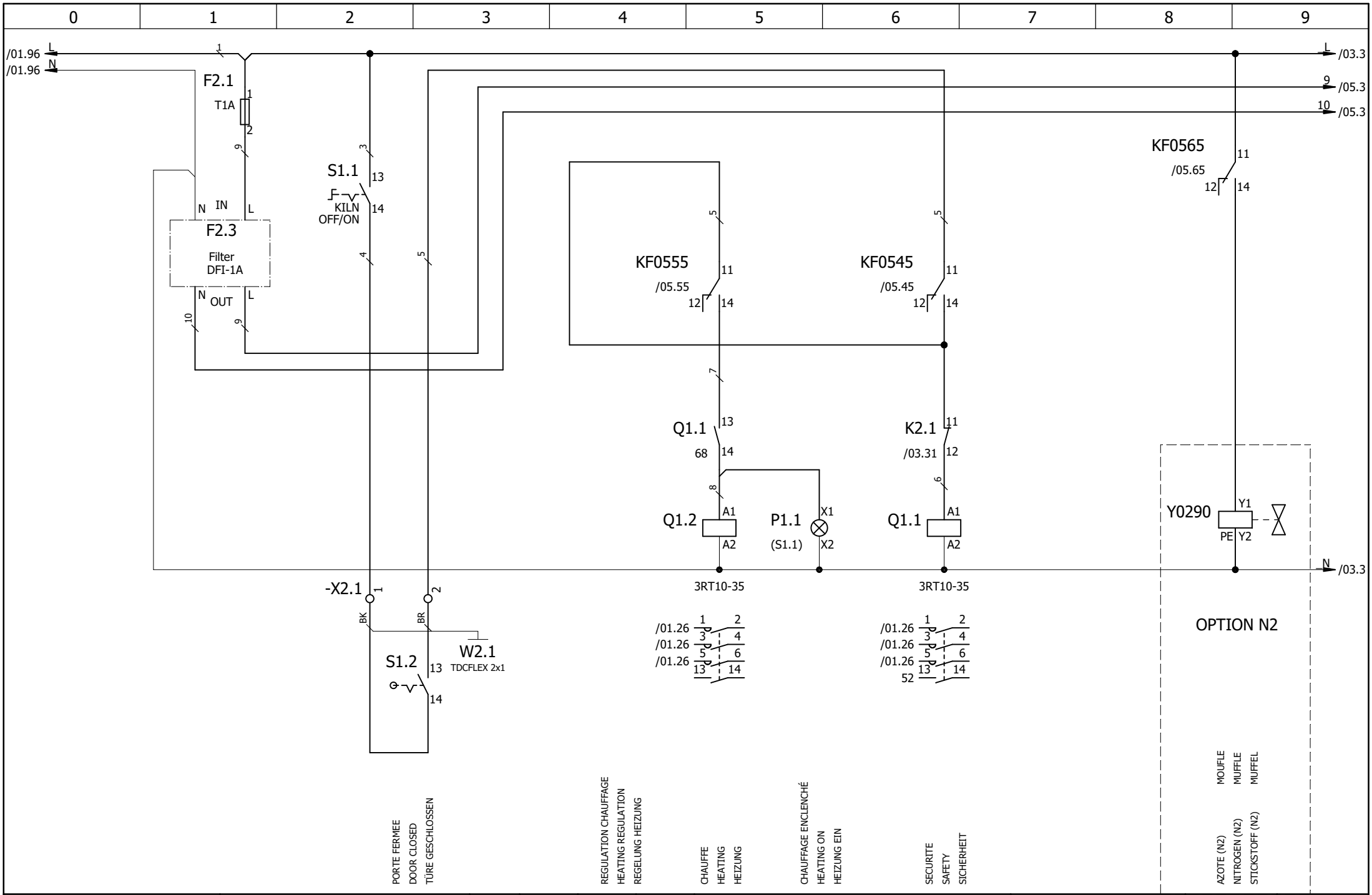

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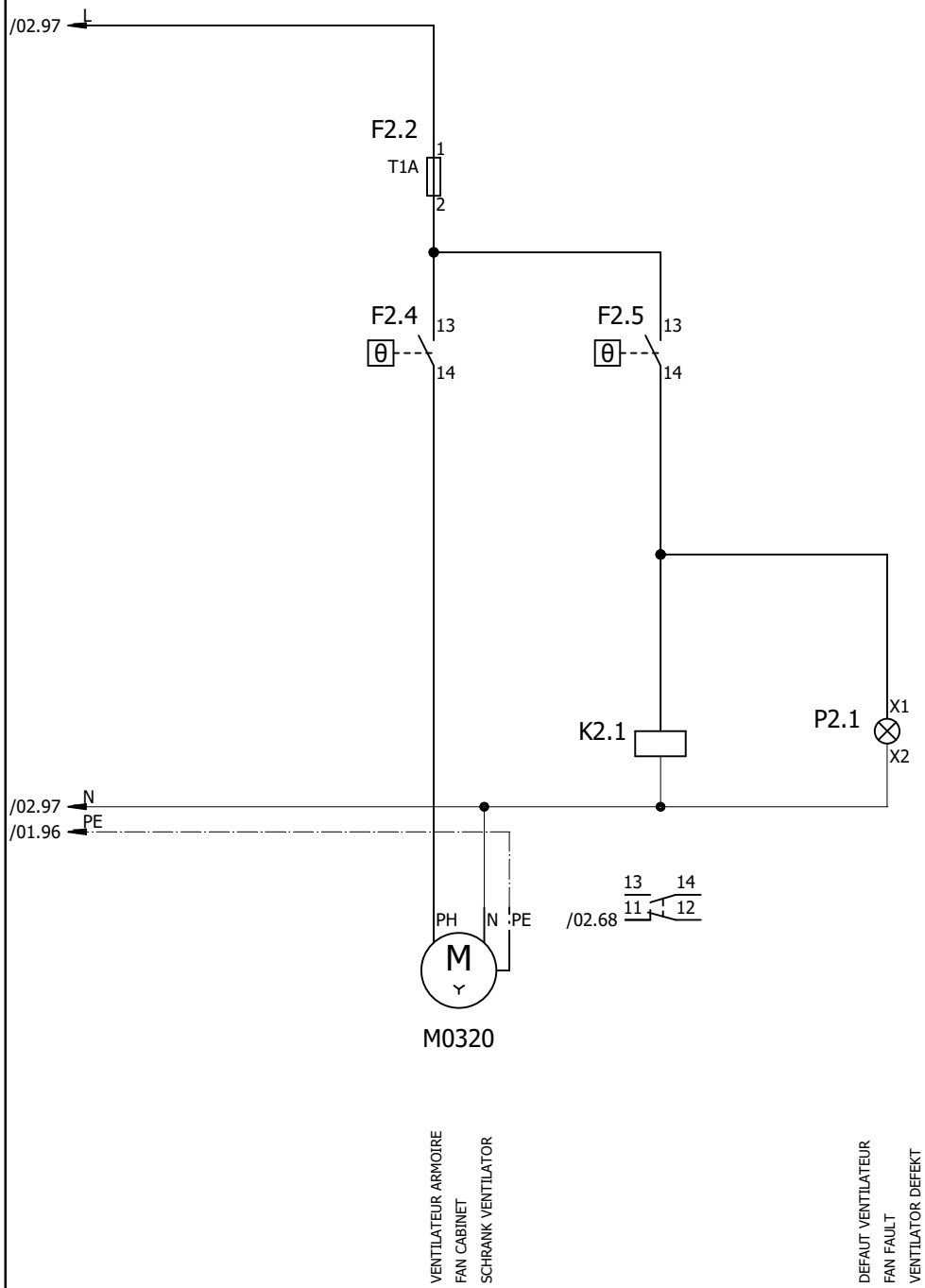
Installation: FI 1250-280			Modified Modifié				E8-G202050-1
1250 C° 3x400VAC/50Hz 33.1kW			Seen Vu				Station : Lieu :
							FI 1250-280 / 02 Schémas élect.

Previous page : 01
Next page : 03



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Installation: FI 1250-280			Modified Modifié						
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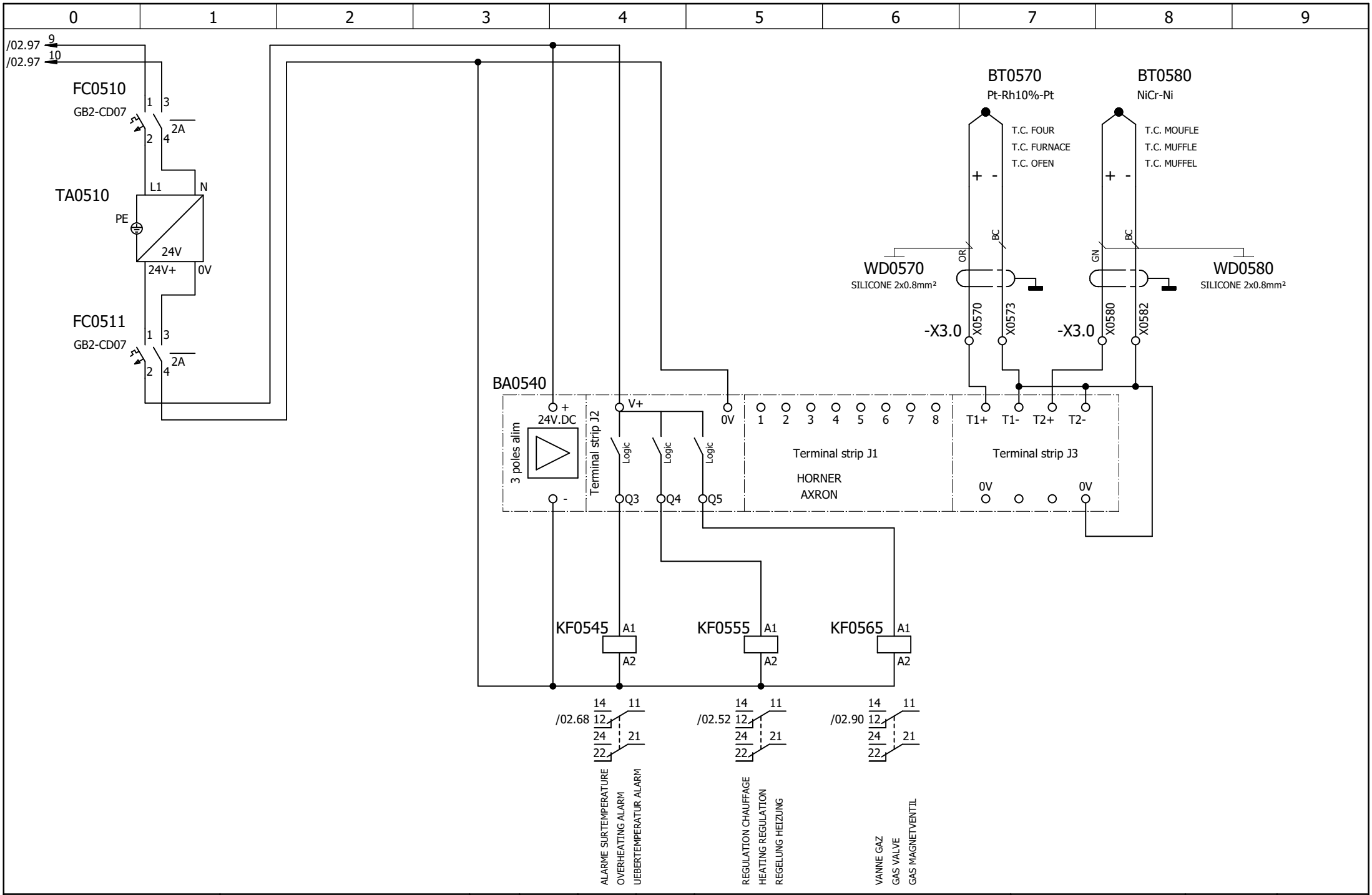

Norme: IEC	SOLO Swiss SA		Drawn Dessiné	04.11.19	B.P	ALIMENTATION PRINCIPALE	Printed : 05.12.2019 15:32:47	Page : Folio : 05	Previous page : 03 Next page :
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			MAIN SUPPLY	E8-G202050-1	Station :	Lieu :
Installation: FI 1250-280			Modified Modifié			HAUPTSPEISUNG			
1250 C° 3x400VAC/50Hz 33.1kW			Seen Vu				FI 1250-280 / 02 Schémas élect.		

E1-G14698-1

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

FI 1250-350

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Norme: IEC	SOLO SWISS SA CH-2900 PORRENTRUY		Drawn Dessiné	18.06.2013	DRE	Printed : 05.10.2018 13:29:26	Page : Folio : 1 / Previous page : Next page :
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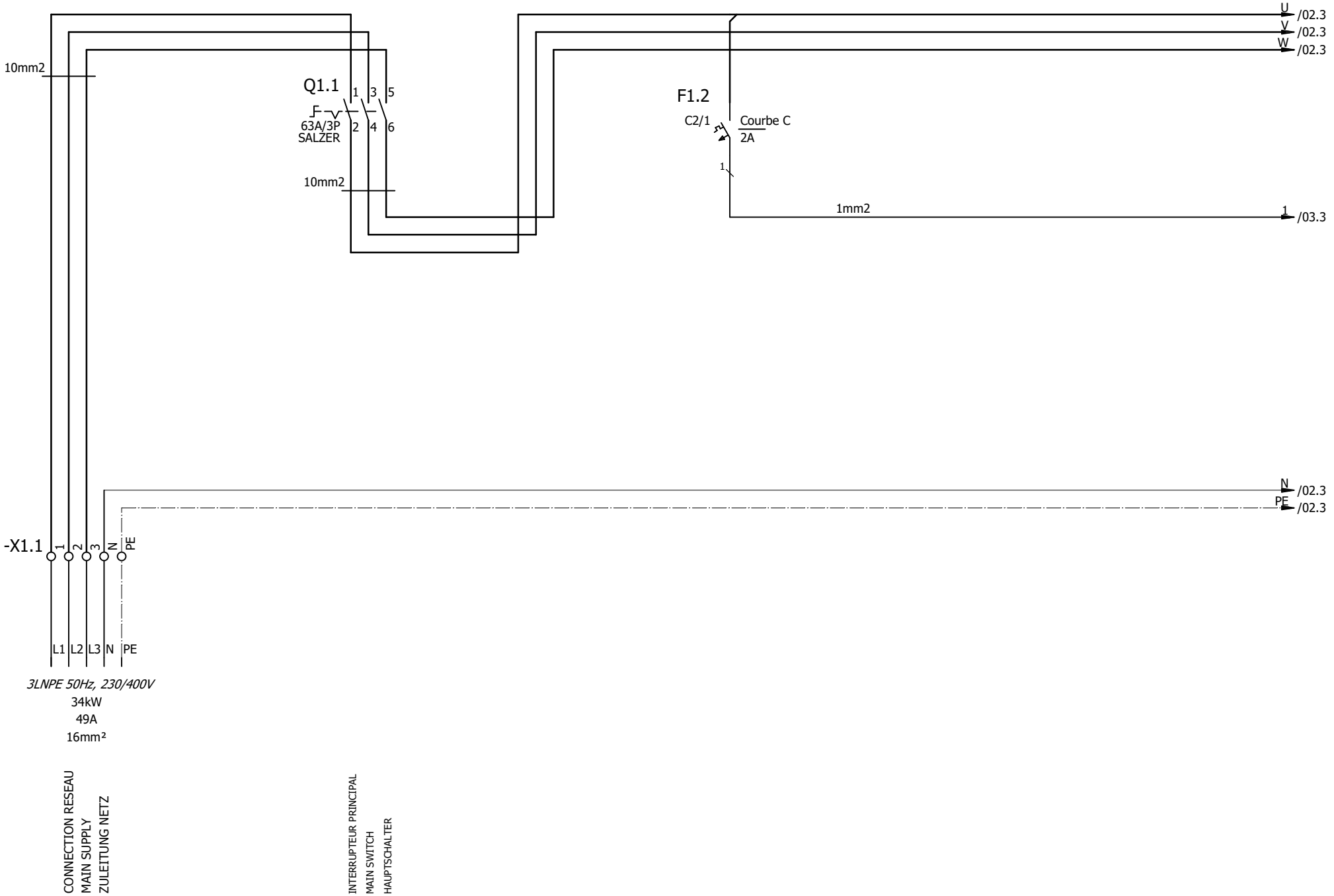
Installation: FI 1250-350			Modified Modifié	08.05.2014	VAI		
1250 C° 3x400VAC/50Hz 34kW			Seen Vu			FI 1250-350 / 00 Page de garde	



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Installation: FI 1250-350			Modified Modifié	08.05.2014	VAI			
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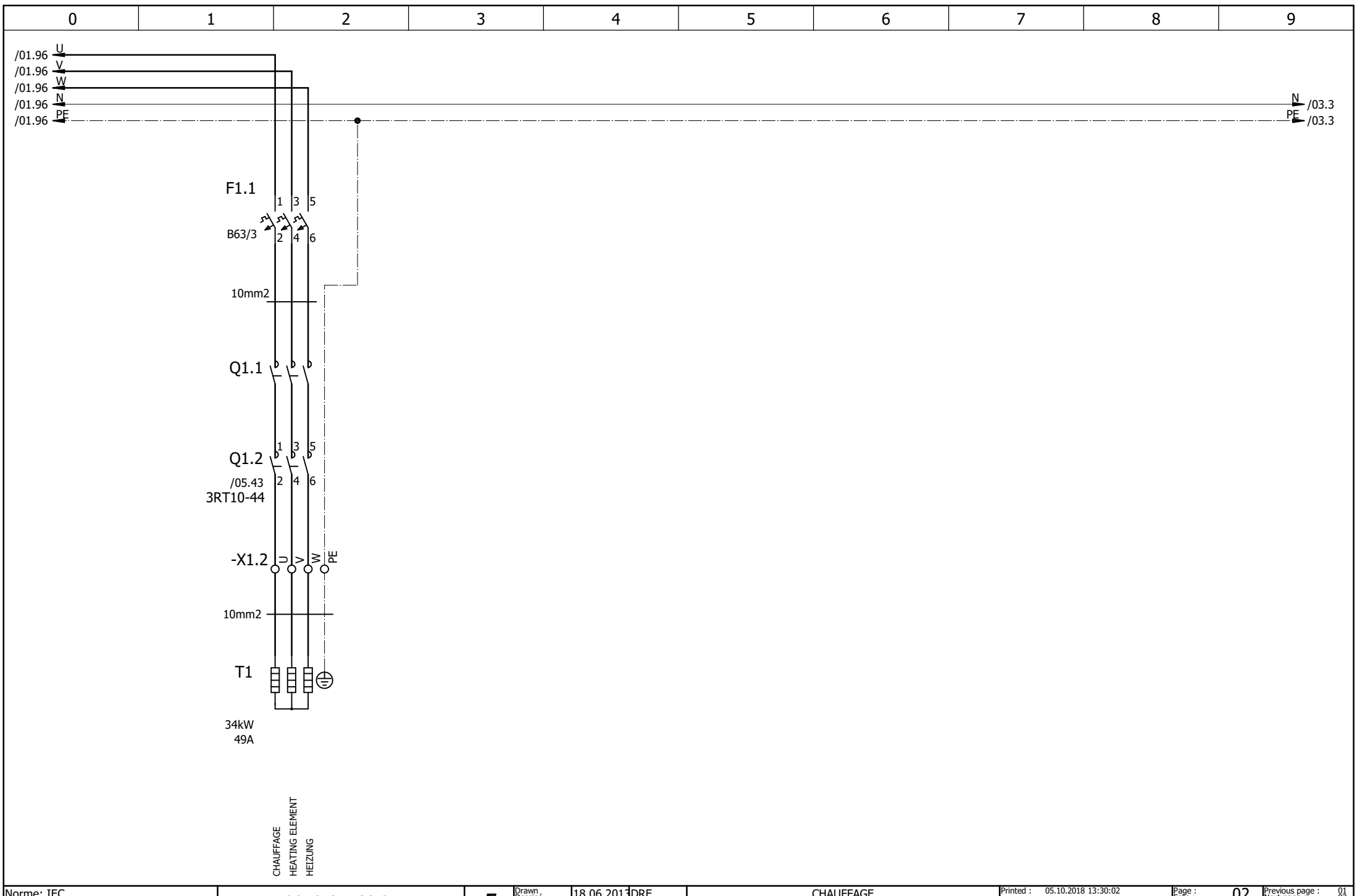

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Installation: FI 1250-350			Modified Modifié	08.05.2014	VAI	HEIZUNG			
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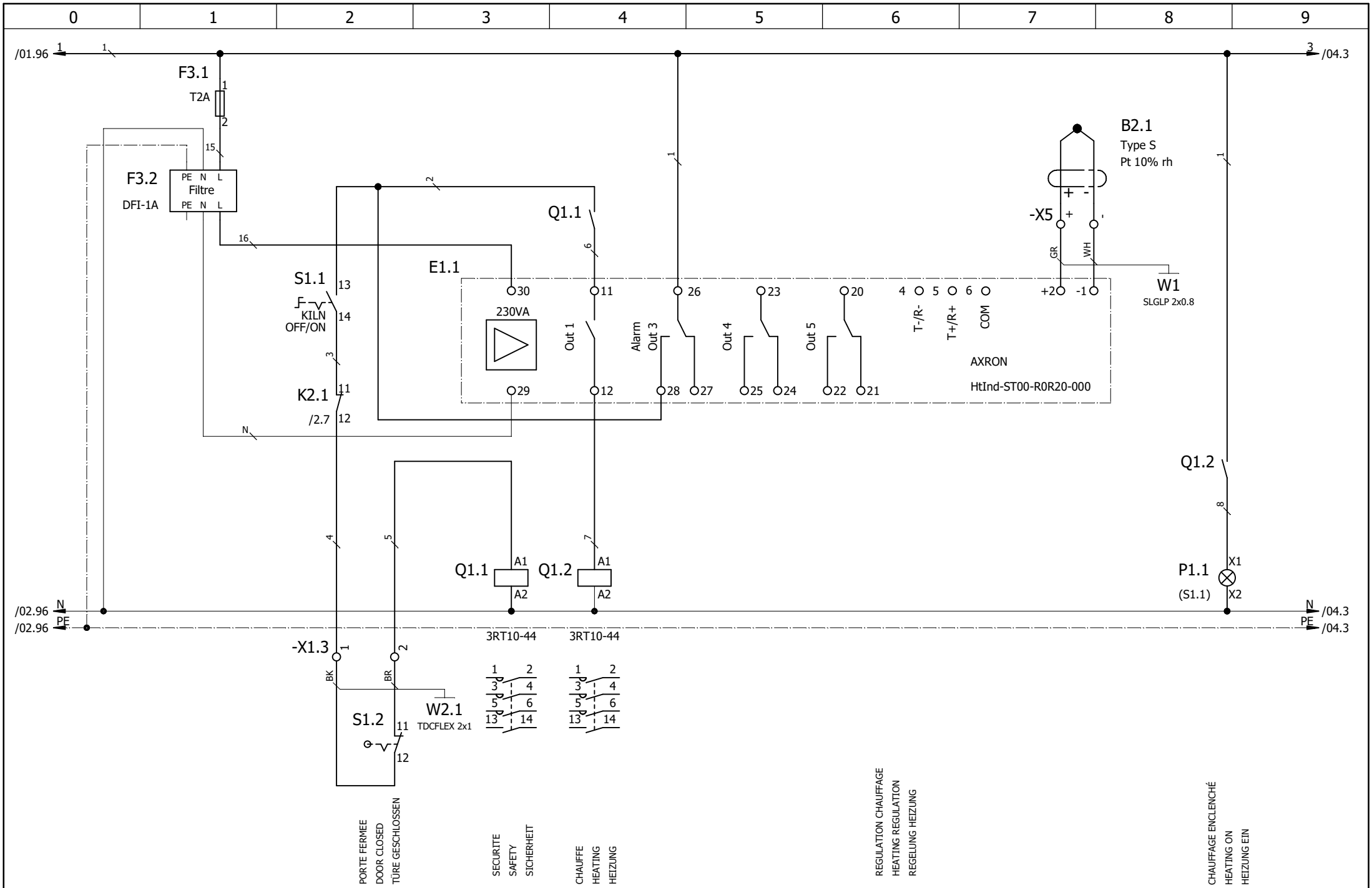

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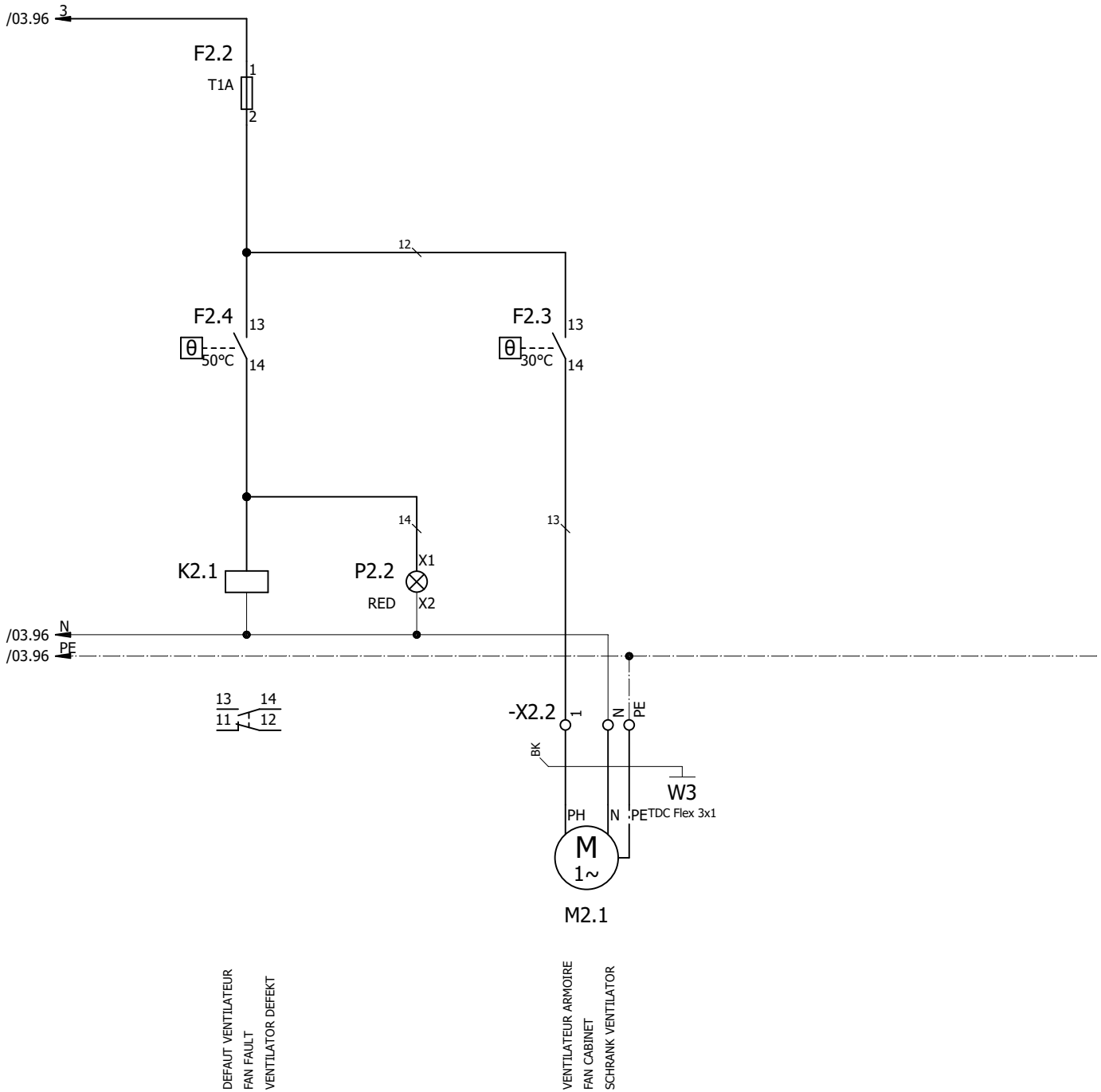
N° CDE:	CH-2900 PORRENTRUY	Checked / Controlé			
Installation: FI 1250-350		Modified / Modifié	08.05.2014	VAI	
1250 C° 3x400VAC/50Hz 34kW		Seen / Vu			

Printed : 05.10.2018 13:30:02 | Page / Folio : 03 | Previous page : 02 | Next page : 04

E1-G14698-1 | Station : | Lieu :

FI 1250-350 / 02 Schémas élect.



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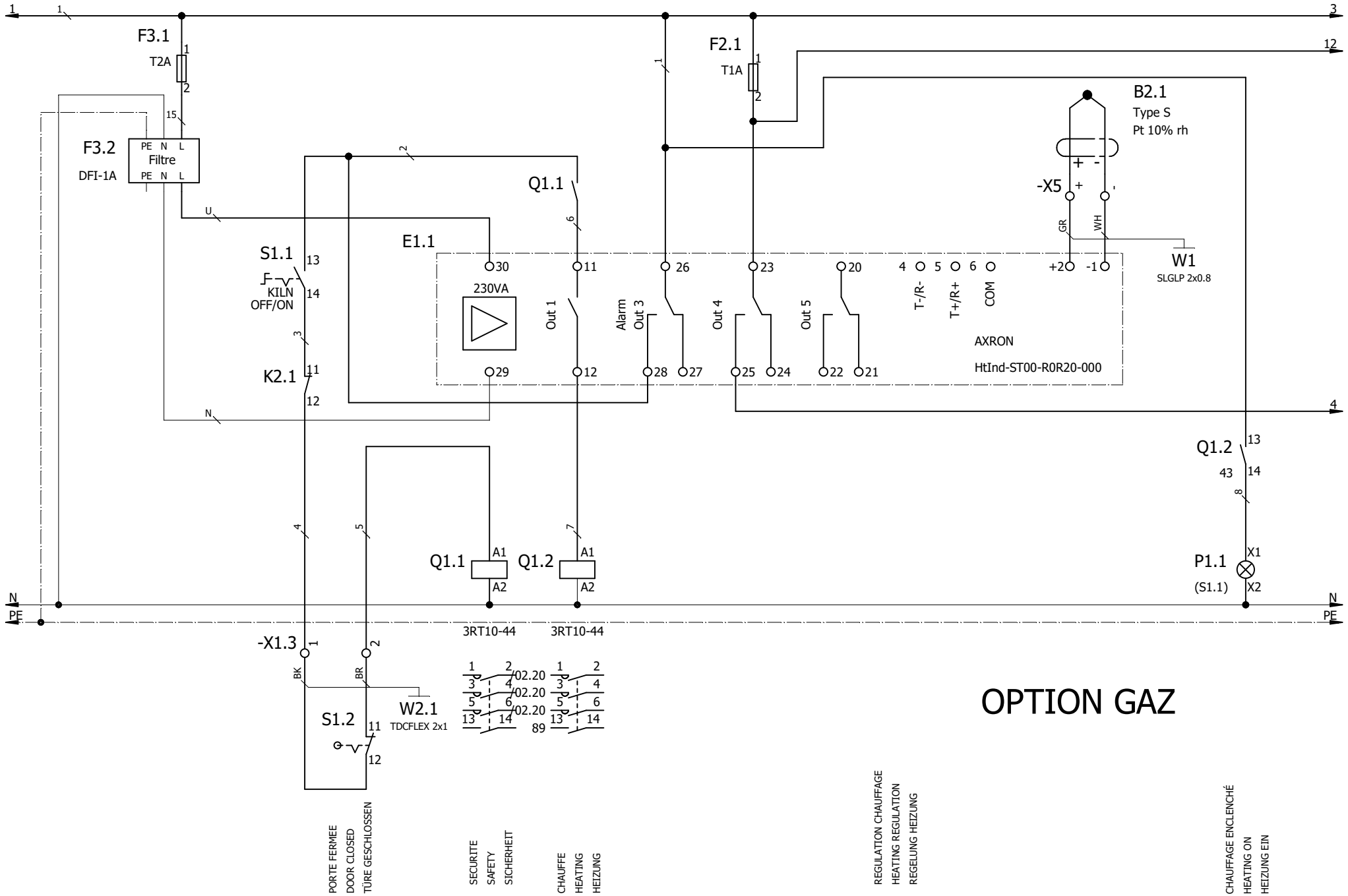
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			MAIN CONTROL	E1-G14698-1	Station :	Lieu :
Installation: FI 1250-350			Modified Modifié	08.05.2014	VAI	HAUPTSTEUERUNG			
1250 C° 3x400VAC/50Hz 34kW			Seen Vu				FI 1250-350 / 02 Schémas élect.		



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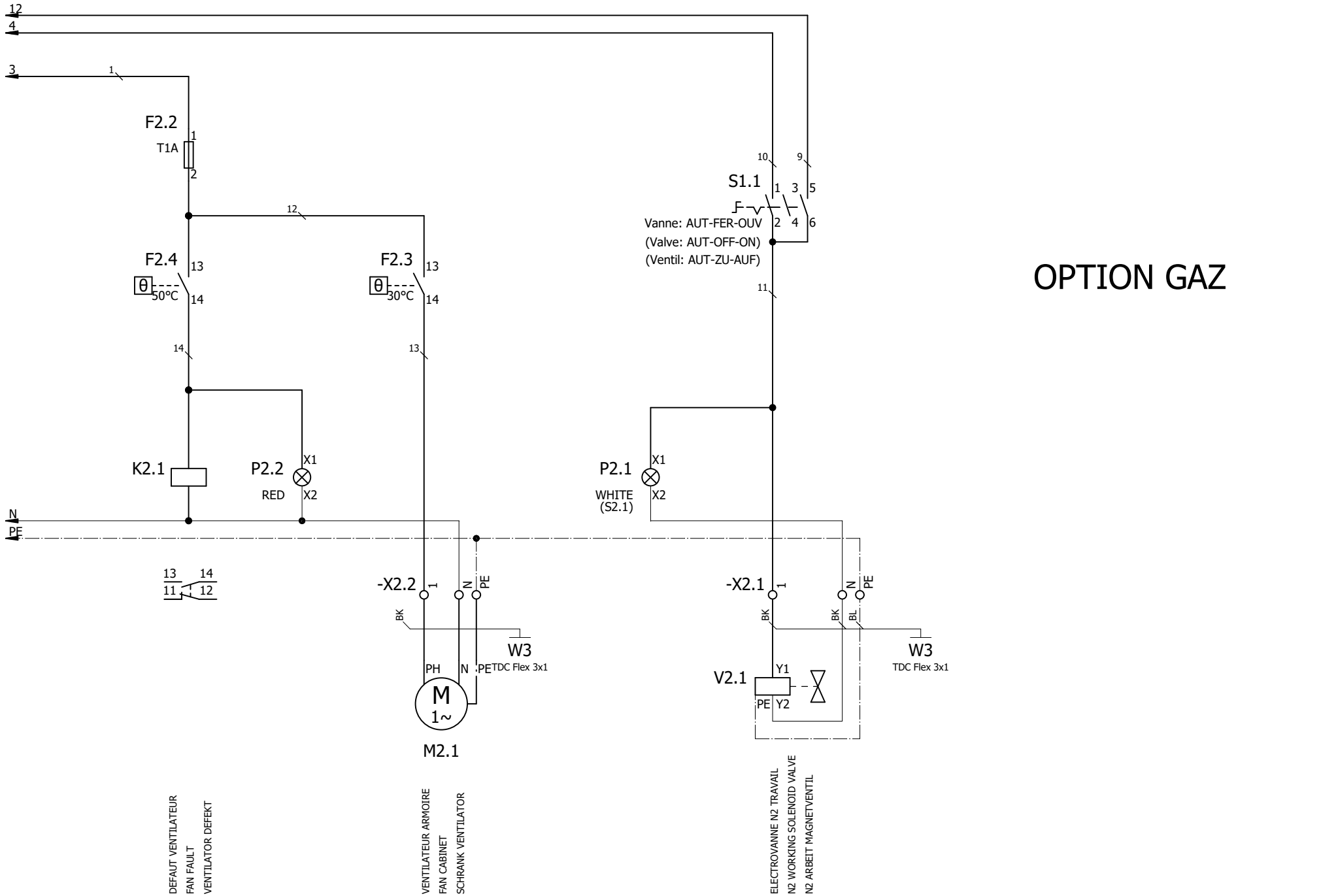
N° CDE:	CH-2900 PORRENTRUY	Checked / Controlé			MAIN CONTROL
Installation: FI 1250-350		Modified / Modifié	08.05.2014	VAI	HAUPTSTEUERUNG
1250 C° 3x400VAC/50Hz 34kW		Seen / Vu			

Printed : 05.10.2018 13:30:03 | Page / Folio : 05 | Previous page : 04 | Next page : 06

E1-G14698-1 | Station : | Lieu :

FI 1250-350 / 02 Schémas élect.



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Installation: FI 1250-350			Modified Modifié	08.05.2014	VAI	HAUPTSTEUERUNG	Previous page : 05 Next page :
1250 C° 3x400VAC/50Hz 34kW			Seen Vu			E1-G14698-1	Station : Lieu :
						FI 1250-350 / 02 Schémas élect.	

E3-G14698

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

FI 1250-350

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Norme: IEC	SOLO SWISS SA CH-2900 PORRENTRUY		Drawn Dessiné	06.03.23	B.P		Printed : 03.04.2023 7:46:43	Page : 1 Folio : 1	Previous page : Next page :
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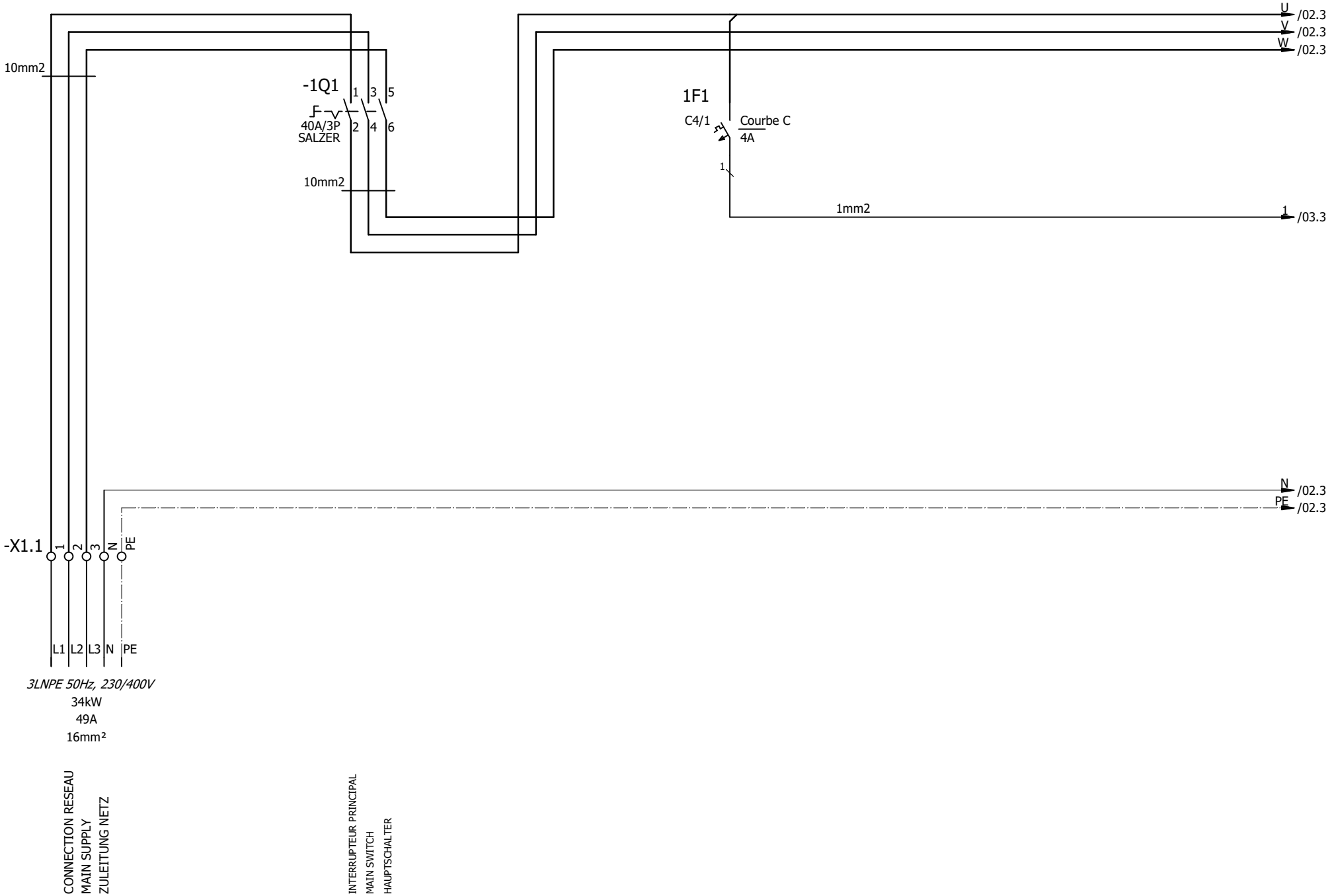
1250 C° 3x400VAC/50Hz 34kW			Seen Vu				FI 1250-350 / 00 Page de garde		



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N° CDE:			Checked Controlé				Page : Folio : 01
Installation: FI 1250-350			Modified Modifié				Previous page : Next page : 02
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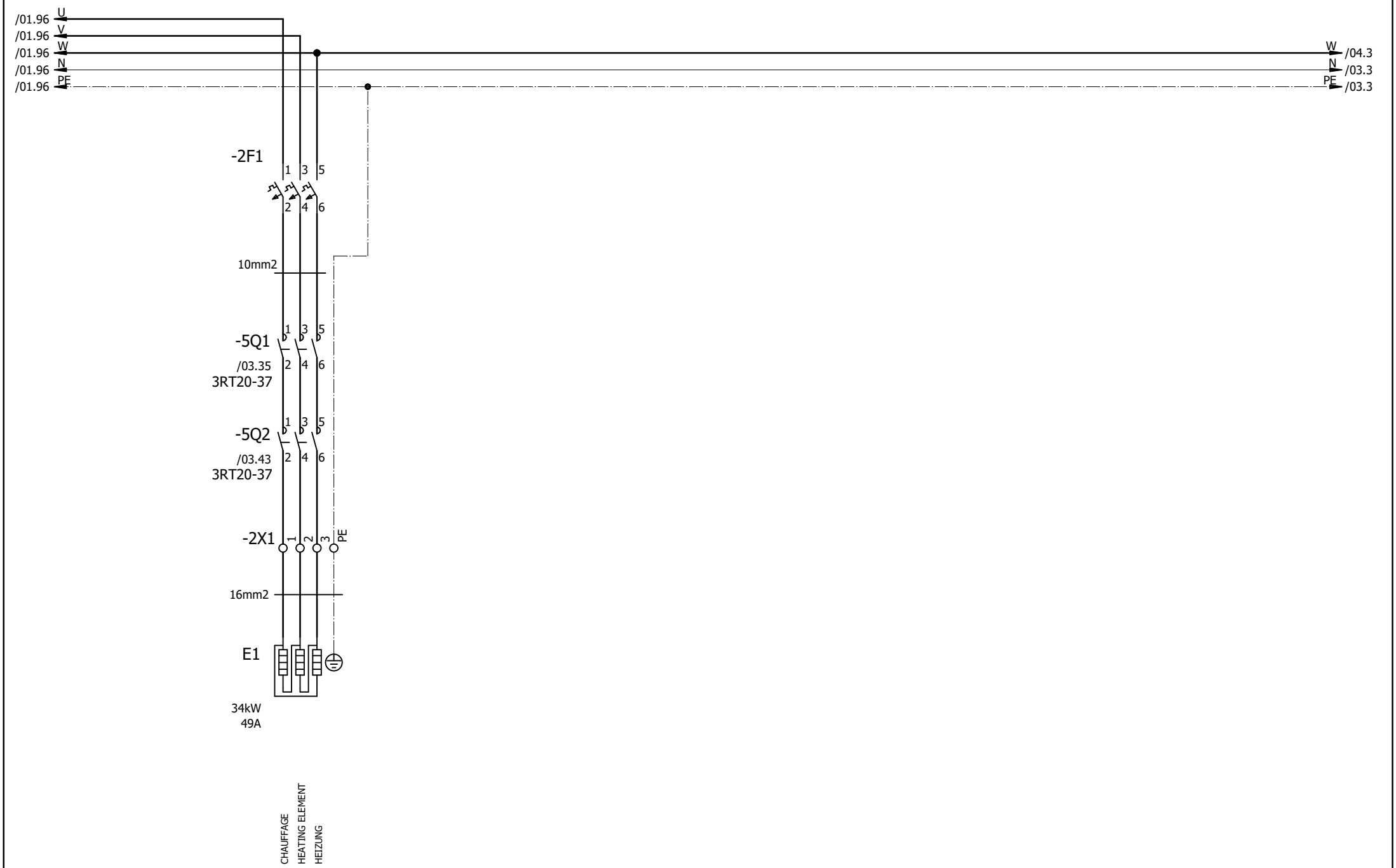
							Station : Lieu :
							FI 1250-350 / 02 Schémas élect.



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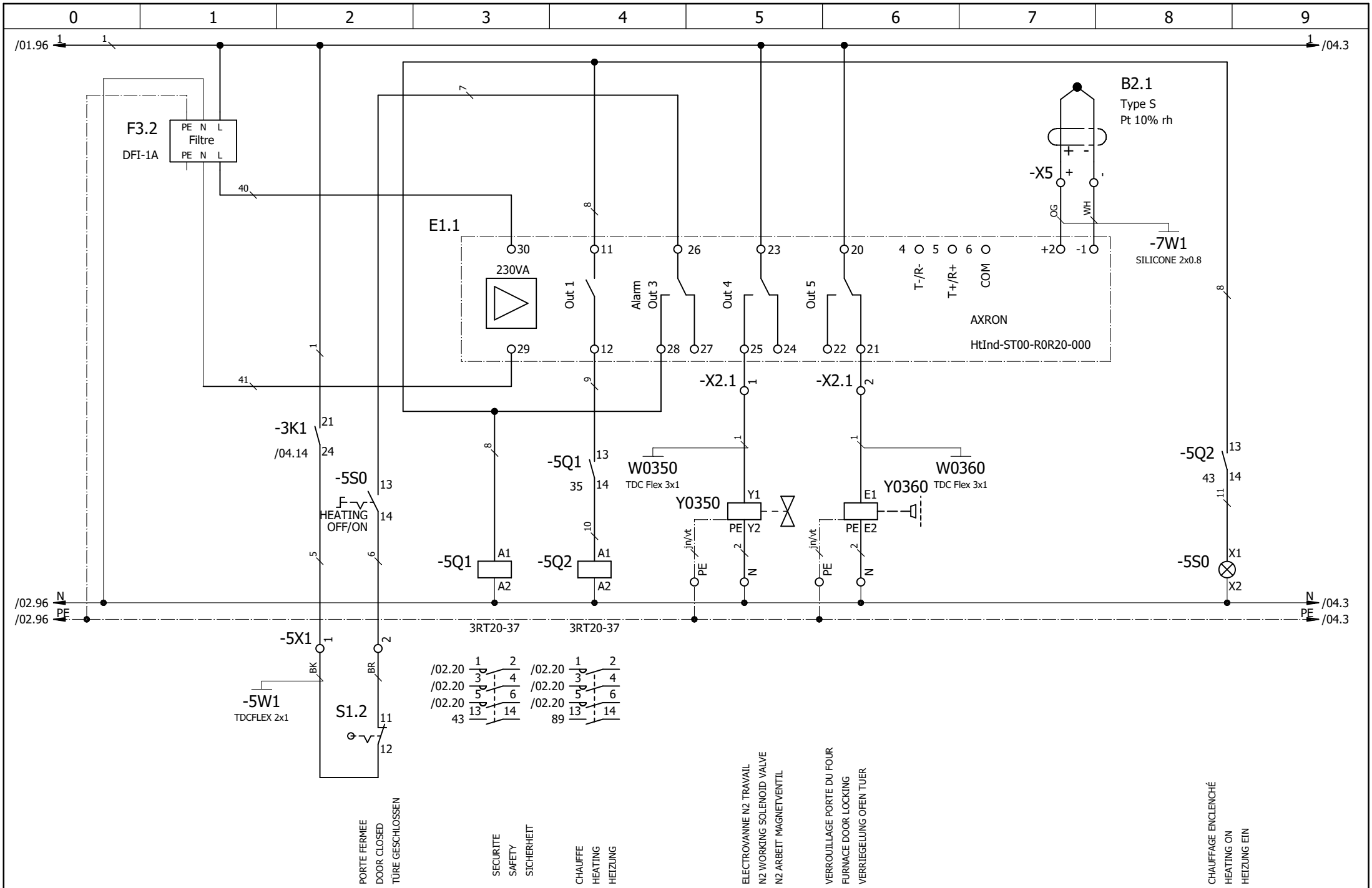
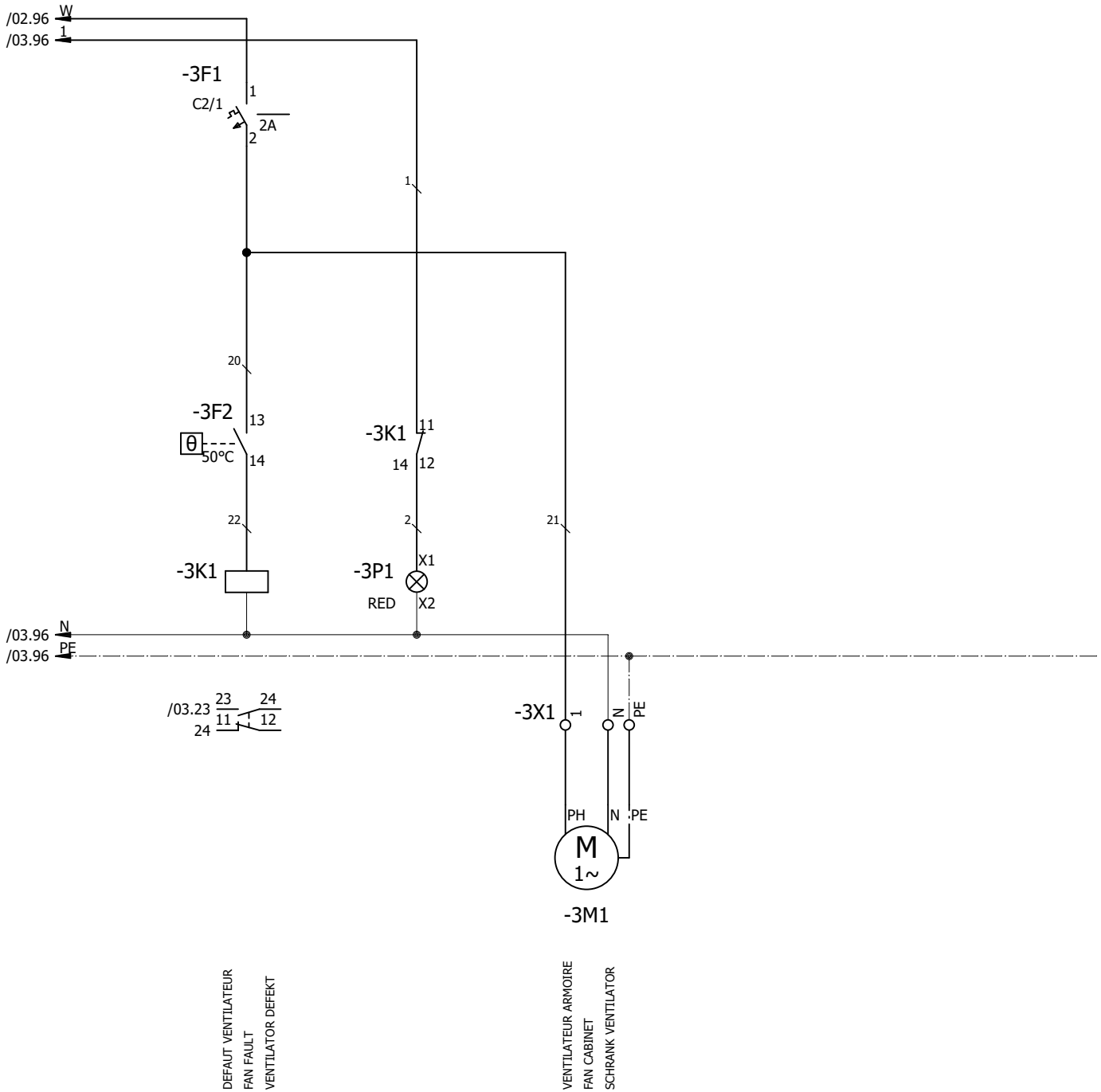
N° CDE:	CH-2900 PORRENTRUY		Checked Controlé			HEATING	E3-G14698	Station :	Lieu :
Installation: FI 1250-350			Modified Modifié			HEIZUNG			
1250 C° 3x400VAC/50Hz 34kW			Seen Vu				FI 1250-350 / 02 Schémas élect.		



Norme: IEC	SOLO SWISS SA		Drawn / Dessiné	06.03.23	B.P	COMMANDE PRINCIPALE	Printed : 03.04.2023 7:46:44	Page / Folio : 03	Previous page : 02 / Next page : 04
N° CDE:	CH-2900 PORRENTRUY		Checked / Controlé			MAIN CONTROL	E3-G14698	Station :	Lieu :
Installation: FI 1250-350			Modified / Modifié			HAUPTSTEUERUNG			
1250 C° 3x400VAC/50Hz 34kW			Seen / Vu				FI 1250-350 / 02 Schémas élect.		



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Installation: FI 1250-350			Modified Modifié			HAUPTSTEUERUNG			
1250 C° 3x400VAC/50Hz 34kW			Seen Vu				FI 1250-350 / 02 Schémas élect.		

E1-G14868

Fours industriels 1250°C
Industrial furnaces 1250°C
Industrielle Öfen 1250°C

FI 1250-640

SCHEMA ELECTRIQUE
ELECTRIC DIAGRAM
ELEKTROSCHEMA

Norme: IEC	SOLO Swiss SA		Drawn Dessiné	12.01.23	B.P		Printed : 12.01.2023 9:56:04	Page : Folio : 1	Previous page : Next page :
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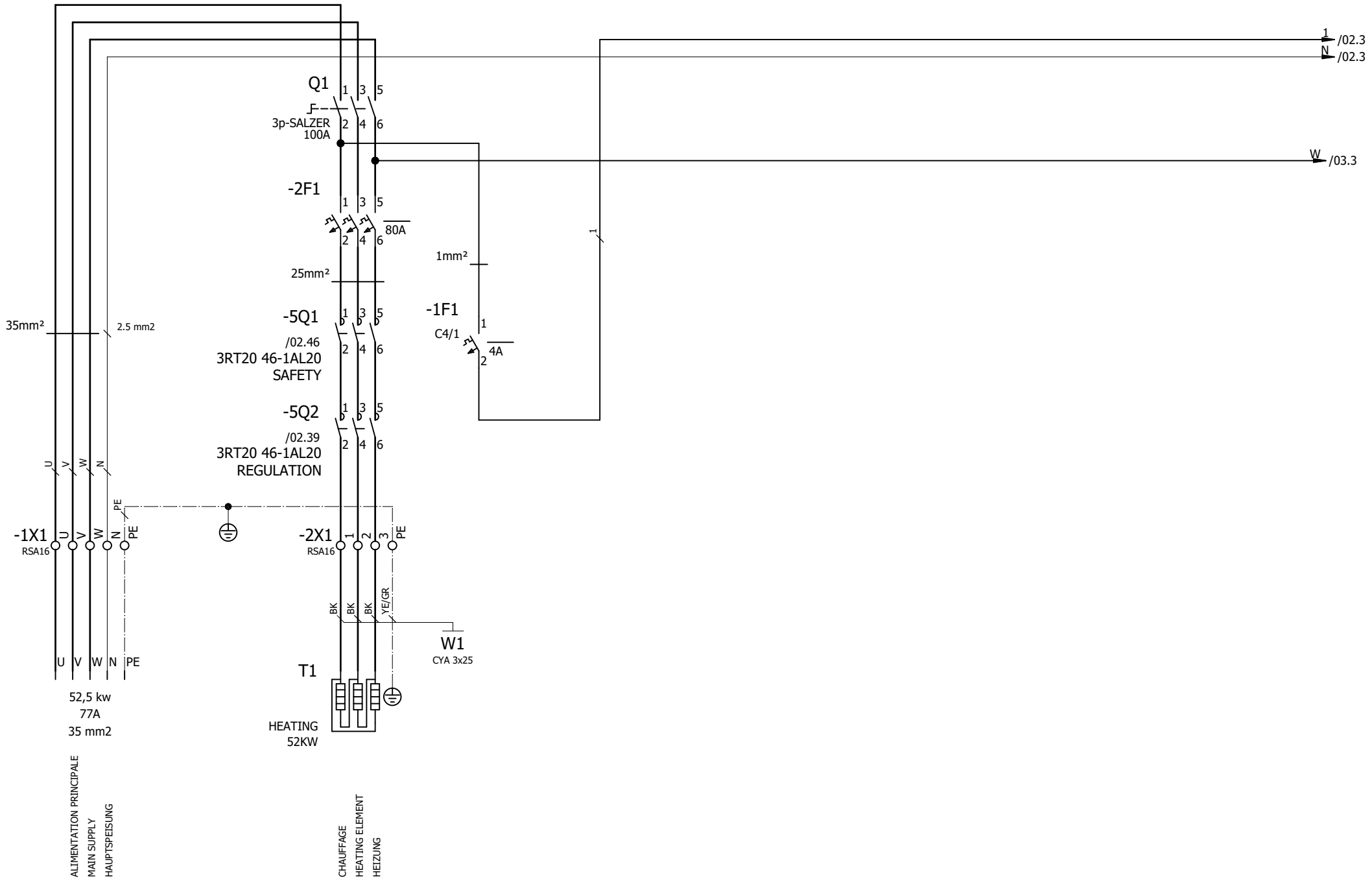
Installation: FI 1250-640			Modified Modifié						
1250 C° 3x400VAC/50Hz 52.5kW			Seen Vu				FI 1250-640 / 00 Page de garde		



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Installation: FI 1250-640			Modified Modifié			HAUPTSPEISUNG			
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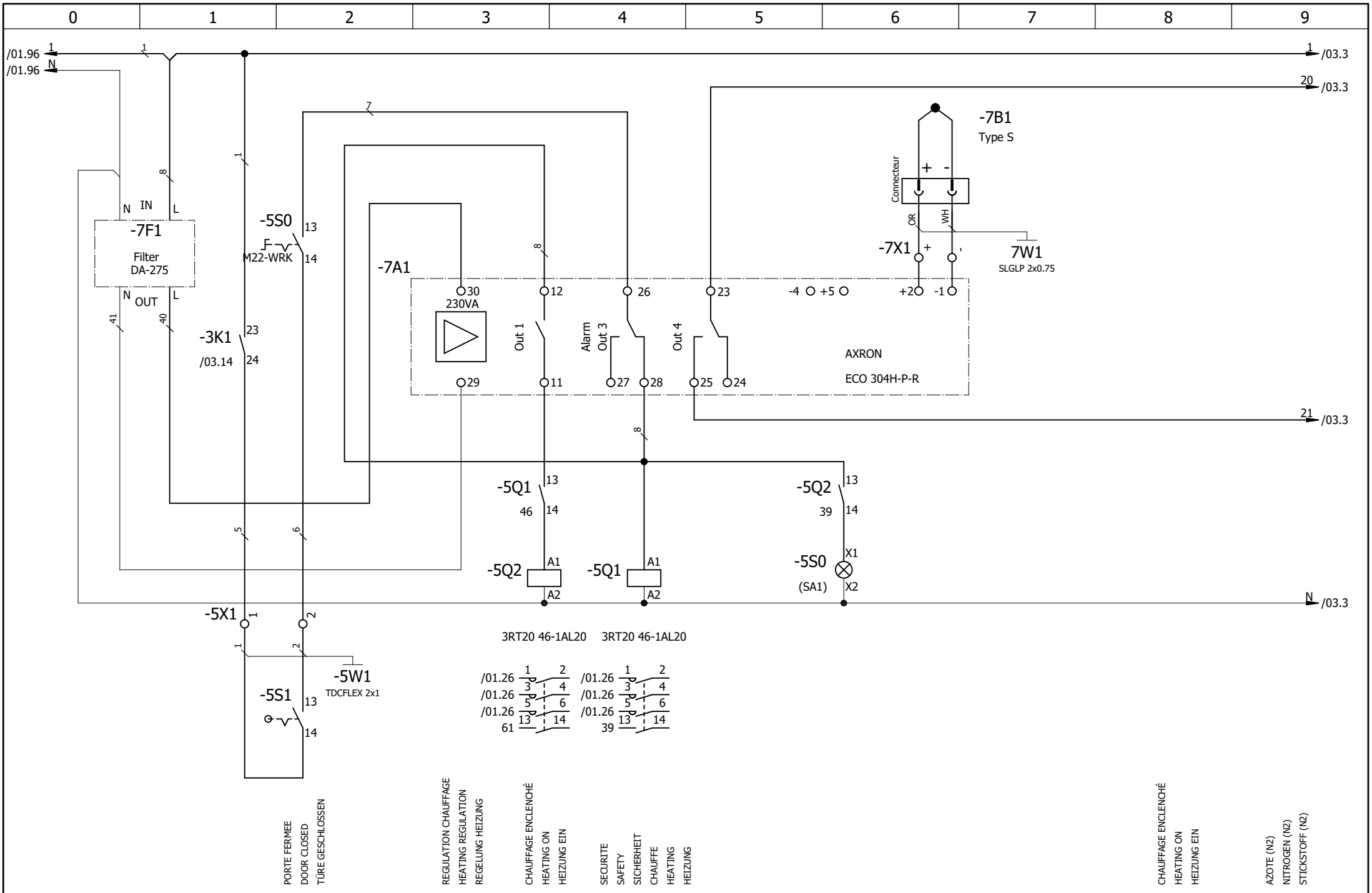

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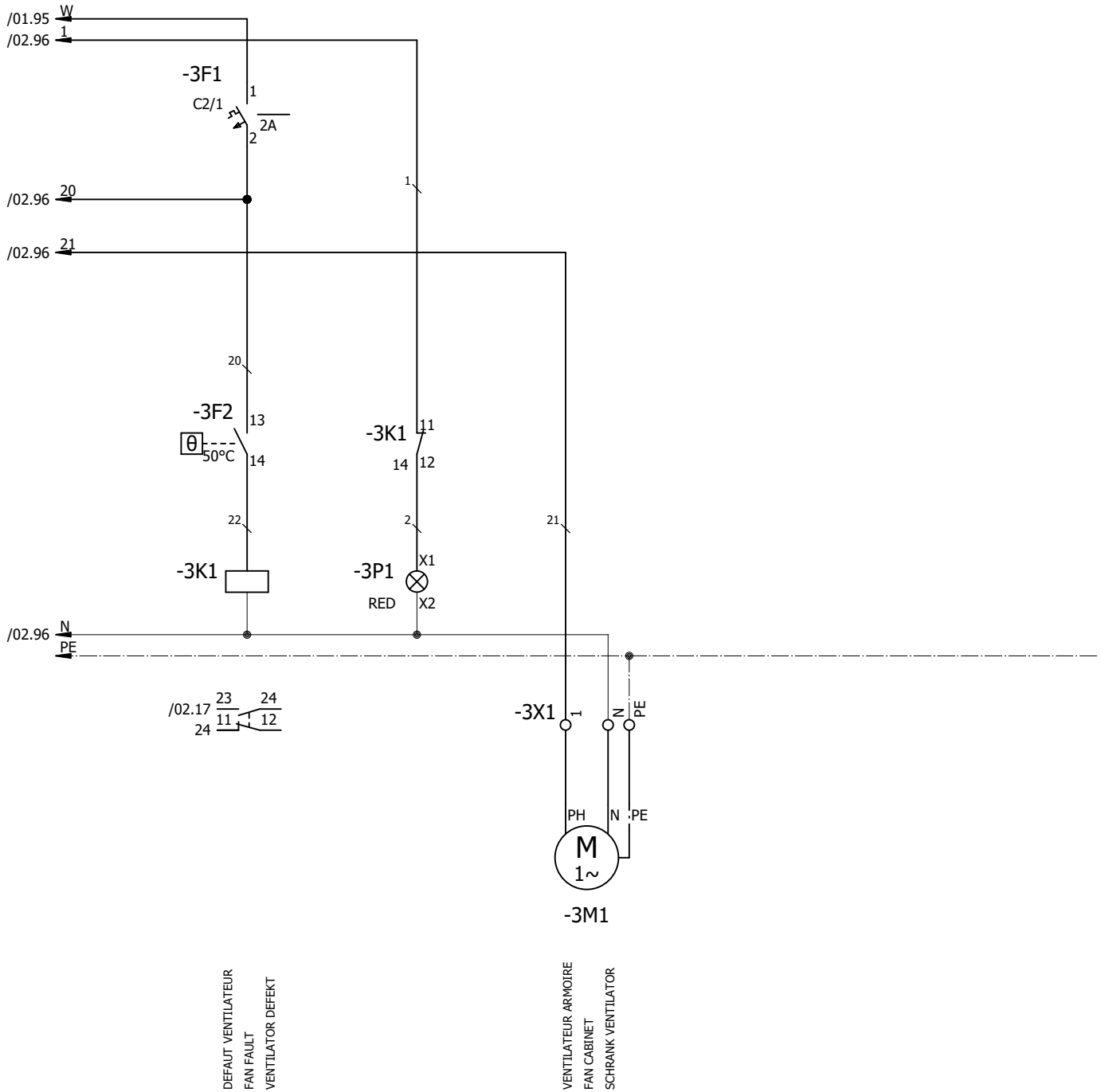
Installation: FI 1250-640			Modified Modifié						
1250 C° 3x400VAC/50Hz 52.5kW			Seen Vu				FI 1250-640 / 02 Schémas élect.		



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N° CDE:			Checked Controlé				02 Schémas élect.	
Installation: FI 1250-640			Modified Modifié				Station :	Place :
1250 C° 3x400VAC/50Hz 52.5kW			Seen Vu					

Borel
Standard Furnaces & Ovens
Switzerland

Annexe C

Manuels d'instructions de l'appareillage

Appendix C

Regulator instruction manuals

Annexe C

Bedienungshandbuch des Reglers

Midland Industrial Temperature Solutions Company

User Instructions

ST 3300 Temperature Programmer

Models

	3300-1	3300-2	3300-3	3300-4	3300-5
Display Ident	1	2	3	4	5
No of programs	1	10	10	10	10
No of segments	2	4	16	16	16
Event Output				1	1

Unit 5, Aston Fields Trading Estate
Aston Road
Bromsgrove
B60 3EX
Tel: 01527 882553 Fax: 01527 836830
Email: info@mitsco.co.uk

Contents

User Controls
- General View
- Switch On
- Switch Off

Program Entry
- Delay
- Segments
- Event
- End
- Exit Program

Starting the Firing
Stopping the Firing Manually
During the firing
- Pause
- Info Key
- Segment Advance
- Event override
- Slow Firing
- Keypad Lock

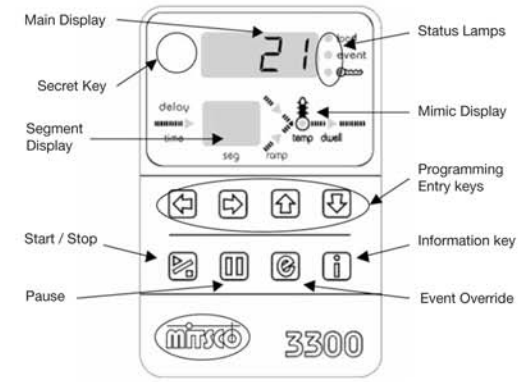
Advanced
- Modifying a running program
- Event Programming
- Info Key
- Kiln Energy
- Power Fail
- 3 Zone Control (Option)
- Configuration

About this Manual
These instructions take you through the process step by step assuming you are using the controller for the first time.
Basic operations are shown first and more complex operations are shown at the end

Installation
A separate manual is available showing how to connect the unit and configure for particular applications. If you purchase this unit from a kiln supplier they will normally have done this for you.

General View

User Controls



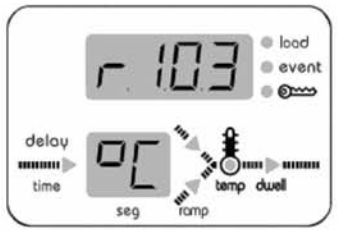
The controller is a highly adaptable unit which allows the user much greater flexibility in program entry than has previously been possible.

The user may freely create programs with segments consisting of either Up or Down Ramps and Dwells. Depending upon the model you may create up to ten programs each containing up to sixteen segments, where a segment is one ramp and one Dwell.

Additionally you can
- Create indefinite Dwells for a holding firing.
- Create your program using either ramp rates or elapsed times.
- With the Event version trigger events at each segment

Switch On

The controller power switch is located below the unit.
When the unit is first switched on, all of the segments on the display and all of the indicators are illuminated, as a lamp test.
The displays then show information, which defines the particular instrument you have, for 3 seconds.



r — Thermocouple type
10 — Software revision
3 — Model Type (See specifications)
°C — Temperature units

After 3 seconds the display will show the current kiln temperature.
You may then Run or Amend a program.

Important
If you phone for technical support we will need to know the information displayed above. (01527 882553)

Switch Off

It is recommended that you ensure you have stopped the program (No mimic lights will be flashing) before switching off.
Note that if you switch off whilst the controller is running a program, the controller may start automatically when you switch on again.

Program Entry

To set a program you should first check that a program is not running.
If there are flashing lamps on the mimic
Press the Stop / Start key once to Stop

The key functions whilst entering a program are;-

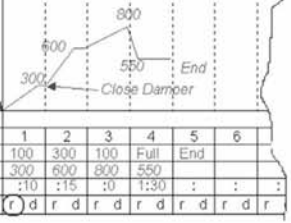
Move forward and back through program segments

To change values for each segment

To Exit program mode and save the changes

To show the program number you are setting

Title	Graph
My First Firing	
Comments	
An example to show how it works	



Program Number	1							
Delay	0:0	1	2	3	4	5	6	
	Ramp Rate	100	300	100	Full	End		
	Temperature	300	600	800	550			
	Dwell Time	:10	:15	:0	1:30	:	:	:
	Event	r d	r d	r d	r d	r d	r d	r d

The programming form provides a convenient way of ensuring you have all the information required to hand. It also provides a record of what you have programmed into the controller.

Delay
Pick the program number you wish to use and set the initial delay prior to the firing.

Action	Display	Values
Program No 1-10	Pn 1	• 1 only on 3300/1 1-4 on 3300/2 1-16 on 3300/3/4/5
Delay	PASS	• Pass (=0) or • 0.01 to 99.59 (HH.MM)

Segments
Enter the values for your firing as a sequence of segments
(See the attached sample form.)

Action	Display	Values
1st Ramp Rate	100	• 1 to 999 OC/Hour * or • Full (=Max) * (0.01 to 99.59 HH.MM in time mode)
1st Temperature	300	• 1 to Setpoint limit or • End (=0)

Enter the values for your firing as a sequence of segments
(See the attached sample form.)

Action	Display	Values
1st Dwell Time	10	• Pass (=0) or • 0.01 to 99.59 (HH.mm) or • Hold (=Max)

Event — **Event version only**

Action	Display	Values
1st Event sequence	E rd	The Relay will be on in;- • -- = Event Off or • rd = Ramp & Dwell or • -d = Dwell only or • r- = Ramp only

For more detailed information on setting up events see later in this manual
Continue entering segment information until the firing profile has been completed

End
Mark the end of a firing sequence (This example has four segments in the program and so five is marked as the end)

Action	Display	Values
Ramp Rate	End	Press and hold until;- • End

Exit Program

Caution
If you press this twice you will exit program mode and then run the program

Starting the Firing

Either **To run the program last viewed or used**

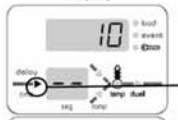
Or **To display program number**

To select the required program

To Store the new program number

To Run the selected program

When the program starts the program number will be displayed for a short time and then the program will run.

Function	Display	Description
Delay		Remaining Delay Time
		Delay (Flashing)
Ramp		Current Temperature
		Up Ramp (Flashing)
Dwell		Current Temperature
		Dwell (Flashing)

Stopping the Firing manually

If the controller is running then one of the mimic lights will be flashing.
To stop the firing press the Start / Stop key once.

During the Firing

Pause

Press Once to Pause, Press Again to Continue

– – – – Display will flash when paused

This function can be disabled,

A timed over-ride is also applied (15 minutes default)

See installation Manual – Configuration to change if required.

Info Key

Press to scroll through various parameters.

Pn Program number currently running.

E Energy used so far during Firing in KwH.

SP The Current Setpoint value.

rd Remaining time in Dwell. (Dwell segment only)

Segment Advance

The controller will move to the next step in the program.

Event Override

This key over rides the event relay state.
The 'Event' Lamp shows the current state.
If the program moves to a new segment the value set in the program will be applied.

Slow Firing

Flashing 926

A Flashing indicator that tells the user that the kiln has not kept up with the program. (With programs that have previously worked this may indicate faulty elements.

Keypad Lock (Secret)

This key locks or unlocks the rest of the keys. Press and hold for approximately a second. The Lamp is lit when locked.

Advanced

Modifying a running program

You may modify a running program. The following points should be observed;-

- Make sure you are modifying the correct segment.
- If you change a dwell time you will re-start that Dwell from the new value.
- If you change an Up Ramp such that the new end temperature is lower than the current temperature then the ramp will change direction. (Similarly for the opposite case)
- If you change a Dwell setpoint when you are in the Dwell the controller will attempt to change as rapidly as possible. You may get Over or Undershoot in these conditions.

When modifying a running program

- The segment number is the one you are changing.
- The static mimic lamp is the value you are viewing.
- The flashing mimic lamp indicates only if the controller is on a Ramp or a Dwell.

To accept the changes you have made you must press the Start / Stop key once only. (If you press it twice you will terminate the firing!)

Event Programming

The Event output is programmed as either On or Off in each part of every program segment. If a segment is programmed with E = r- then the relay will be turned On at the start of the ramp and Turned Off at the start of the Dwell.

- When the controller is first powered the event will be Off.
- When a program is run the event relay will respond to the entered values for each segment.
- The user may over ride the state at any time by pressing the "Event" key. (The 'event' lamp will show the current state)
- Whenever the power is turned off the current state of the event relay is stored, and restored upon return of power.
- When the program Ends the Event relay is left in its last state. Whilst switching at a specific temperature is not directly supported, this may easily be achieved by adding extra segments.

eg. To have an initial Ramp to 600°C at 100°C per Hour, with a damper opening at the start, and closing at 300°C;-
Enter
Ramp 1 @ 100°C to 300°C, Dwell 1 = Pass, & Ramp event On
Ramp 2 @ 100°C to 600°C, Dwell 2 = as req'd, Ramp event Off

Info Key

This key serves various purposes;-

- **Whilst entering a program**
  Whilst pressed the key will show the program number you are setting.
- **During a Firing**
  Scrolls through various parameters
  - Pn Program number currently running
  - E Energy used so far during Firing in KwH
  - SP The Current Setpoint value
  - rd Remaining time in Dwell (Dwell segment only)
- **Firing complete**
  - E Energy used in KwH
    This value is stored until a new firing is started
- **Parameter Setting**
  See the Installation manual

Kiln Energy

The display of energy used is an estimated usage based upon the value entered in configuration for the rating of your kiln. Since ageing of elements will affect this you should use this as a comparative value rather than an absolute measure.

Power Failure

If the power fails during a firing the controller will check to see the temperature upon restoration of power. If this has not changed by more than 100°C / 180°F the firing will continue. If the change is greater than 100°C the controller will show. PF

3 Zone Control

The "3 Zone" controller may be used as a three or two zone control.
Whichever is to be used the controller may be configured for two methods of control which we define as Absolute or Differential.

Comparison

	Diff (Default)	Abs
Best Uniformity	Yes - If main zone is slowest	No
Fastest firing	No – Restricted by slowest zone	Yes
Simple to set up	Interaction between zones may be a problem	Yes

Differential

The main zone is controlled directly by the program. The other zone(s) will attempt to follow what the main zone achieves.
(This is the equivalent of having differential controllers and back-to-back thermocouples for the slave zones)
With this configuration it is normal to make the main zone the slowest in the kiln. The controller will then provide the best uniformity by slowing down the faster zones to match the slowest.

Absolute

All zones follow the program profile directly. If they are not able to achieve the set rates then they will only achieve what each zone is inherently capable off.

Hardware Definition Code

The 3 Zone controller has five possible outputs
(Zone 1, Zone 2, Zone 3, Alarm, Event.)
However only four outputs may be used. The user must choose which are required and set the hardware definition code to define this choice. See the installation manual for details of setting the Hardware definition code.

Configuration

Changing the values in the list should only be undertaken by an experienced operator or engineer.

- With the instrument switched Off
- Press and hold the Info key whilst turning on the power.
- Wait until the first parameter is shown
  - Use the → key to move through the list
  - Use the ↑ ↓ keys to change parameters
- Press the Start key to exit configuration and use the controller

	Display	Parameters
User Level		
Alarm Type	AL	OFF or bAnd or tr or iP
Alarm Temp	At	NB The band alarm will not trigger during a Ramp if a ramp rate of Full is selected
Kiln Rating (Kw)	Kr	0 (Default) to 99.9 Kw
Trip Temp (Option Board)	Ot	This value is above the highest point in the program Default = 50°C
Engineer Level	EL	You are blocked at this point

Title	Description	English	German
Slow Start	Kiln rises too slowly at start of firing ie T/C not in, or short cct, Kiln failed	Err1	F1
Band Alarm		Err2	
Over Temp			
T/C High	T/C input above the T/C max	Open	F3
T/C Low	T/C input below the T/C Min	Fail	F4
Finish	Program completed	End	Ende

Slow Start

When program is started, controller looks for a change in setpoint of 50°C. If the process has not changed by >10°C at this point then an error is raised. This function can be disabled by setting err1 to off.

Band Alarm

The measured temperature is differs from the setpoint by more than the value set in Alarm Temperature.

Over Temp

T/C High

This signals that the controller has seen a value above the maximum for the thermocouple. This will normally be caused by open circuit thermocouple wiring.

T/C Low

This signals that the controller has seen a value below the minimum for the thermocouple. This will normally be caused by reverse connected thermocouple wiring.

Error 5 Trip Alarm only

The process temperature has exceeded the highest setpoint by the amount set in Alarm Temperature. 20°C default

Notes

User Guide – simplified version

Controller Axron ECO 300H-P

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1.0 Description of controller:

The front panel is composed of two screens, 3 control lights (LED diodes) indicating the output status and 3 control lights indicating the state of the program. The device is set and configured using five key-buttons.

1. Upper display : indicates process value or parameter value during setting.
2. Lower display : indicates set point or type of parameter
3. Diode 1 : indicates the state of the output « Heating » .
4. Diode 2 : indicates the state of the output 2.
5. Diode AI : indicates the state of the alarm output
6. Diodes rate-sp-time: indicate state of program

Keyboard functions:


Key for setting and viewing the parameters. By pressing this key the modification of the parameter set is confirmed and the controller switches to the next parameter.


Key for decreasing a parameter value.

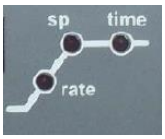

Key for increasing a parameter value.

Key to start and stop a program.

Key for editing a program.

2.0 Basic mode :

The controller is in basic mode after power up. Upper display shows the process value. Lower display shows oFF or the set point value. If a program runs, the diodes indicate the state of the program:



- «rate » blinks, « sp » is ON: rate up or down of set point temperature
- «time » blinks, « sp » is ON: soak at set point temperature

If there is an other heading on lower display, the controller is not in basic mode.

To return in basic mode press shortly the keys  .

3.0 Information and error messages:

On the upper display:

---- error of temperature sensor

On the lower display:

PCLK indicates a time-delayed start of program.

GSD indicates that process value is outside the adjusted tolerance.

For other messages, please refer to the main manual.

4.0 Controlling of set point value - Program:

The controller enables controlling of set point value or controlling by a simple program (ramp and soak).

4.1 Controlling by set point value:

Setting of set point value SP1 can be changed with the arrow-keys  ,  . The new value is validated 2 seconds after the last pressing of the key.

Don't forget the push button « Heating ON/OFF » (for the furnaces equipped).

4.2 Controlling by simple program:

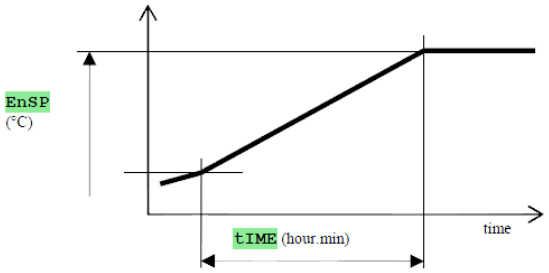
When the program is not active (before starting or after ending), the controller is controlled by the set point value SP1(see 4.1)

The program consists of single step (maximum 15) that can be used or not. It is possible to have until 30 programs.

4.2.1 Types of steps:

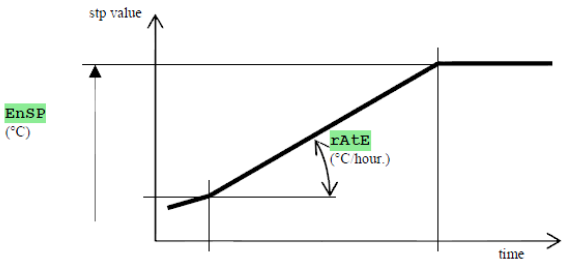
The following pictures shows all types of steps you can use.

StPt : Ramp rate up or down of set point value, characterized by final set point value EnSp [°C] and time needed for reaching value tIME [hour.min]

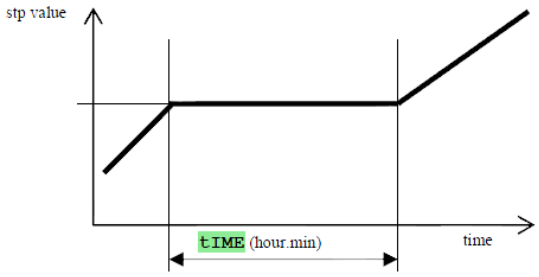


Initial set point value is the same as the final set point value of preceding step.

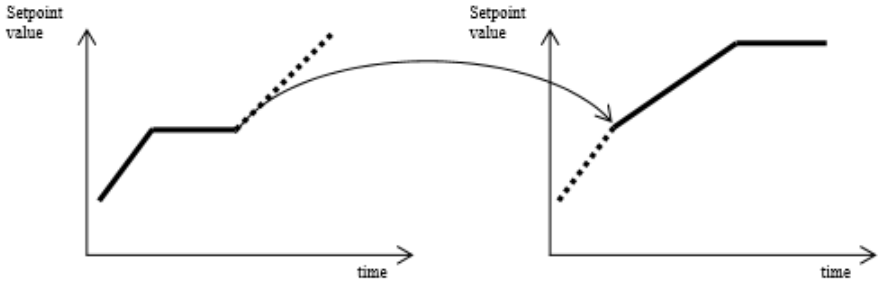
rAtE : Rate up and down of set point value, characterized by final set point value EnSp [°C] and rate of time to set point value rAtE [°C/hour]



SoaK: soak on set point value, characterized by time tIME [hour.minute]



JuMP: jump in a program, characterized by J Pr [number of program] and J St [number of step]



End: the program ends with step End.

4.2.2 Additional step parameters:

Entx :

In option on certain furnace, the controller can control external devices like air flap by using an auxiliary output (event output). In this case, each step has another parameter: Ent1. This parameter has 2 states on or oFF.

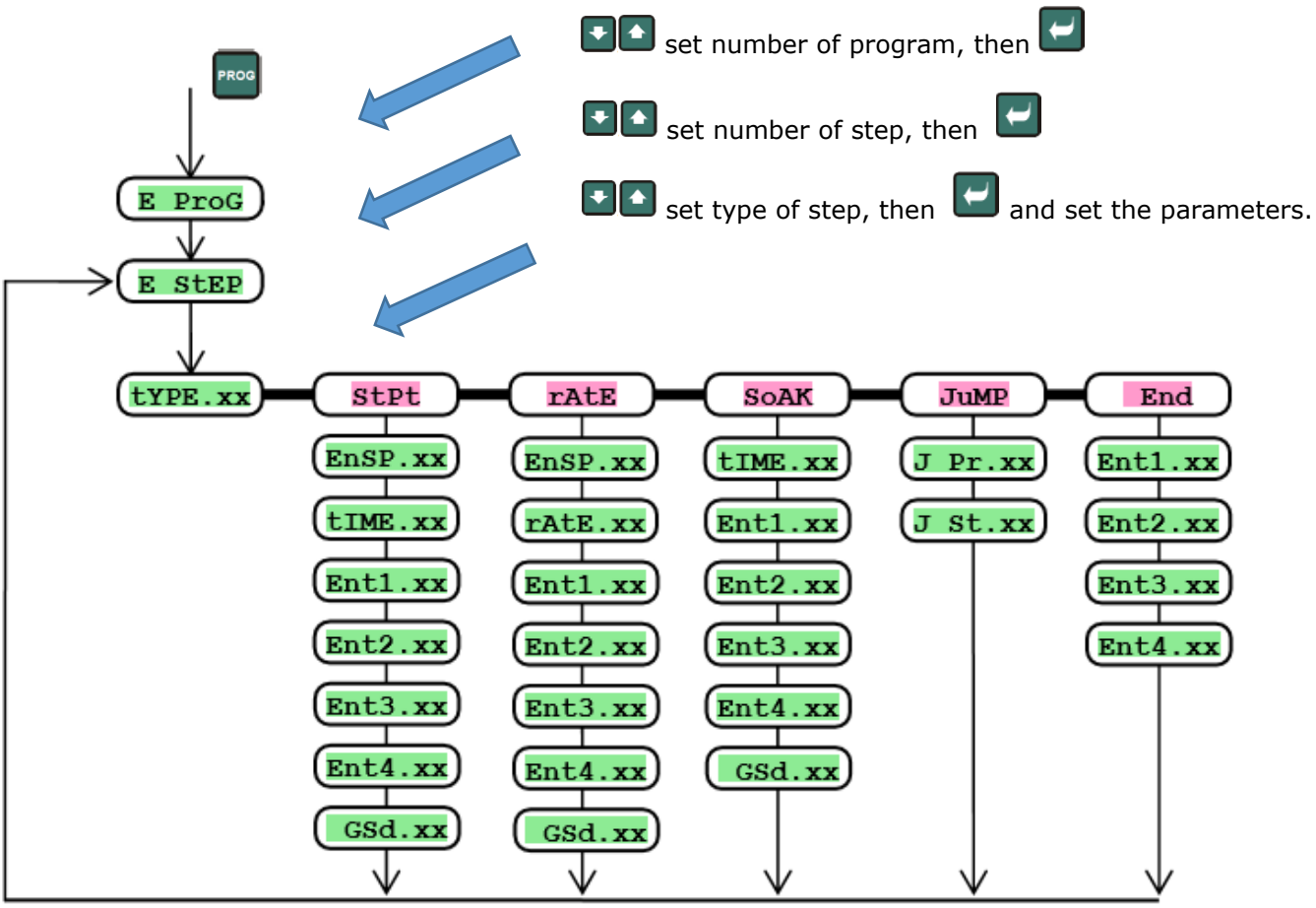
GSD :

The function GSD is defined for each step separately and can be used or not. For more details, please refer to the main manual.

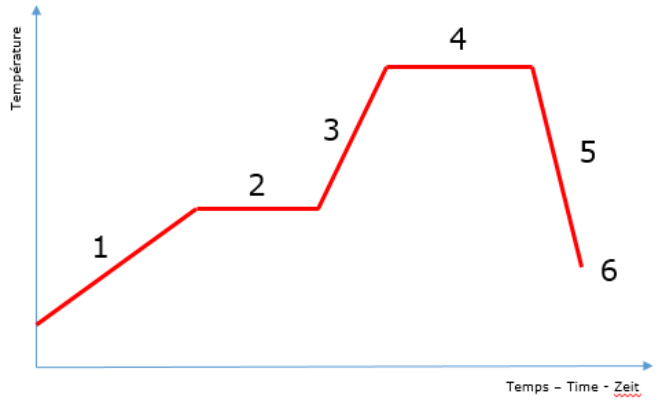
4.2.3 Editing a program:

To enter the menu for editing a program from basic mode, press the key PROG.

To exit the editing menu, press shortly the keys ▼▲.



4.2.4 Program example:



1. Ramp up to set point value 150°C within 1h30, event output is OFF
2. Soak of 1 hour 10min, event output is ON
3. Ramp up to stp value 1050°C with rate 250°C/hour. Event output is OFF
4. Soak of 50min, event output is OFF
5. Ramp down to stp value 150°C with rate 300°C/hour. Event output is OFF.
6. Program end, event output is OFF.

E StEP	tYPE.xx	EnSP.xx	tIME.xx	rAtE.xx	Ent1.xx	GSd.xx
1	StPt	150	1.30		oFF	oFF
2	SoAK		1.10		on	Strt
3	rAtE	1050		250	oFF	oFF
4	SoAK		0.50		on	on
5	rAtE	150		300	oFF	oFF
6	End				oFF	
7						
8						

4.2.5 Starting, ending a program:

The program can be started by the command of operator with keyboard or can be automatically started by the internal time clock.

4.2.5.1 Starting a program by keyboard:

Press shortly the key START STOP. Prog appears on lower display. Set the number of program you wish to start by using the keys ▼ ▲ and confirm with START STOP.

The control diodes are blinking.

4.2.5.2 Starting a program by the internal clock:

Press and hold the key START STOP 3 secondes. PCLK appears on lower display and you have to proceed as follows :

- PCLK : set the number of program you wish to start with ▼ ▲ and confirm with START STOP. If you set oFF, automatic start is not allowed.
- Mon dAY : set month and day of start. Mon set oFF, the program starts every day.
- dAtE hour Min set parameters and confirm with START STOP

If you set the automatic starting a program by the clock, PCLK is blinking on lower display.

To stop an automatic starting, press and hold the key START STOP 3 secondes and set the parameter PCLK = oFF.

4.2.5.3 Ending a program :

To stop a program, press shortly the key START STOP. Prog appears on the lower display. With the keys ↓ ↑, you can set :

- Cont and confirm with START STOP, the program will continue.
- End and confirm with START STOP, the program will be stopped.

At program stop, the controller maintains the set point value SP1. If you did not want to heat after a program, you must set the value SP1 to 0 before starting a program.

5.0 Automatic setting of control parameters PID :

The PID Parameters define the behavior of the controller. The controller use two sets of PID parameters according to the temperature. One set is used at low temperature and the second at high temperature.

5.1 Autotunning :

The controller is fitted with the function that automatically sets PID parameters.

You can start autotunning in a program as well as in controlling by set point value, but the control output must not be turned OFF. The set of PID parameter adjusted (PID 1 or 2) depends of the actual temperature of the furnace (low or high).

To start the autotunning, press ↵ many times, until the parameter Aut = oFF appears. Set Aut=ht and confirm with ↵.

On lower display blinks Aut1 or Aut2 during the operation. It can takes several minutes.

Borel
Standard Furnaces & Ovens
Switzerland

Annexe D

Certification CE

Appendix D

CE certification

Annexe D

CE-Zertifizierung

CE DECLARATION DE CONFORMITE

CE KONFORMITÄTSERKLÄRUNG

CE DECLARATION OF CONFORMITY

Cette Déclaration de Conformité est conforme à la Directive machine 2006/42/CE. Les bases pour ces critères ont été trouvées dans la documentation internationale, et autres spécifications techniques.

Diese Konformitätserklärung entspricht der Richtlinie 2006/42/CE für Maschinen. Die Grundlagen für diese Kriterien und anderen technischen Spezifikationen. wurden in der internationalen Dokumentation gefunden.

This Declaration of Conformity is in conformity to the European Standard 2006/42/CE. The basis for the criteria has been found in international documentation or other technical specifications.

CE

Porrentruy, le 03.11.2021

Nous, SOLO Swiss SA,
déclarons sous notre seule responsabilité, que l'équipement:

Wir, SOLO Swiss AG,
erklären in alleiniger Verantwortung, dass die Ausrüstung:

We, SOLO Swiss LTD,
declare under our sole responsibility that the equipment:

Type:
Typ:
Type:

Borel FI 550-500, FI 550-700, FI 550-1000, FI 550-1600, FI 550-2100, FI 550-2400, FI 550-3700, FI 600-60, FI 600-130, FI 600-180, FI 600-300, FI 600-500, FI 600-850, FI 600-1550, FI 1100-50, FI 1100-120, FI 1100-180, FI 1100-250, FI 1100-400, FI 1100-740, FI 1100-1100, FI 1100-1600, FI 1250-53, FI 1250-63, FI 1250-84, FI 1250-120, FI 1250-140, FI 1250-160, FI 1250-200, FI 1250-280, FI 1250-350, FI 1250-420, FI 1250-490, FI 1250-640

satisfait aux dispositions de la Directive machines 2006/42/CE et est conforme aux normes:

entspricht mit der Maschinen-Richtlinie 2006/42/CE und Normen konform ist:

satisfy the provisions of the machine directive 2006/42/CE and are in conformity with the following standards:

2014/35/UE	(Directive basse tension – Niederspannungsrichtlinie - Low Voltage Directive)
2014/30/UE	(Compatibilité électromagnétique – Elektromagnetische Verträglichkeit - Electromagnetic Compatibility)
EN 746	(Equipements thermiques industriels - Industrielle Thermoprozeßanlagen - Industrial thermal Equipments)

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f 55.075.6/version 01/12.10.16/FL