

Three-Phase Static Switch System K864

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Documentation	Date	Signature
Issued	02.10.2008	N. Deufel

Rev.	Description	Date	Signature
A	Simplified diagram (Three-Phase UPS-System) (76 K864-S1 E)		
0	First edition	11.08.08	A. Scherer

Static Switch

Voltage	3 x 220V AC Phase to virtual-N
Frequency	50Hz
Power	10000 VA
Switching times:	
- mains to inv. (mains priority)	½ period, typical ¼ period (including time for detection mains failure)
- inv. to mains (inv. priority)	½ period, typical ¼ period (including time for detection inv. failure)
Switch back to:	
- mains (mains priority)	uninterruptable
- inv. (inv. priority)	uninterruptable
Switching point	$0.8 U_{nom} < \text{voltage} < 1.15 U_{nom}$
Surge current	$5 \times I_{nom}$ for 1sec.
Output protection	Short circuit protected by external fuse which needs to be provided for nominal output current
Signal inputs	Logic low = 0 - 5V / logic high = 12 - 30V via opto-coupler
Relay contacts	$U_{max} = 250V_{AC}$, $I_{max} = 3A$

General

Operating temperature	-20°C to +75°C
Load derating	2.5 %/°C from +55°C
Storage temperature	-40°C to +85°C
Isolation resistance	> 10 MΩ at 500V DC
Isolation test	acc. to EN 60950-1: 2003
Safety / Construction	acc. to EN 60950-1: 2003
Earth leakage	< 3.5 mA at 230V AC, acc. to EN 60950
RFI-interference	acc. to EN 55022, class A
Connection	see connection diagrams
Dimensions	see dimensions outline drawing

Highlights

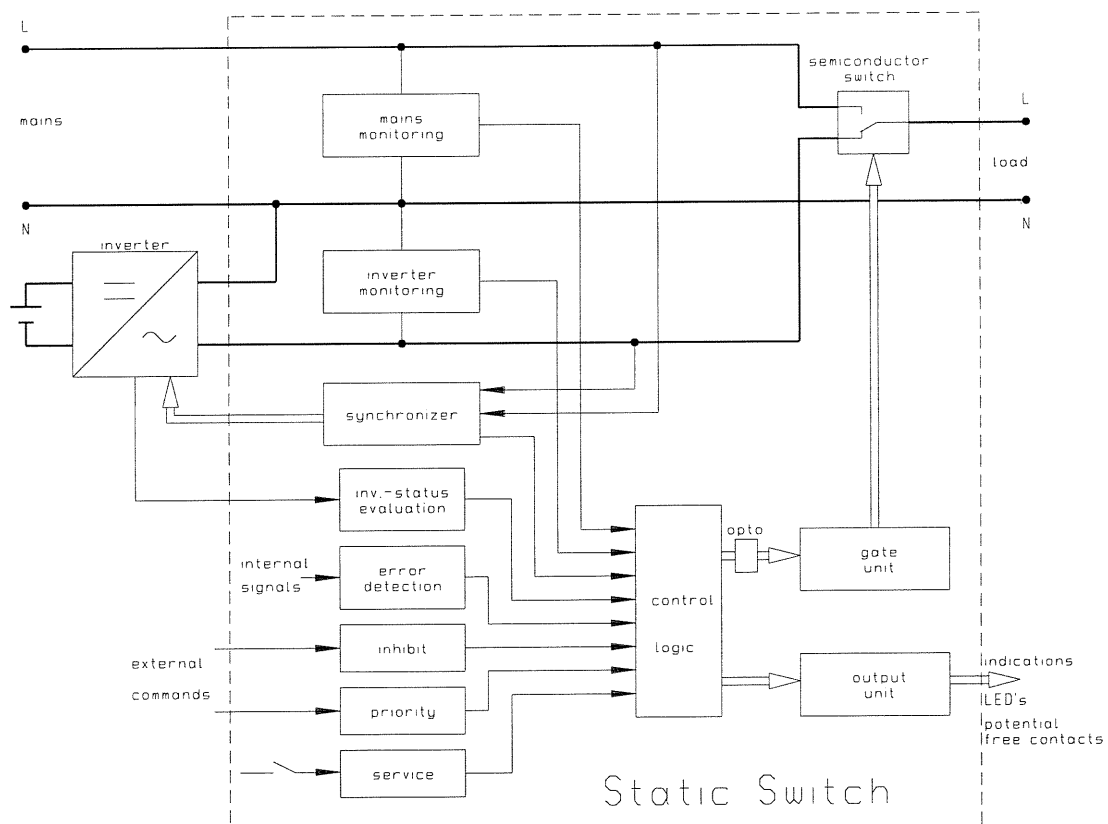
- Wall mounting

The static switch transfers the AC loads from the mains to the inverter output or vice versa. It synchronizes the inverter to the mains frequency when mains voltage is present or when it came back after a power failure. To achieve logically correct operation, the static switch monitors and evaluates:

- under- and overvoltage of the mains
- under- and overvoltage of the inverter
- short circuit at the output
- present mode of operation
- faults

For adapting the unit to different requirements, it is possible to select externally via an opto-coupler priority for mains- or inverter operation. Further, the static switch can be turned off electronically via another opto-coupler input, it acts like an electronic fuse and disconnects the load at a certain overload level, and a manual switch can disable the automatic selection and connect the load to either the mains or the inverter output. LED's and potential-free relay contacts indicate the mode of operation.

During mains operation, the inverter is synchronized to the mains. In case of a mains failure (input voltage drops below a certain level or exceeds another level), the sensing circuit takes approx. 1/4 cycle until the irregularity is recognized and the output is then with practically no interruption transferred to the inverter output. Upon return of the mains, the inverter is automatically synchronized to the mains again and the output load is transferred back to the mains with practically no interruption.



1. Indication

1.1 Indication by LED's

1.1.1 Indication of the mode of operation, at master only (green)

Mains operation:	The LED indicates that the output load is supplied by the mains.
Inverter operation:	The LED indicates that the output load is supplied by the inverter.
Inverter is synchronized:	This LED indicates that the inverter operates in synchronized synchronism with the mains, regardless whether the load is supplied by the inverter or whether the inverter operates idle in synchronism to the mains.

1.1.2 Indication of warnings or faults (red)

Mains overvoltage	(mains voltage $> U_N + 15\%$)
Mains undervoltage	(mains voltage $< U_N - 20\%$)
Inverter overvoltage	(inverter voltage $> U_N + 15\%$)
Inverter undervoltage	(inverter voltage $< U_N - 20\%$)
Common alarm (<i>at master only</i>):	- mains- or inverter voltage out of tolerance - semi-conductors in the power switching circuit overloaded - auxiliary voltage for control circuits too low - inhibit activated
Service mode (<i>at master only</i>):	- service switch activated (de-activates priority selection) It is indicated that the static switch operates in manual mode, dependent of the position of the mode selector switch. The output load is connected to either the mains or the inverter output.

1.2. Indication by potential-free relay contacts

The following indications are given by potential-free switch-over contacts:

- mains operation (*at master only*)
- inverter operation (*at master only*)
- common alarm (*at master only*)
- inverter output voltage ok
- mains voltage ok
- inverter is not synchronized with mains (*at master only*)

2. Inputs for externally controlling the static switch (*at master only*)

Via opto-coupler inputs the following commands may be given to the static switch:

2.1 Inhibit

Upon application of voltage (12 - 30V DC) to the inhibit input all power semi-conductors of the static switch are inhibited, so that the output load is disconnected from any source of power.

2.2 Priority

The priority command select whether the mains on the inverter is connected to the load under normal (both input voltage are within the tolerance) conditions. If we have no special order the priority is preset to inverter.

2.2.1 Priority to the inverter (factory preset)

Without an external priority command and under normal condition, the inverter supplies the output load if it works correctly. Upon failure of the inverter, the static switch automatically connects the load to the mains. Upon return of the inverter output voltage, the inverter will be synchronized to the mains voltage and operation will then be transferred back to the inverter.

2.2.2 Priority to the mains

Upon application of voltage (12 - 30V DC) to the priority input the mains is given priority and the inverter runs idle in stand-by. Upon mains failure, the loads are connected by the static switch to the inverter output. Upon return of the mains, the inverter is synchronized to the mains voltage and the load is then switched back from the inverter output to the mains.

With factory preset to mains priority, the external priority input has no function.

3. Manual mode (service switch on the front panel, *at master only*)

In neutral position of the switch the external priority selection signal determines whether the load is supplied in normal (undisturbed) operation by the mains or the inverter.

3.1 Switch turned to "mains"

In this position the load is connected to the mains output. Upon failure of the mains the static switch transfers the load from the mains output to the inverter.

3.2 Switch turned to "inverter"

In this position the load is connected to the inverter output. Upon failure of the inverter the static switch transfers the load from the inverter output to the mains.

4. Connections

For proper operation of the static switch the following connections are necessary:

4.1 Power connections

These are the input connections (mains and inverter) and the output connections (load). It should be mentioned that the neutral is not switched so that neutral of the mains, neutral of the inverter and neutral of the output are firmly connected together.

4.2 Connections to the inverter

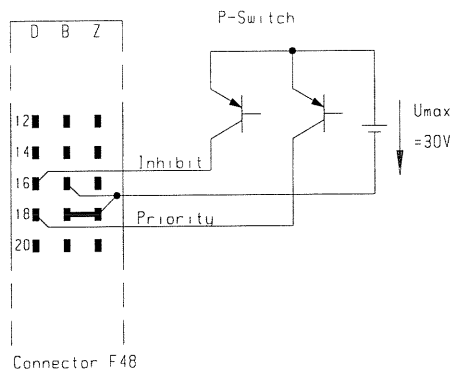
The 6 connections to the inverter should be made with shielded cable (e.g. 6x0,38mm²). The screen should be connected to ground at the inverter.

4.3 Inputs (*at master only*)

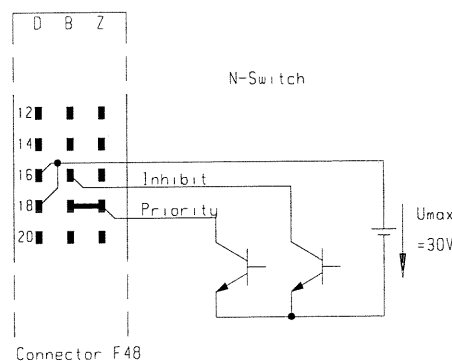
The inputs for inhibit and priority are galvanically insulated from the auxiliary voltage circuit of the static switch by opto-couplers. Thus, the static switch may be controlled via the “P”- as well as via “N” switch.

Level: logical **LOW** = 0...5 V
logical **HIGH** = 12...30 V

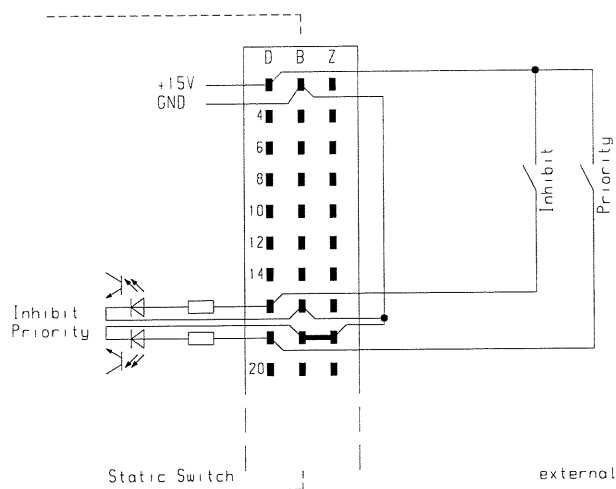
connection diagram P-switch



connection diagram N-switch



If there is no external voltage source available, the internal auxiliary voltage of the the static switch may be used according to the following diagram:

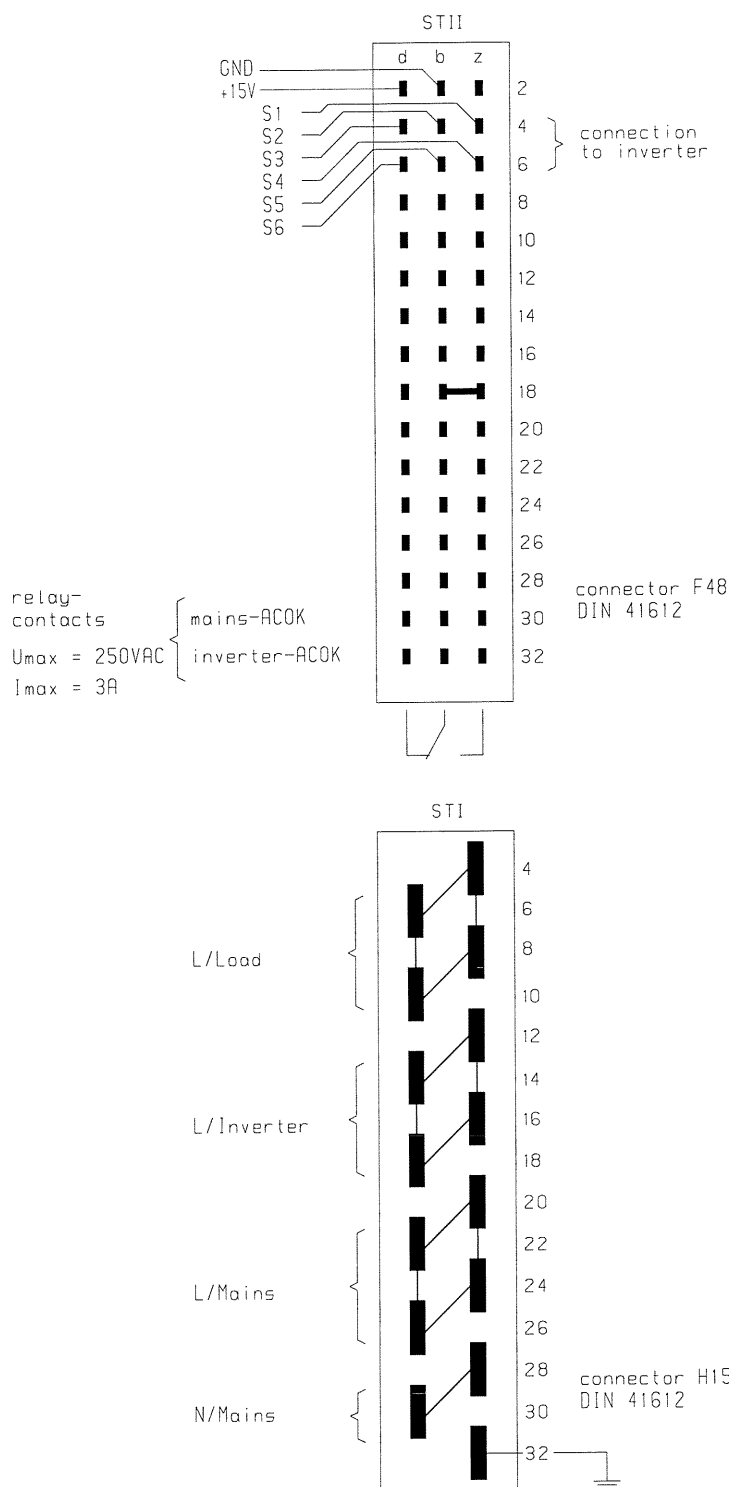


4.4 Relay outputs

The relay contacts are shown in “idle-position”, which means that during mains operation (the loads are connected to the mains via the static switch), for example the n.o. contact is closed.

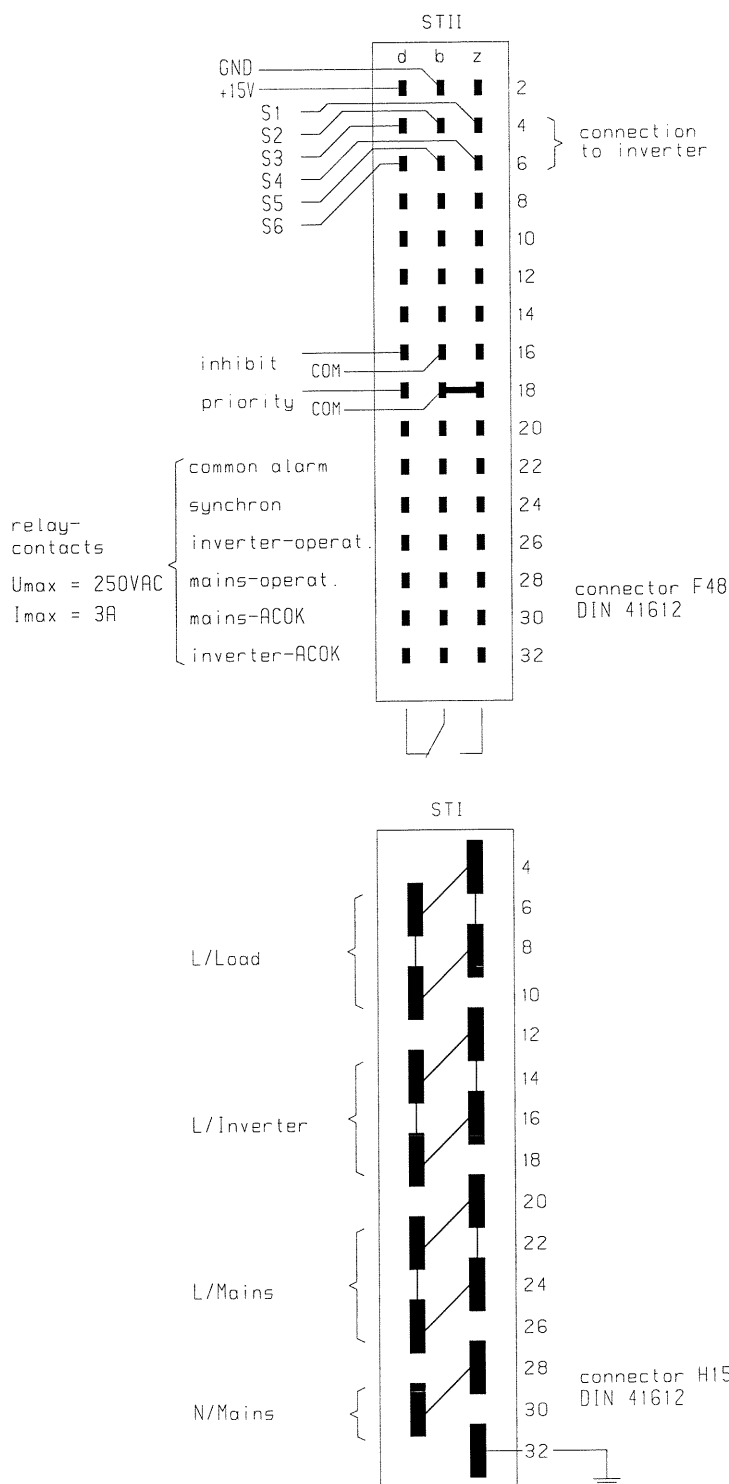
→ ATTENTION !

The Three-Phase inverter IV5878F.5-14 is operating correctly together with the Three-Phase Static Switch System K864 only.



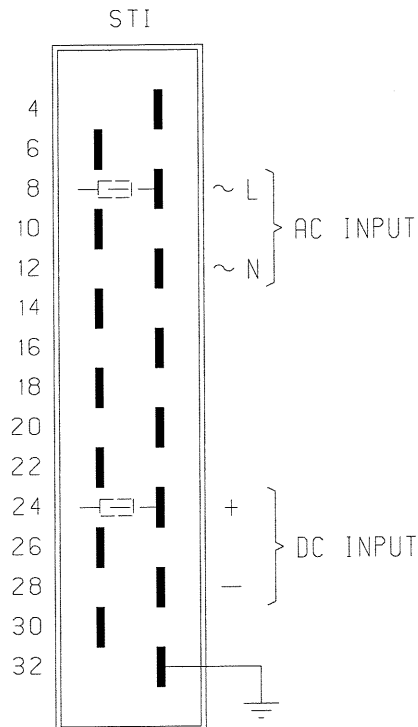
ST1 connector coding: "B"

The pins of the connector are rated 15 A max. At higher currents pins internally parallel connected must also be paralleled externally at the mating connector.



ST1 connector coding: "A"

The pins of the connector are rated 15 A max. At higher currents pins internally parallel connected must also be paralleled externally at the mating connector.



Rear view
Connector H15 DIN 41612

The pins of the connector are rated 15 A max. At higher currents pins internally parallel connected must also be paralleled externally at the mating connector.

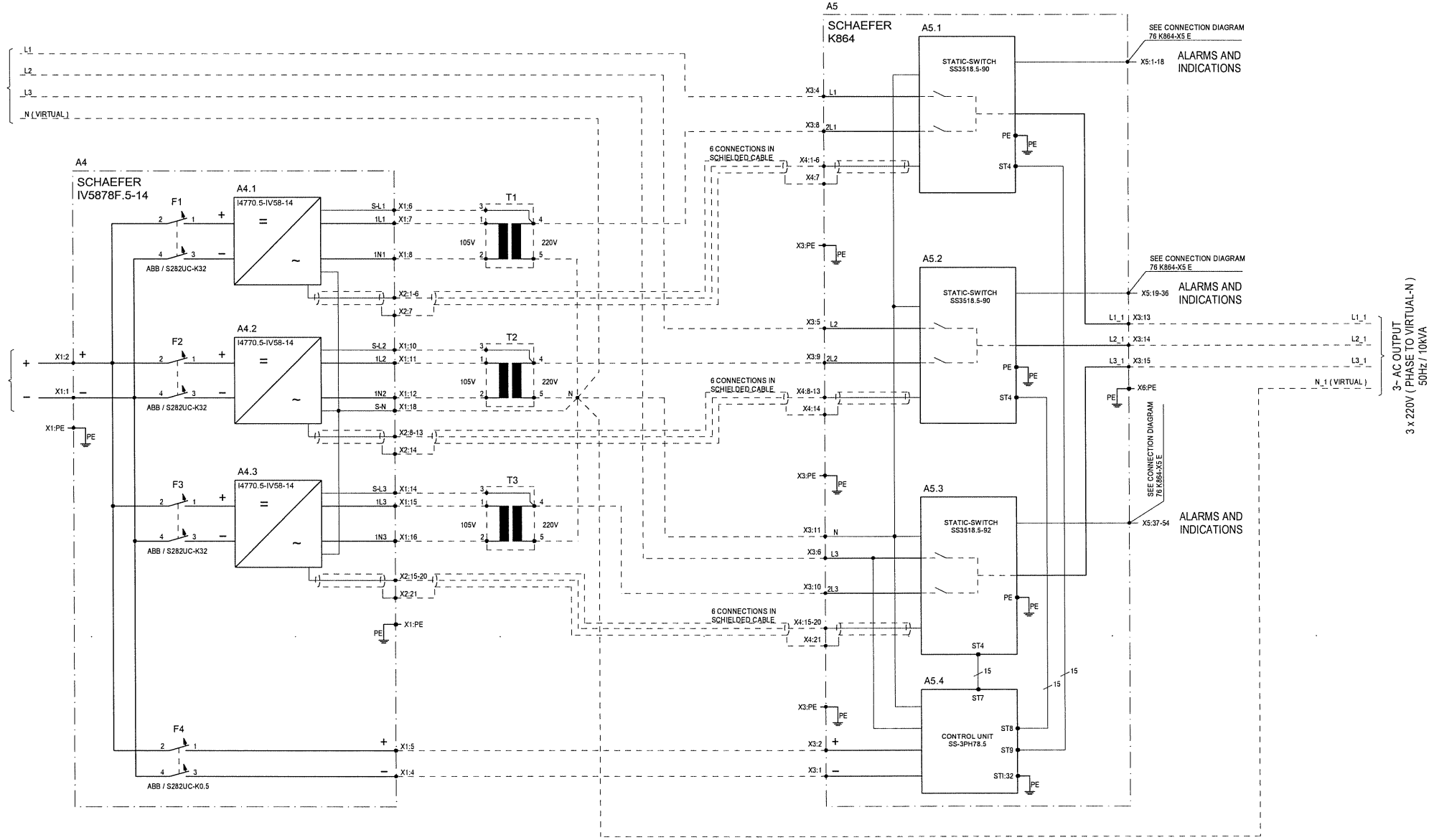
AC Input protection by internal fuse 0.63A slow

DC Input protection by internal fuse 0.63A slow

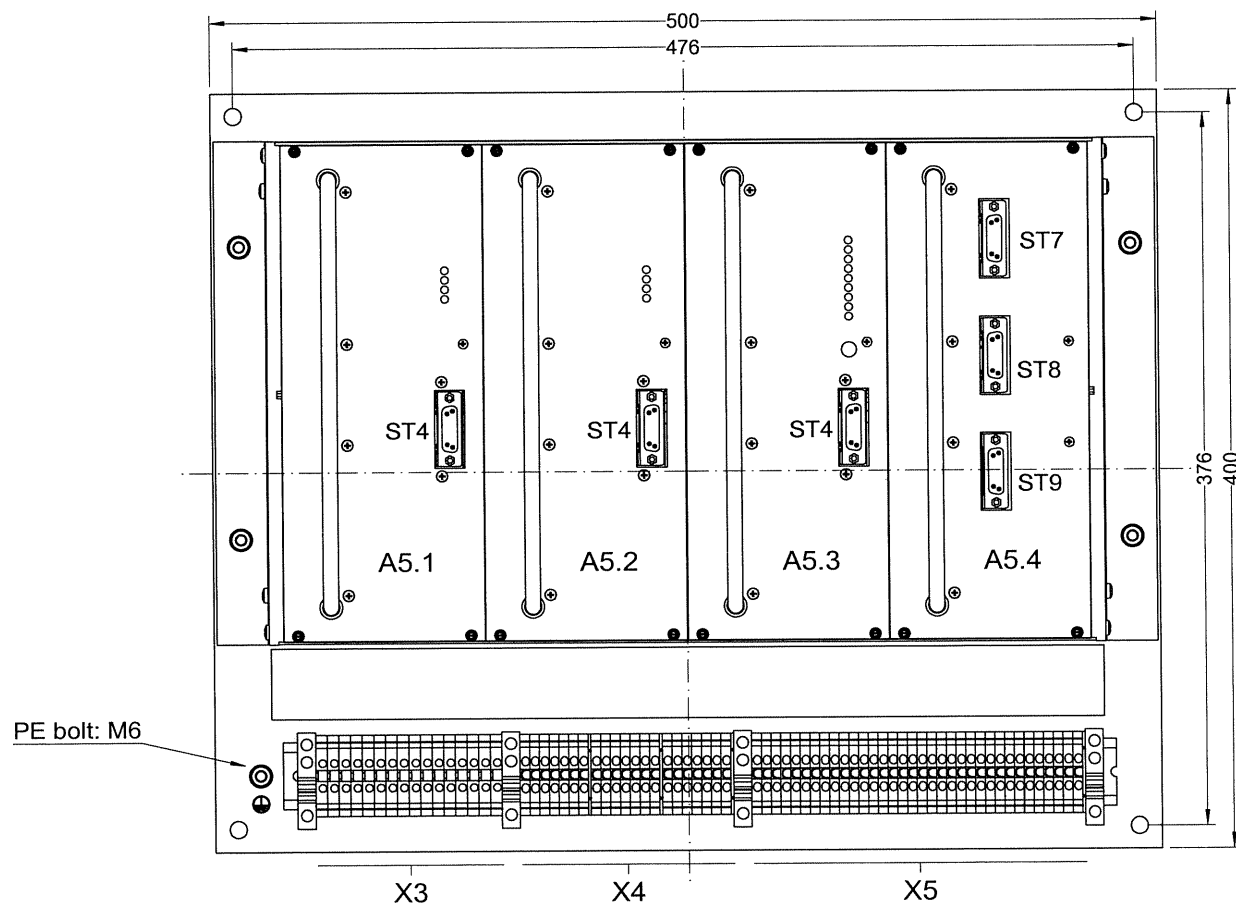
Do not use undefined pins, because it is not sure whether they are neutral.

FROM EXTERNAL
TRANSFORMER
3 x 220VAC (PHASE TO VIRTUAL-N)
50Hz

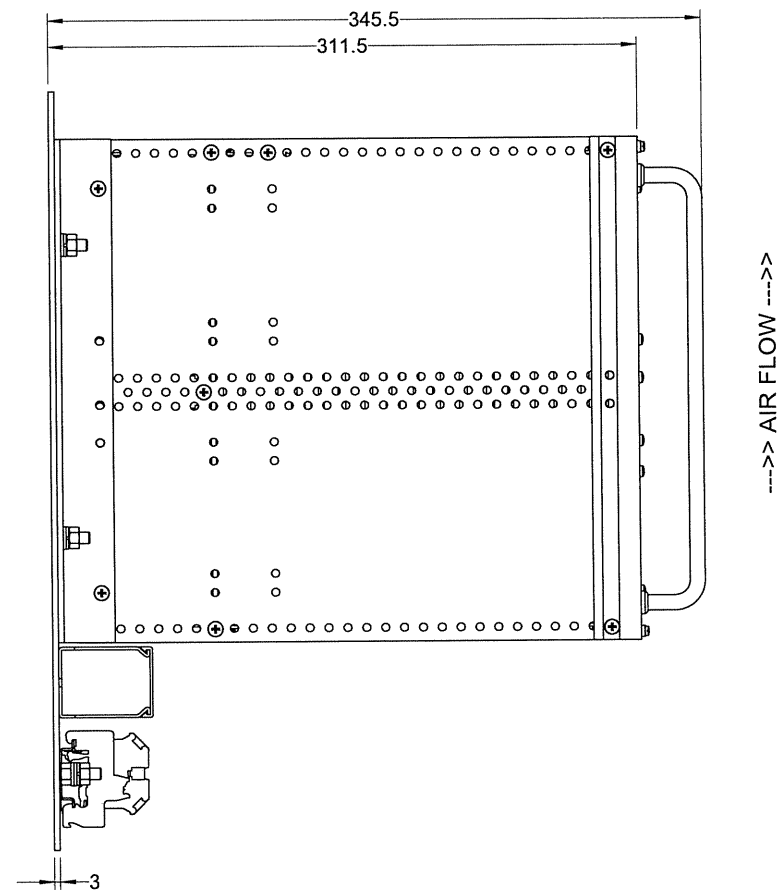
DC INPUT
180 - 360V



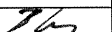
				Bearb.	26.06.08	A. Scherer		Benennung Simplified diagram Three-Phase UPS-System	Zeichnungsnummer 76 K864-S1 E	Blatt 1
				Gepr.						
				EDV						
Rev.	Änderung	Datum	Name		Datum	Name	Ers. f.:	Ers. d.:	M:\cad\caddy_malmod\K-Geräte\K864\	1 Bl.



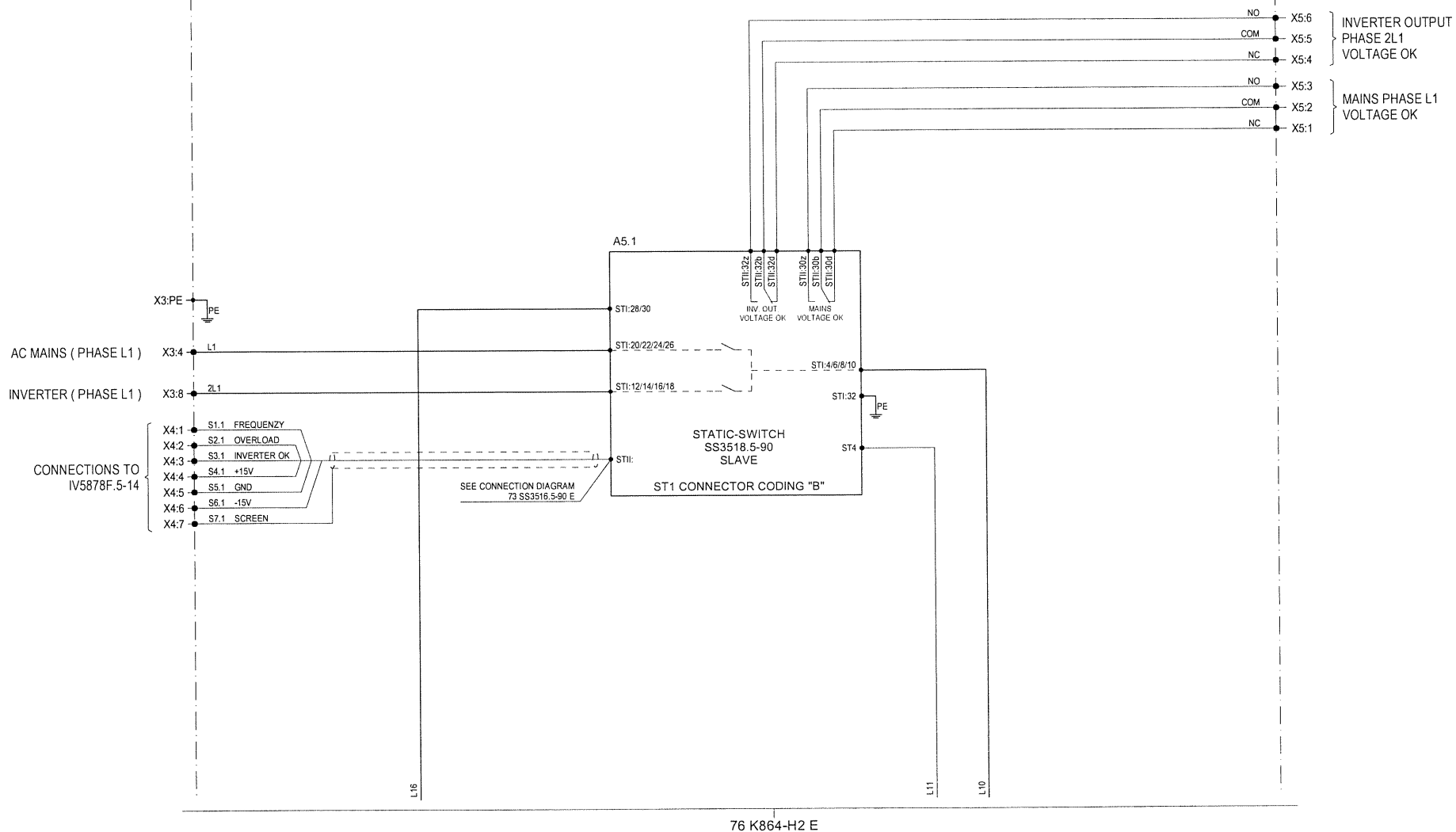
All mounting holes: Ø9.0mm



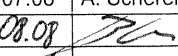
Protection acc. to: IP 20
Dimensions in: mm

		Bearb.	07.07.08	A. Scherer		Benennung Dimensional drawing K864	Zeichnungsnummer 76 K864-F1 E	Blatt 1
		Gepr.	12.08.08					
Rev.	Änderung	Datum	Name	Ers. f.:				
		Datum	Name	Ers. d.:		M:\cad\caddy_mat\mod\K-Geraetel\K864\	1	Bl.

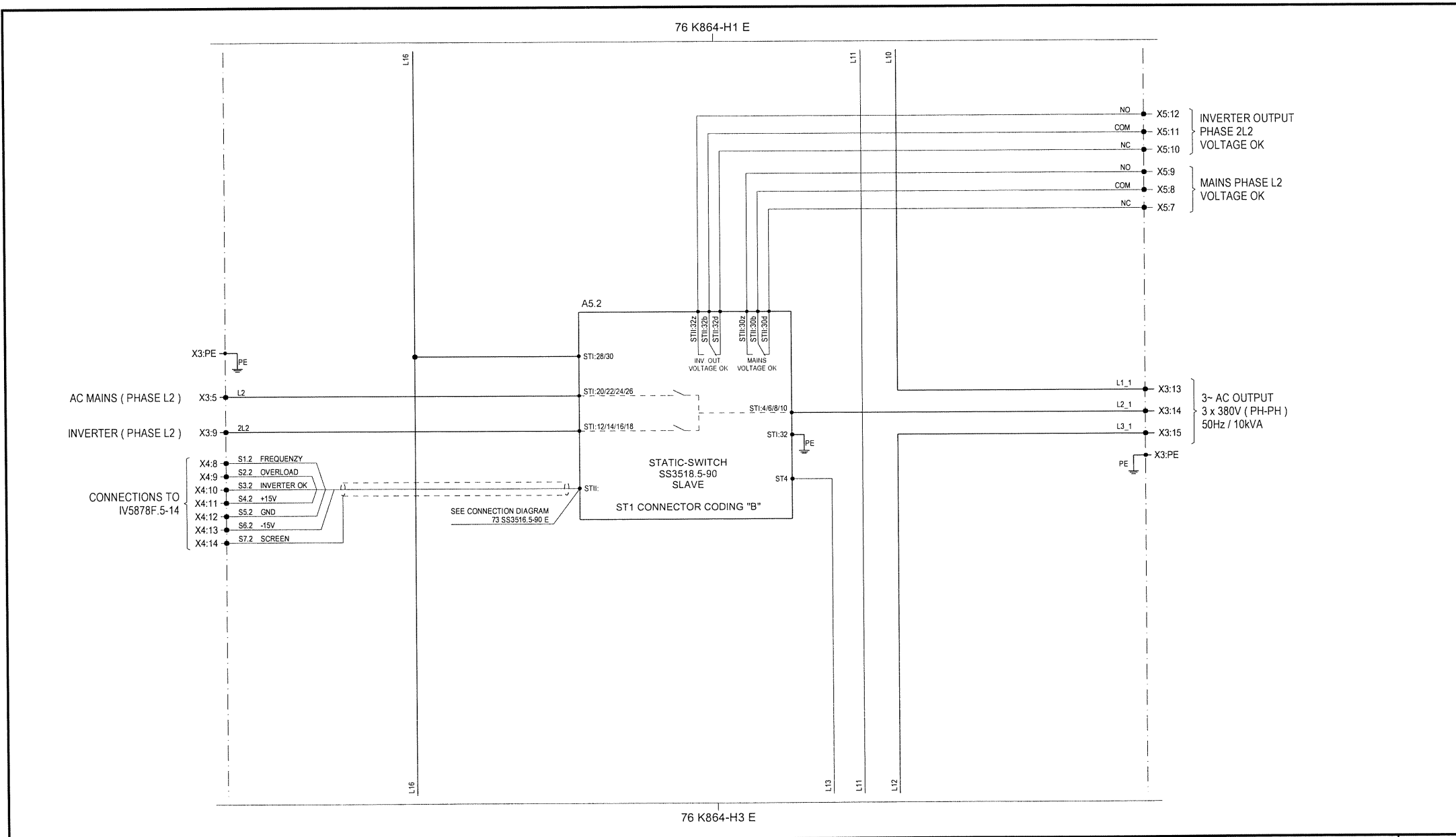
K864 (A5)



76 K864-H2 E

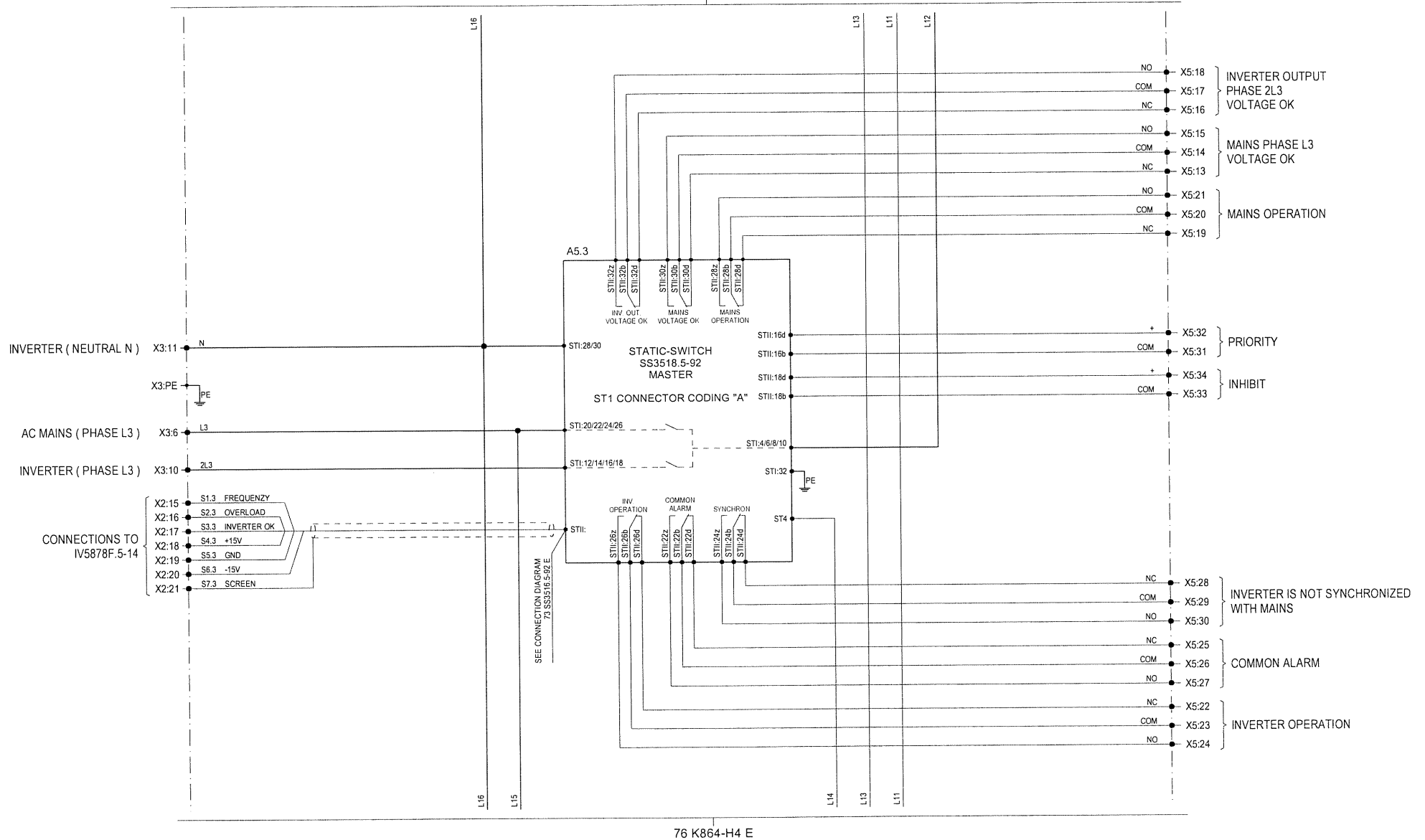
		Bearb.	03.07.08	A. Scherer		Benennung Wiring drawing K864	Zeichnungsnummer 76 K864-H1 E	Blatt 1
		Gepr.	12.08.08					
		EDV						
Rev.	Änderung	Datum	Name	Datum	Name	Ers. f.:	Ers. d.:	1 Bl.

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					Bearb.	03.07.08	A. Scherer		Benennung Wiring drawing K864	Zeichnungsnummer 76 K864-H2 E	Blatt 1
					Gepr.	12.08.08					
					EDV						
Rev.	Änderung	Datum	Name		Datum		Name	Ers. f.:	Ers. d.:	M:\CAD\GABO\76 K864\GABO\76 K864 E	

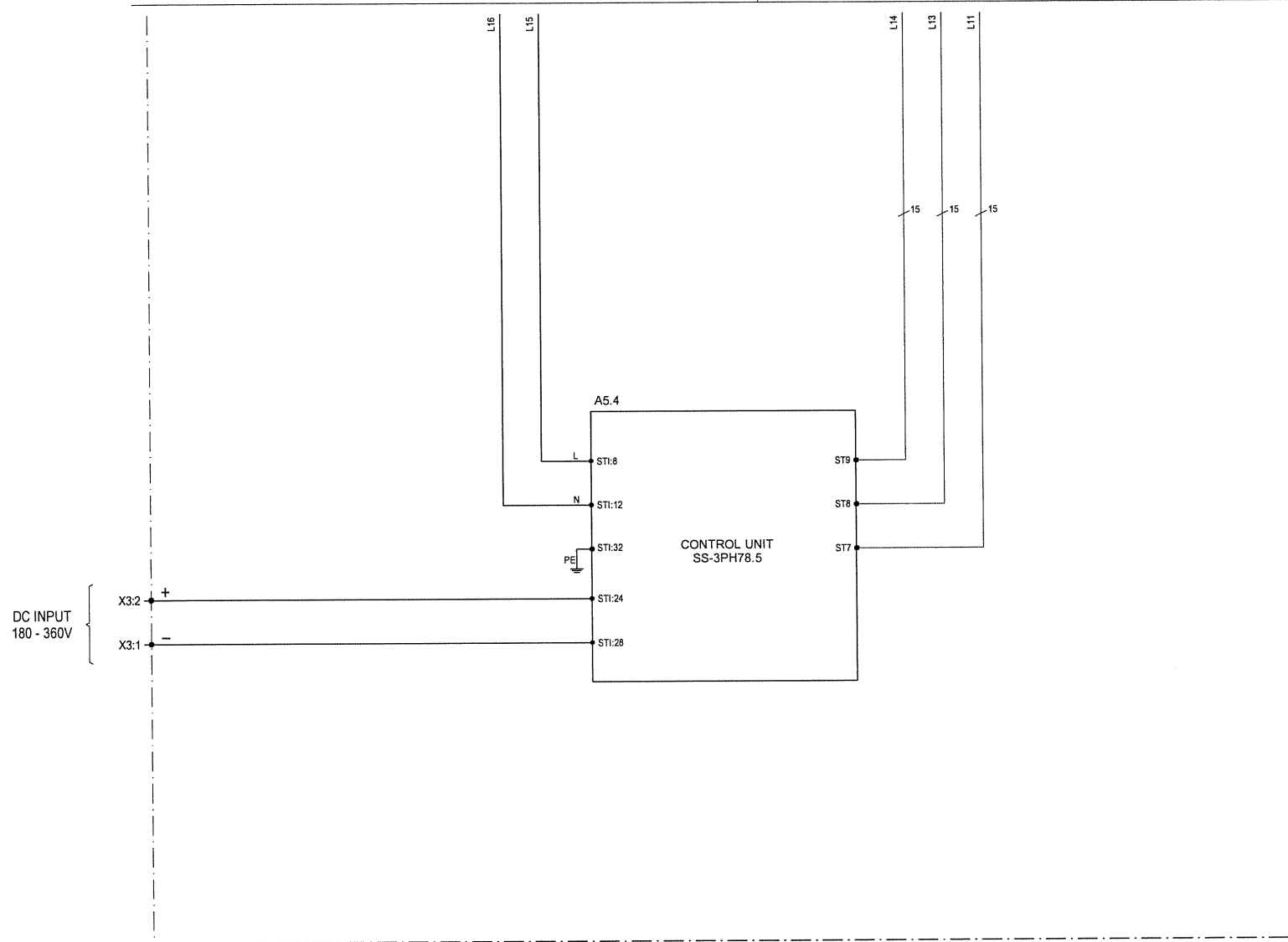
76 K864-H2 E



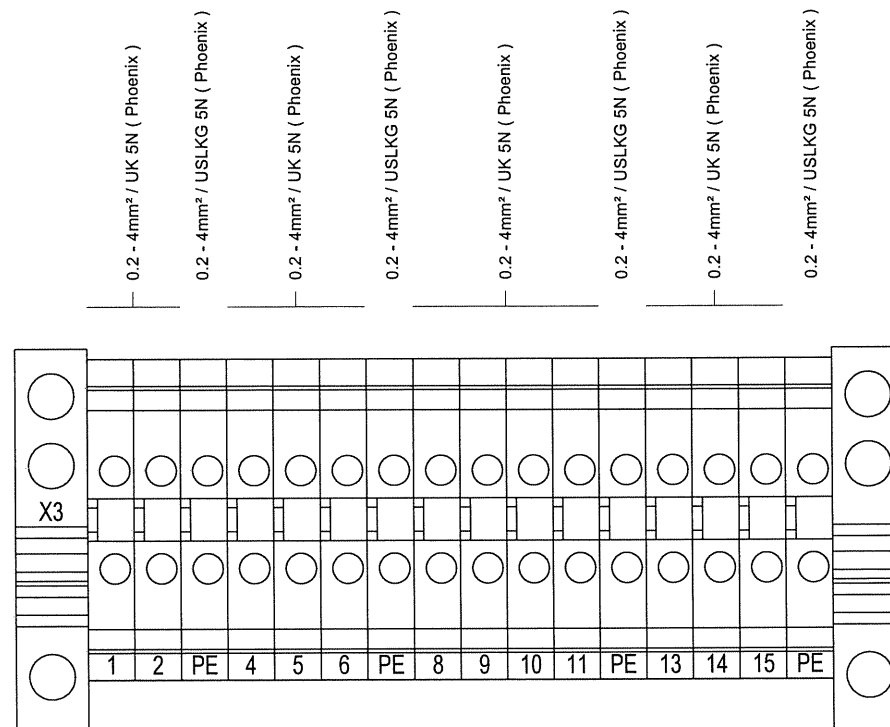
76 K864-H4 E

			Bearb.	03.07.08	A. Scherer		Benennung Wiring drawing K864	Zeichnungsnummer 76 K864-H3 E	Blatt 1
			Gepr.	14.08.08					
			EDV						
Rev.	Änderung	Datum	Name	Datum	Name	Ers. f.:	Ers. d.:	M:\cad\caddy_malmod\K-Geräte\K864\	1 Bl.

76 K864-H3 E

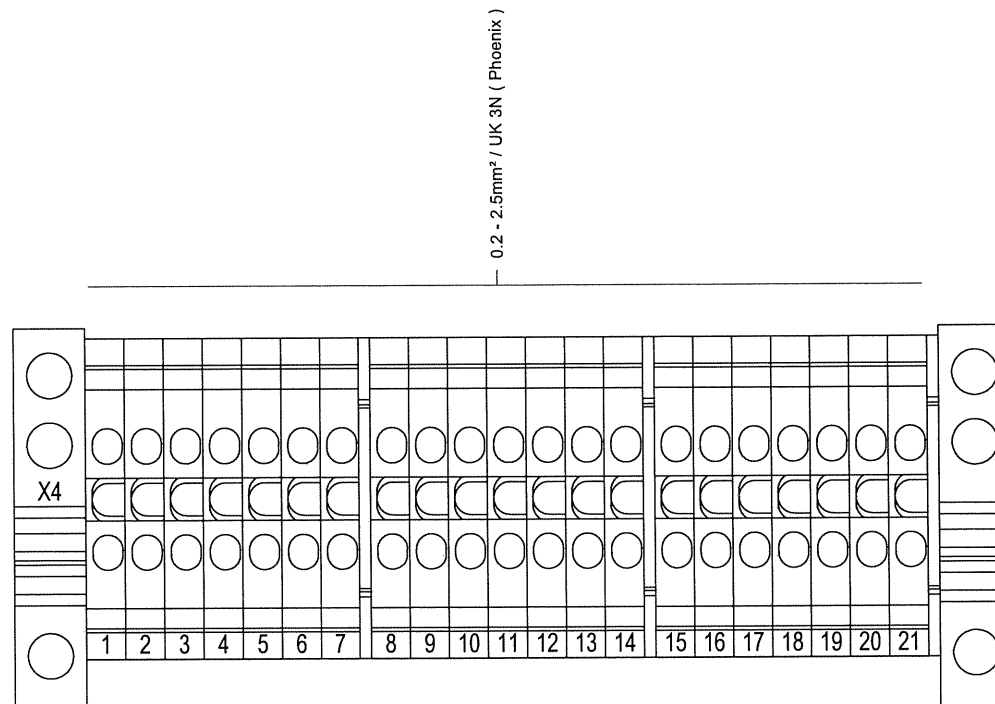


				Bearb.	03.07.08	A. Scherer		Benennung Wiring drawing K864	Zeichnungsnummer 76 K864-H4 E	Blatt 1
				Gepr.	12.08.08					
				EDV						
Rev.	Änderung	Datum	Name		Datum	Name	Ers. f.:	Ers. d.:	M:\CAD\BAG\012\AW\BIBID\MODEM\K864\	1 Bl.



X3	1	2	PE	4	5	6	PE	8	9	10	11	PE	13	14	15	PE
Terminal block	-	+	⏏	L1	L2	L3	⏏	2L1	2L2	2L3	N	⏏	L1_1	L2_1	L3_1	⏏
	DC INPUT 180 - 360V			3~ AC MAINS 3x 380V / 50Hz				3~ AC INPUT FROM INVERTER 3x 380V / 50Hz					3~ AC OUTPUT 3x 380V / 50Hz 10kVA			

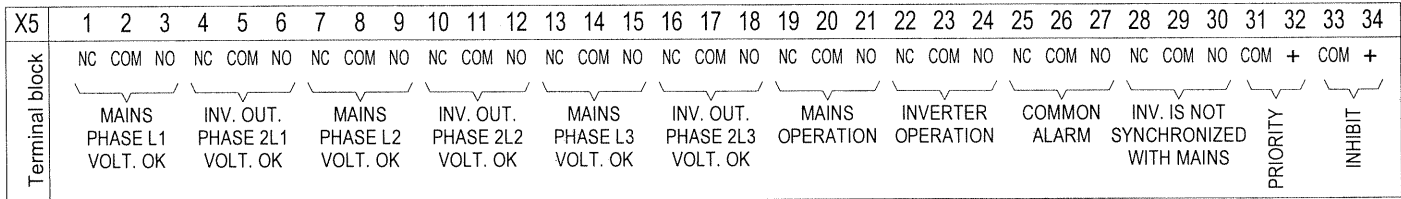
PLEASE NOTE!
THE SYSTEM MAY BE CONNECTED ONLY BY AN EXPERT.



X4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Terminal block	S1.1	S2.1	S3.1	S4.1	S5.1	S6.1	S7.1	S1.2	S2.2	S3.2	S4.2	S5.2	S6.2	S7.2	S1.3	S2.3	S3.3	S4.3	S5.3	S6.3	S7.3
	CONNECTION TO INVERTER IV5878F.5-14 (PHASE L1)							CONNECTION TO INVERTER IV5878F.5-14 (PHASE L2)							CONNECTION TO INVERTER IV5878F.5-14 (PHASE L3)						

PLEASE NOTE!
THE SYSTEM MAY BE CONNECTED ONLY BY AN EXPERT.
SEE ALSO PAGE: SIMPLIFIED "76 IV5878F.5-S1 E"

				Bearb.	07.07.08	A. Scherer		Benennung	Zeichnungsnummer	Blatt
				Gepr.	12.08.08			Connection diagram	76 K864-X4 E	1
				EDV				K864		
Rev.	Änderung	Datum	Name		Datum	Name	Ers. f.:	Ers. d.:	M:\CAB\GADON\K864\76 K864-X4 E.dwg	1 Bl.



INHIBIT:
a signal of 12 - 24VDC between terminals 33 and 34,
switches off the static-switch.