

User Manual

SIGMA AIR MANAGEMENT SYSTEM

SBU

No.: 901736 07 USE

Manufacturer:

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1 Regarding this Document

1.1 Using this document

The operating manual contains important information to the entire life cycle of SBU.

The operating manual is a component of the product.

- Keep the manual in a safe place throughout the life of SBU.
- Pass the manual on to the next owner or user of the equipment.
- Ensure that any amendments received are inserted in the manual.
- The images shown are only examples. Menus or functions may be shown that are not available in the specific product or will be introduced at a later time only.

1.2 Copyright

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1.4 Symbols and labels

- Please note the symbols and labels used in this document.

1.4.1 Warnings

Warning notices indicate dangers that may result in injury when disregarded.

Warning notices indicate three levels of danger identified by the corresponding signal word:

Signal term	Meaning	Consequences of ignoring the warning
DANGER	Warns of an imminent danger	Will result in death or severe injury
WARNING	Warns of a potentially imminent danger	May result in death or severe injury
CAUTION	Warns of a potentially dangerous situation	May result in a moderate physical injury

Tab. 1 Danger levels and their definitions (personal injury)

Warning notices preceding a chapter apply to the entire chapter, including all sub-sections.

Example:

1 Regarding this Document

1.4 Symbols and labels

⚠ DANGER

These show the kind of danger and its source.

The possible consequences of ignoring a warning are shown here.

If you ignore the warning notice, the "WARNING" signal word indicates a lethal or severe injury will occur.

- *The measures required to protect yourself from danger are shown here.*

Warning notes referring to a sub-section or the subsequent action are integrated into the procedure and numbered as an action.

Example:

1. **⚠ WARNING** *These show the kind of danger and its source.*
The possible consequences of ignoring a warning are shown here.
If you ignore the warning notice, the "WARNING" signal word indicates that a lethal or severe injury may occur.
 - *The measures required to protect yourself from danger are shown here.*
2. Always read and comply with warning instructions.

1.4.2 Potential damage warnings

Unlike the warnings shown above, damage warnings do not indicate a potential personal injury.

Warning notices for damages are identified by their signal term.

Signal term	Meaning	Consequences of ignoring the warning
NOTE	Warns of a potentially dangerous situation	Damage to property is possible

Tab. 2 Danger levels and their definition (damage to property)

Example:

NOTICE

These show the kind of danger and its source.

Potential effects when ignoring the warning are indicated here.

- *The protective measures against the damages are shown here.*

- Carefully read and fully comply with warnings against damages.

1.4.3 Other alerts and their symbols



This symbol identifies particularly important information.

Material Here you will find details on special tools, operating materials, or spare parts.

Precondition Here you will find conditional requirements necessary to carry out the task.
The conditions relevant to safety shown here will help you to avoid dangerous situations.

- This symbol denotes lists of actions comprising one stage of a task.
 1. Instructions with several steps are numbered in the sequence of the operating steps.



Information referring to potential problems is identified by a question mark.

The cause is named in the help text ...

➤ ... as is a solution.



This symbol identifies important information or measures concerning environmental protection.

Further information Further topics are introduced here.

2 Technical Data

2.1 System data

➤ Enter the system data of this product in the following table.

System data	Value
Part number	
Serial number	

Tab. 3 System data



The part number and serial number is provided on the nameplate.

2.2 Electrical Data

Model	SBU 400 — 100-240 V AC	SBU 400 — 24 V DC
Rated voltage [V]	100–240, 50–60 Hz	24
Rated current [A]	1.25-0.65	2.5
User's fusing [A]	10/13/16	Max. 4
Power cable core cross-section [AWG]	3x AWG 14	

Tab. 4 Electrical Data

2.3 Versions and Options

2.3.1 SBU for wall mounting

Scope of supply: Sheet-steel control cabinet, complete, without plug for the on-site bus wiring.

Description	Part number	DI (24 VDC)	DO (24 VDC 0.5A)	Relay at DO	All (0-20mA, p/a)	AO (0-20 mA)	AIR (PT100)	DII (Impulse)	SNW ports RJ45 / FOC	DP master	Isolating amplifiers	Relay signal duplication	Ethernet extender
Converter SBU200-1	7.9691.0	0	0	0	0	0	0	0	0/0	0	0	0	0
Converter SBU200-1_DSL	7.9691.00010	0	0	0	0	0	0	0	0	0	0	0	1
Converter SBU200-1_SW	7.9691.02000	0	0	0	0	0	0	0	8/0	0	0	0	0
Converter SBU200-1_OLM	7.9691.04000	0	0	0	0	0	0	0	4/1	0	0	0	0

Description	Part number	DI (24 VDC)	DO (24 VDC 0.5A)	Relay at DO	AI (0-20mA, p/a)	AO (0-20 mA)	AIR (PT100)	DII (Impulse)	SNW ports RJ45 / FOC	DP master	Isolating amplifiers	Relay signal duplication	Ethernet extender
Converter SBU200-1_OLM2	7.9691.07000	0	0	0	0	0	0	0	6/2	0	0	0	0
Converter SBU400-1	7.9681.1	6	6	6	4	0	0	0	1/0	0	0	0	0
Converter SBU400-1_PT	7.9681.10010	6	6	6	4	0	4	0	1/0	0	0	0	0
Converter SBU400-1_FC	7.9681.10020	6	6	6	4	2	0	0	1/0	0	1	0	0
Converter SBU400-1_DHS	7.9681.10030	6	6	6	4	0	0	0	1/0	0	0	6x2	0
Converter SBU400-1_II	7.9681.10040	6	6	6	4	0	0	4	1/0	0	0	0	0
Converter SBU400-1_SW	7.9681.12000	6	6	6	4	0	0	0	7/0	0	0	0	0
Converter SBU400-1_OLM	7.9681.14000	6	6	6	4	0	0	0	3/1	0	0	0	0
Converter SBU400-1_OLM2	7.9681.17000	6	6	6	4	0	0	0	5/2	0	0	0	0
Converter SBU400-1_DP	7.9681.11000	6	6	6	4	0	0	0	1/0	1	0	0	0
Converter SBU400-1_SWDP	7.9681.13000	6	6	6	4	0	0	0	7/0	1	0	0	0
Converter SBU400-1_OLMD P	7.9681.15000	6	6	6	4	0	0	0	3/1	1	0	0	0
Converter SBU400-1_OLMS W	7.9681.16000	6	6	6	4	0	0	0	9/1	0	0	0	0
Converter SBU400-2	7.9682.1	6	6	6	8	4	4	0	1/0	0	0	0	0
Converter SBU400-3_X	7.9683.1	12	12	12	4	2	0	0	1/0	0	0	0	0
Converter SBU400-3_XDP	7.9683.11000	12	12	12	4	2	0	0	1/0	1	0	0	0
Converter SBU400-3_XLFC	7.9683.12010	12	12	12	4	2	0	0	7/0	0	2	0	0
Converter SBU400-3_XOLM	7.9683.14000	12	12	12	4	2	0	0	3/1	0	0	0	0
Converter SBU400-4	7.9684.1	36	6	6	4	2	0	0	1/0	0	0	0	0

Description	Part number	DI (24 VDC)	DO (24 VDC 0.5A)	Relay at DO	All (0-20mA, p/a)	AO (0-20 mA)	AIR (PT100)	DII (Impulse)	SNW ports RJ45 / FOC	DP master	Isolating amplifiers	Relay signal duplication	Ethernet extender
Converter SBU400-4_SW	7.9684.12000	36	6	6	4	2	0	0	7/0	0	0	0	0
Converter SBU400-4_SWII	7.9684.12010	24	6	6	4	2	0	4	7/0	0	0	0	0

Tab. 5 SBU types for wall mounting

2.4 Components within the control cabinet

2.4.1 I/O-Modules (SIGMA AIR MANAGER 4.0 and SBU)

The following technical data apply to the I/O block and the individual I/O modules used in SIGMA AIR MANAGER 4.0 and SBU:

- I/O block 6DI&6DOT&4AI
- Module 6DI – X20DI6371
- Module 6DOT – X20DO6322
- Module 4AI – X20AI4632-1

Technical data, all I/O modules

Feature	Value
Connection terminals	Push-in terminal
Connection cross-section	Copper wires
<ul style="list-style-type: none"> ■ Wire/single-core [AWG] ■ Flex/fine-core [AWG] ■ Wire end ferrule [AWG] ■ Double wire-end ferrule [AWG] 	<ul style="list-style-type: none"> ■ AWG 28-14 ■ AWG 24-14 ■ AWG 24-16 ■ 2x AWG 24-18
Display elements	Status LEDs

Tab. 6 Technical data, all I/O modules

Technical data, I/O-block and individual modules

Feature	Value
Bus Controller	X20BC0087-C01
Bus	KAESER SIGMA NETWORK
Transfer rate [MBit/s]	10/100
Characteristics	Auto crossing (Auto-MDI(X)), Auto negotiation
Connections	2 x -socket RJ45: SIGMA NETWORK, RJ45, 10/100Base-TX

Feature	Value
Bus Controller	X20BC0087-C01
Max. length of the line between SIGMA NETWORK two components [ft.]	328
Potential isolation SIGMA NETWORK I/O-module	Yes
24 V DC power supply	X20PS9400
Power supply [V DC], [A]	24 (-15% / +20%), max. 0.7
Potential isolation	—
<ul style="list-style-type: none"> ■ Supply - internal bus ■ Supply - I/O module 	<ul style="list-style-type: none"> ■ Yes ■ No
Digital inputs (DI)	Module 6DI – X20DI6371
Input voltage [V DC]	24
Model Input current at 24 V DC [mA]	3.75
Switching threshold [V DC]	Low <5 , High >15
Insulation voltage between channel and bus [V _{eff}]	500
Digital outputs (DOT)	Module 6DOT – X20DO6322
Output voltage [V DC]	24
Output current per output maximum (high voltage and short-circuit proof) [A]	0.5
Output protection	Thermal shut-down at high voltage or short-circuit, integrated protection for switching inductive loads
Insulation voltage between channel and bus [V _{eff}]	500
Analogue Inputs (All)	Module 4All – X20AI4632-1
Measuring range [mA]	0-20
Resolution [bit]	15
Connection type	Active and passive possible (2 conductor and 4 conductor technology)
Ohmic resistance (internal) [Ohm]	< 400
Input protection	Protection against supply voltage wiring
Maximum error in 25°C range from current measured value [%]	0.08
Maximum error in 25°C - offset from final value of measuring range [%]	0.02
Distribution 24 VDC	Module 6x 24 VDC - X20PD2113
Rated output voltage [V DC]	24
Output current, total [A]	6.0
Fusing (internal, replaceable) [A], [in.]	T6.3, 5x20mm (0.8 in.)

Tab. 7 Technical data, I/O-block and individual modules

2.4.2 I/O Modules (only SBU)

The following technical data apply to the individual I/O modules used only in SBU:

Feature	Value
Connection terminals	Push-in terminal
Connection cross-section	Copper wires
<ul style="list-style-type: none"> ■ Wire/single-core [AWG] ■ Flex/fine-core [AWG] ■ Wire end ferrule [AWG] ■ Double wire-end ferrule [AWG] 	<ul style="list-style-type: none"> ■ AWG 28-14 ■ AWG 24-14 ■ AWG 24-16 ■ 2x AWG 24-20
Display elements	Status LEDs

Tab. 8 Technical data, all I/O modules

2.4.2.1 Module 4AIR – X20AT4222

Feature	Value
Analogue inputs for PT100 IEC/EN 60751	4
Range [°C]	-200–+850
Resolution [Bit]	16
Connection type	3-wire technology
Measuring current [µA]	250
Maximum error in 25°C range from current measured value [%]	0.037
Maximum error in 25°C offset from final value of measuring range [%]	0.0015
Isolation voltage input–internal bus [V_{eff}]	500

Tab. 9 Data, 4AIR module

2.4.2.2 Module 4AOI – X20AO2632

Feature	Value
Analogue outputs 0–20 mA	2
Output range [mA]	0-20
Resolution [bit]	15
Max. ohmic resistance [Ohm]	500
Output protection	Short-circuit-proof, current-limiting 40 mA
Maximum error in 25°C- range from current measured value [%]	0.045
Maximum error in 25°C - offset from final value of measuring range [%]	0.025
Isolation voltage output–internal bus [V_{eff}]	500

Tab. 10 Data, 4AOI module

2.4.2.3 Module 4AIP – X20AP3121

Feature	Value
Voltage, analogue inputs	3
<ul style="list-style-type: none"> ■ Max. rated voltage, Phase-Phase [V AC], [Hz] ■ Max. rated voltage, Phase-N [V AC] ■ Max. overload voltage 	<ul style="list-style-type: none"> ■ 480 at 50/60 ■ 277 ■ $1.5xU_N$ permanent, $2xU_N$ for 1 minute
Current, analogue inputs	4
<ul style="list-style-type: none"> ■ Rated current [A] ■ Maximum overload current ■ Resistance [mOhm] 	<ul style="list-style-type: none"> ■ 1 ■ $8xI_N$ for 0.5s ■ 500
Measuring accuracy	—
<ul style="list-style-type: none"> ■ U_{RMS} and I_{RMS} [%] ■ Power [%] 	<ul style="list-style-type: none"> ■ < 0.5 ■ < 0.5
Potential isolation	—
<ul style="list-style-type: none"> ■ Inputs–internal bus ■ Input–input 	<ul style="list-style-type: none"> ■ Yes ■ No
Isolation voltage	—
<ul style="list-style-type: none"> ■ Inputs–Internal bus [V DC] ■ Inputs–ground [V DC] 	<ul style="list-style-type: none"> ■ 5500 ■ 5500

Tab. 11 Data module 4AIP

2.4.2.4 Module 2DII – X20DI2377

Feature	Value
Input voltage [VDC]	24
Typical input current at 24 VDC [mA]	10.5
Event counter signal form	Rectangular pulse
Event counter evaluation	Each positive side
Event counter input frequency [kHz]	max. 50
Switching threshold [VDC]	Low <5 , High >15
Insulation voltage between channel and bus [V_{eff}]	500

Tab. 12 Data module 2DII

2.4.3 Relay block

The relay block comprises 5 relays (SIGMA AIR MANAGER 4.0) or 6 relays (SBU) with the following technical data:

Feature	Value
Connection terminals	Push-in terminal Screw terminal

Feature	Value	
Connection cross-section	Copper wires	Copper wires
<ul style="list-style-type: none"> ■ Wire/single-core [AWG] ■ Flex/fine-core [AWG] ■ Wire -end ferrule [AWG] ■ Double wire ferrule 	<ul style="list-style-type: none"> ■ 0.14-1.5 / AWG 24-16 ■ 0.14-1.5 / AWG 24-16 ■ 0.14-1.5 / AWG 24-16 ■ not possible 	<ul style="list-style-type: none"> ■ 0.5-4 / AWG 20-12 ■ 0.5-2.5 / AWG 20-14 ■ 0.5-1.5 / AWG 20-16 ■ 0.5-1.0
Stripping length [in.]	0.3	0.3
Tightening torque	—	0.5–0.6 Nm / 4.4–5.3 lb-in
Display elements	Status LED	
Coil voltage [V DC]	24	
Output contact	1 changeover contact	
<ul style="list-style-type: none"> ■ Max. switching voltage [V AC/DC] ■ Min. switching voltage [V AC/DC] ■ Min. switching current [mA] ■ Max. continuous current [A] ■ Switching capacity IEC 60947 / DIN VDE 0660 24 V DC13 [A] ■ 230 V AC15 [A] 	<ul style="list-style-type: none"> ■ 250 ■ 5 (at 100 mA) ■ 10 (at 12 V) ■ 6 ■ — ■ 1 ■ 3 	
Inductive loads (e.g. auxiliary contactor, solenoid valve)	to be connected with RC element	
Rated isolation voltage [V AC]	250	

Tab. 13 Relay block data

2.4.4 Switch 8 port

Feature	Value
Ports RJ45: SIGMA NETWORK	8
Transfer rate [Mbps]	10/100
Transfer mode	Store-and-forward switching mode
Characteristics	Auto crossing (Auto-MDI(X)), Auto negotiation, Auto sensing
Connections	RJ45, 10/100Base-TX
Max. length of the line between SIGMA NETWORK two components [ft.]	328
Power supply [VDC]	9–48, @ 24 V DC/200 mA
Display elements	Status LEDs for voltage and every port

Tab. 14 Switch 8 port

2.4.5 SIGMA NETWORK Switch 4-port RJ45 – 1-port FOC

Feature	Value
Port RJ45: SIGMA NETWORK	4
Transfer rate [Mbps]	10/100
Characteristics	Auto crossing (Auto-MDI(X)), Auto negotiation, Auto sensing
Connections	RJ45, 10/100Base-TX
Max. length of the line between SIGMA NETWORK two components [ft.]	328
Ports: FOC ¹⁾ : SIGMA NETWORK	1
Transfer rate [Mbps]	100
Fibre type	Multi-mode
Cable dimensions, core/cladding	62.5/125 µm
Wavelength	1270 – 1360 nm
Connections	2x ST (BFOC), 100Base-FX
Max. conductor length between two FOC components [ft]	9842
Transfer mode	Store-and-forward switching mode
Power supply [V DC]	9-30, @ 24 V DC/300 mA
Display elements	Status LEDs for voltage and every port

¹⁾ FOC: Fiber-optic cable

Tab. 15 SIGMA NETWORK Switch 4-port RJ45 – 1-port FOC

2.4.6 Protocol converter SIGMA NETWORK/ PROFIBUS master

Feature	Value
SIGMA NETWORK	—
<ul style="list-style-type: none"> ■ Transfer rate ■ Properties 1 ■ Properties 2 ■ Max. conduit length between two components [ft.] 	<ul style="list-style-type: none"> ■ 10/100 ■ Auto crossing ■ Auto negotiation ■ 325
PROFIBUS DP	Master
<ul style="list-style-type: none"> ■ Transfer rate [kBit/s] ■ Interface ■ Connections ■ Max. conduit length for the entire bus length [ft.] 	<ul style="list-style-type: none"> ■ 187.5 ■ RS486 floating ■ 9-pole SUB-D socket ■ 2625
Power supply [V DC]	24 +/-25 %, typ. @ 130 mA

Feature	Value
Display elements	Status LED
Service interfaces	Mini USB, slot for MMC memory card, rotary switch

Tab. 16 Data, SNW/DP bus controller

2.4.7 Ethernet extender

The Ethernet extender makes broadband Ethernet applications possible on existing cables. You can use company-owned 2- and 4-wire cables. Depending on the cable quality, ranges of up to 20 km are possible.

Characteristic	Value	
Type	PHOENIX CONTACT TC EXTENDER 2001 ETH-2S	
Power supply	18-30, @ 24 V DC/180 mA	
Display elements	Status LEDs for voltage, communication and diagnostics	
Ports RJ45: SIGMA NETWORK	Quantity	1
	Connections	RJ45, 10/100Base-TX
	Transfer rate [Mbps]	10/100
	Max. length of the line between SIGMA NETWORK two components [ft.]	328
DSL ports	Quantity	2 (2-wire operation) 1 (4-wire operation)
	Connections	2x 2-pole plug-in screw terminal
	Serial transfer rate	4-wire operation: 64 kbit/s ... 30 MBit/s 2-wire operation: 32 kBit/s ... 15.3 Mbit/s
	Transfer length [mil]	≤ 12,4 (depending on data rate and cable cross-section)
	Connection cross-section <ul style="list-style-type: none"> ■ Wire/single-wire [mm²/AWG] ■ Flexible wire/finely stranded [mm²/AWG] 	Copper lines <ul style="list-style-type: none"> ■ 0.2–2.5 / AWG 24–14 ■ 0.2–2.5 / AWG 24–14
USB interface (not used)	Quantity	1
	Connections	Mini USB type B, 5-poles
Digital outputs (not used)	Quantity	2
	Connections	2x plug-in screw terminal
	Switching current [mA]	≤ 150 (short-circuit proof)

Tab. 17 Data Ethernet extender

2.5 Control cabinet

Model	SBU 400-1
Material	Sheet metal, painted RAL 7035 light-grey
Width [in.]	16
Height [in.]	12
Depth [in.]	6
Weight [lb.]	26
Enclosure protection	IP54 (IEC 529)

Tab. 18 Control cabinet data

3 Safety and Responsibility

3.1 Basic instructions

⚠ DANGER

Disregarding these instructions can result in serious injury.

- *To safely operate this product, carefully read the operating manual and take notice of its contents.*

The product SBU is manufactured to the latest engineering standards and acknowledged safety regulations. Nevertheless, dangers can arise through its operation:

- Danger to life and limb of the operator or third parties,
 - impairments to the SBU and other material assets.
- Therefore, observe the following:
- Use the product SBU only if it is in a technically perfect condition and only for the purpose for which it is intended; observe all safety measures and the instructions in the service manual.
 - In particular, immediately rectify (have rectified) any faults that could be detrimental to safety.

3.2 Specified use



Specified use also includes compliance with the instructions in this manual.

The SBU is intended solely for the operation of compressors, blowers and vacuum systems in industrial fields in conjunction with SIGMA AIR MANAGER 4.0. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result from incorrect use. The user alone is liable for any risks incurred.

- Adhere to the specifications given in these operating instructions and the operating manual for SIGMA AIR MANAGER 4.0.
- Operate the product only within its performance limits and under the permitted ambient conditions.

3.3 Improper use



Specified use also includes compliance with the instructions in this manual.

Converting or changing the SBU constitutes improper use. The manufacturer's warranty is made invalid in such cases.

Improper usage can cause damage to property and/or (severe) injuries.

- Use SBU only as intended.
- Do not use SBU to control other machines or products for which SBU is not intended.
- Do not allow conversions or changes.

3.4 User's responsibilities

3.4.1 Observe statutory and universally accepted regulations

- Observe relevant statutory and accepted regulations during installation, operation and maintenance of the control cabinet and its components.

3.4.2 User's Responsibilities

These are people who, by virtue of their training, knowledge and experience as well as their knowledge of relevant regulations can assess the work to be done and recognize the possible dangers involved.

Authorized operators possess the following qualifications:

- are of legal age,
- are familiar with and adhere to the safety instructions and sections of the service manual relevant to operation,
- have received adequate training and authorization to operate electrical and compressed air devices,

Authorized installation and maintenance personnel have the following qualifications:

- are of legal age,
 - are familiar with and adhere to the safety instructions and sections of the service manual applicable to installation and maintenance,
 - are completely familiar with the safety concepts and regulations of electrical and compressed air engineering,
 - are able to recognize the possible dangers of electrical and compressed air devices and take appropriate measures to safeguard persons and property,
 - have received adequate training in and authorization for the safe installation and maintenance on this equipment.
- Ensure that operating, installation and maintenance personnel are qualified and authorized to carry out their tasks.

3.5 Dangers

The general safety instructions in this chapter describe possible dangers and how to deal with them. Special safety instructions are found in this service manual at the beginning of each chapter or directly before a task instruction.

- Take full heed of all safety instructions.

3.5.1 Safely dealing with sources of danger

Electricity

- Disconnect the machine from all power supply phases.
- Switch off any external power sources.



External voltage is still present on the marked terminals (orange or labelled) in the SBU when the power supply is switched off.

- Check and ensure that no voltage is present.
- Before switching on again make sure that
 - no maintenance personnel are working on the machine,
 - all panels are in place,
 - all access doors are closed.
- Allow only qualified electricians or trained personnel under the supervision of a qualified electrician to carry out work on electrical equipment according to electrical engineering regulations.
- Observe all accepted safety regulations and legislation applicable to all work carried out on the SBU.
- Use fuses corresponding to machine power (see chapter 2).
- Make electrical connections only with voltage removed and check regularly for tightness and condition.
- Use only electrical cables that are suitable and approved for the surroundings and electrical loads applied.
- Before every start-up of machines that are linked to the master controller, make sure there is adequate protection against electric shock from direct or indirect contact and check regularly.

3.5.2 Safe SBU operation

Pay attention to the following points to avoid damage to the SBU:

⚠ WARNING

A short circuit can cause irreversible damage to the PROFIBUS interface.

- *Avoid short circuits on the power supply pins in the PROFIBUS interface for PROFIBUS/SIGMA NETWORK converter.*
- Do not remove any plugs on the SBU while the compressed air system is in operation.
- Operate the SIGMA AIR MANAGER 4.0 only when all supplies are connected.
- Never modify, bypass or disable safety devices.
- Do not remove or obliterate labels and notices.
- Use only spare parts approved by the manufacturer for use in SBU.

3.6 Warranty

This service manual does not contain any independent warranty commitment. Our general terms and conditions apply with regard to warranty.

A condition of our warranty is the specified use of the master controller under observation of the specific operating conditions.

Due to the large number of possible applications, it is incumbent on the user to determine whether the master controller can be used for any specific application.

Furthermore, we accept no warranty obligation for:

- the use of unsuitable parts or operating materials,
- unauthorized modifications,
- incorrect maintenance,
- incorrect repair.

Correct maintenance and repair means the use of genuine Kaeser spare parts.

- Obtain confirmation from KAESER that your specific operating conditions are suitable.

4 Design and Function

4.1 Overview

The SBU (SIGMA NETWORK BUS CONVERTER) is an interface expansion for SIGMA AIR MANAGER 4.0. Use SIGMA NETWORK to connect SBU with SIGMA AIR MANAGER 4.0.

SBU is offered in different designs. They differ by the number of the factory-installed components.

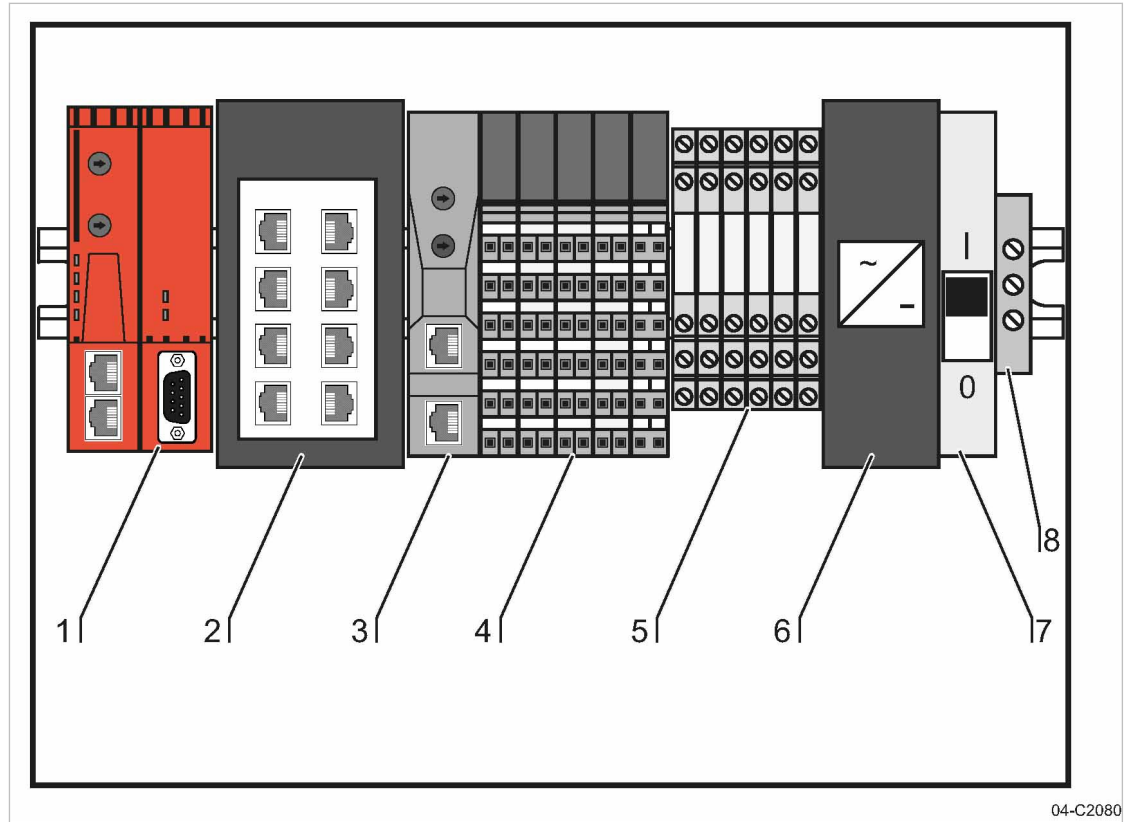


Fig. 1 SBU – Example of possible components

- | | | | |
|---|-----------------------------|---|-------------------|
| ① | PROFIBUS master | ⑤ | Relay |
| ② | SIGMA NETWORK Switch 8 port | ⑥ | Power supply unit |
| ③ | I/O block: Bus controller | ⑦ | Safety cut-out |
| ④ | I/O block: I/O modules | ⑧ | Terminal |

4.2 Converter SBU200-1 DSL

The product "Converter SBU200-1 DSL" constitutes a control cabinet with integrated Ethernet extender. It allows broad-band Ethernet transmissions on existing 2- and 4-wire cables (with new installations screened twisted pair cables should be installed). Depending on the cable quality, ranges of few kilometers are possible. With it, e.g. an existing PROFIBUS line may still be used in order to establish a very long connection between two SBUs with DSL design/option.

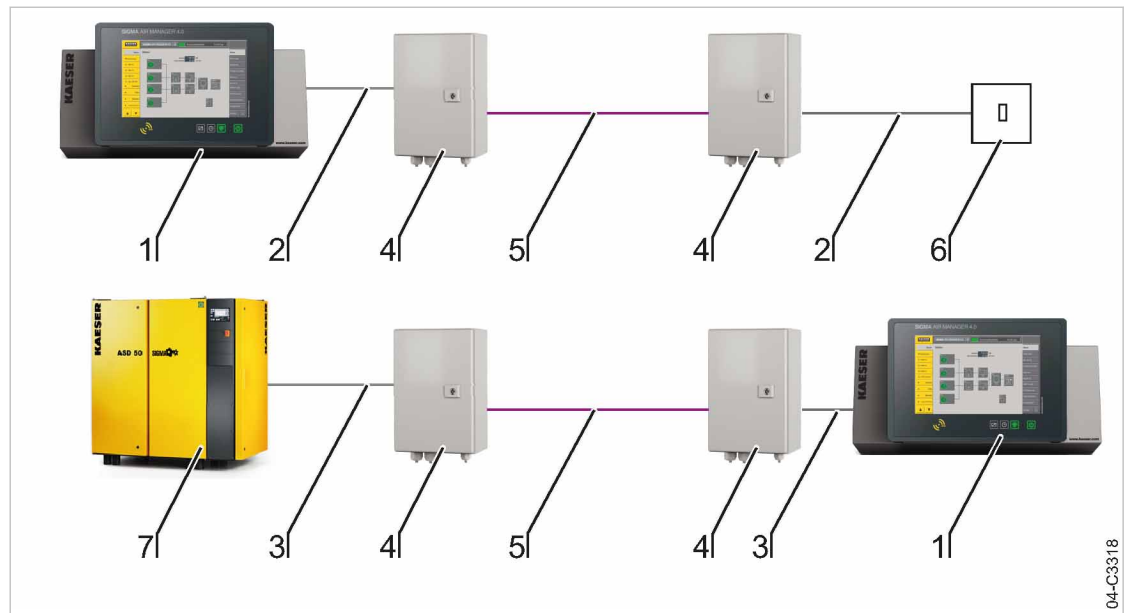


Fig. 2 Application examples with converter SBU200-1 DSL

- | | |
|--------------------------|--|
| ① SIGMA AIR MANAGER 4.0 | ⑤ 2-wire cable (e.g. PROFIBUS line) or 4-wire line |
| ② Ethernet line | ⑥ Customer LAN |
| ③ SIGMA NETWORK cable | ⑦ KAESER compressor with SIGMA NETWORK |
| ④ Converter SBU200-1 DSL | |

5 Installation and Operating Conditions

5.1 Environment

Temperature range

Ambient temperatures	
Min. ambient temperature	Maximum ambient temperature
0 °C	45 °C

Tab. 19 Ambient temperatures

Storage temperatures	
Minimum storage temperature	Maximum storage temperature
-20°C	70°C

Tab. 20 Storage temperatures

Note permissible ambient temperatures:

1. Check ambient temperature.
2. Adjust equipment location to suitable ambient temperature range.

Note storage temperature:

1. Check temperature of storage location.
2. Adjust storage temperature to suitable range.

5.2 Installation conditions

The SBU can be operated in general environments or in industrial environments.

- Install SBU accordingly.

6 Installation

6.1 Ensuring safety

Follow the instructions below for safe installation.

Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety notes can cause unforeseeable dangers!

- Comply with the instructions in chapter 3 Safety and Responsibility.
- This product may only be installed by a qualified person. See chapter 3, "Assigning personnel".

When working on live components

Touching voltage carrying components can result in electric shocks, burns or death.

- Work on electrical equipment may only be carried out by authorized electricians.
- Switch off and lock out the power supply disconnecting device and check that no voltage is present.
- Check that there is no voltage on floating relay contacts.

6.2 Reporting transport damage

1. Check the master controller for visible and hidden transport damage.
2. Inform the carrier and the manufacturer in writing of any damage without delay.

6.3 Scope of delivery

This product comprises at least the following components:

Item	Material No.	Designation
10	—	SBU
20	—	Ferrit bushes
30	—	This instruction

Tab. 21 Standard scope of delivery

6.4 Installing the control cabinet

A solid, vibration-free and load-bearing wall is required for the control cabinet.



Pay attention to the following when fitting the control cabinet:

- The fixing materials must be compatible with the type of wall and the weight of the control cabinet (chapter 2 Technical Specification).
- The control cabinet must be fully accessible.
- Fully opening control cabinet door.
- A free escape route must be maintained (also with the control cabinet door fully open).
- Protection from direct sunlight, rain, splashed water or excessive dust build up must be provided.

➤ Properly mount the control cabinet at the wall. A template for the bore holes is provided in the annex (see chapter 12.1).

6.5 Identifying the machines



For details regarding the identification of the machines, please refer to the service manual for SIGMA AIR MANAGER 4.0, chapter Installation.

6.6 Planning the wiring



For details regarding the wiring and information about required accessories, please refer to the operating manual for SIGMA AIR MANAGER 4.0, chapter Installation.

For wiring between two SBU with DSL design/option see chapter 4.2

There are several methods of connecting the machines to SIGMA AIR MANAGER 4.0 or SBU:

- Using SIGMA NETWORK
(for machines with SIGMA CONTROL 2).
Prerequisite: A port is provided for every machine: SIGMA NETWORK in SIGMA AIR MANAGER 4.0 or SBU are available.
- PROFIBUS
(When replacing a SIGMA AIR MANAGER with SIGMA AIR MANAGER 4.0 or for machines with SIGMA CONTROL).
Prerequisite: The option PROFIBUS master is available in the SIGMA AIR MANAGER 4.0 or SBU.
- Using floating relay contacts
(for conventional machines without SIGMA CONTROL or SIGMA CONTROL 2).
Prerequisite: **At least** one I/O Port DOR is available in SIGMA AIR MANAGER 4.0 or SBU for each machine. We recommend one DOR I/O port and one DI I/O port for each machine.

6.6.1 Instructions on the electrical installation

- A power supply disconnecting device to EN 60204 must be installed by the user.
- Do not exceed the following maximal values for the cable lengths:

Type	Maximum cable length [ft.]	Remark
SIGMA NETWORK (cop- per DSL)	see chapter 6.6.2	Maximum conductor length between two SBU with DSL design or option

Type	Maximum cable length [ft.]	Remark
SIGMA NETWORK (copper Ethernet)	330	Maximum conductor length between two devices at the SIGMA NETWORK.
SIGMA NETWORK fibre-optic cable	9800	Maximum conductor length between two SBU with OLM design or option
Digital transistor outputs	100	
Digital relay outputs	330	
Digital inputs	100	
Analogue inputs	100	screened
PROFIBUS	2600	Maximum cable length of the entire PROFIBUS.

Tab. 22 Maximum cable lengths

- Use galvanic isolation on cables laid outside the building to ensure lightning protection (preferably fiber optic cable).
- See the wiring diagrams in the annex for cable types, cross-sections and cable selection. Use flexible cables as far as is possible.
- This suppressor is suitable for inductive loads connected to the relay outputs.

6.6.2 Cable length with copper DSL

The maximum possible data rate on a copper DSL line depends on many parameters:

- Cable length
- Type of cable (diameter/cross-section, design, capacity, shielding)
- Installation (number of transitions, lines installed in parallel)
- Communication line interferences from EMC from neighboring subscribers

For the maximum possible cable length the two most important parameters are the cable cross-section and the data rate.

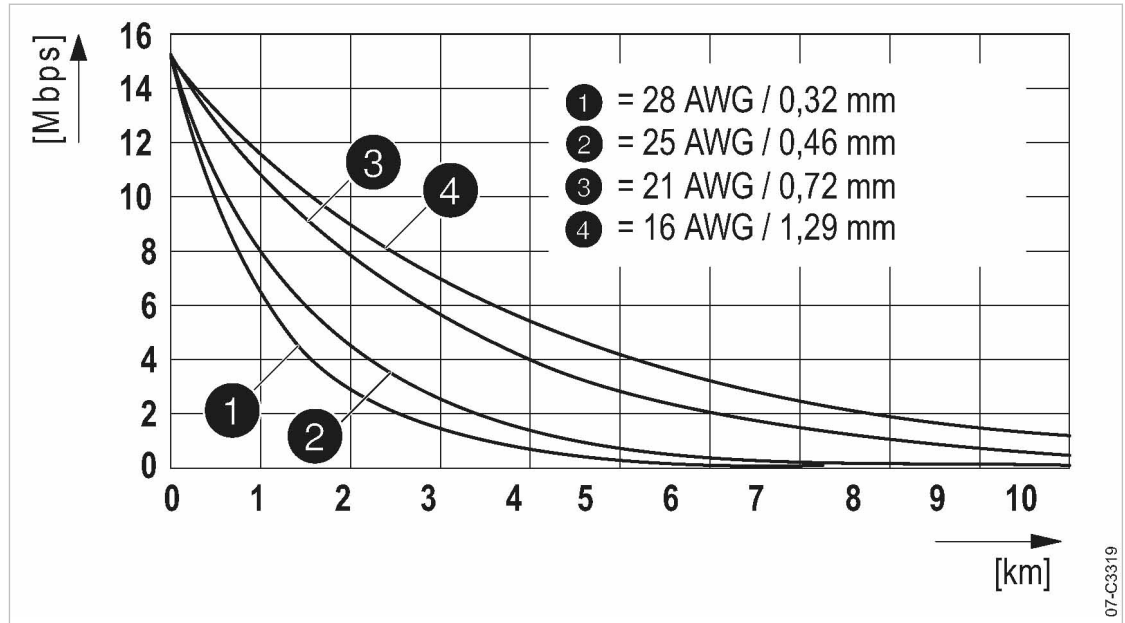


Fig. 3 The cable length depends on the data rate and cross-section for a 2-wire cable

	Cross-section [mm ²]	Cross-section of AWG	diameter [mm]
①	0.08	28	0.32
②	0.16	25	0.46
③	0.41	21	0.72
④	1.31	16	1.29

Tab. 23 Legend for Fig. 3

With cables of a higher quality and cables with larger cross-sections greater ranges can be achieved. A 4-wire cable has twice the data rate of a 2-wire cable.

Ten SIGMA NETWORK components that are connected to SIGMA AIR MANAGER 4.0 via DSL require a data rate of approx. 1 Mbps (Mbit/s). Use figure 3 to estimate the maximum cable length between two SBU with DSL design/option.

Example: Typical PROFIBUS cable 1x2x0.64 mm² and ten SIGMA NETWORK components connected via DSL results in a maximum cable length of approx. 5 km.

Ultimately, an existing copper line for connecting SIGMA NETWORK components to a SIGMA AIR MANAGER 4.0 via DSL can only be determined by a test in practice. Usual PROFIBUS lines (1x2x0.64 shielded) from existing SIGMA AIR MANAGER installations, fully installed by a professional can be used up to 2600 ft without any problems.

6.7 Laying cables

⚠ DANGER

Contact with live electrical components can cause serious injury or death.

➤ De-energize SIGMA AIR MANAGER 4.0/SBU and external power sources.

1. Switch off all phases of SIGMA AIR MANAGER 4.0/SBU and external power sources.
2. Lock them out and tag them out.

3. Observe all accepted safety regulations and national legislation applicable to all work carried out on the SIGMA AIR MANAGER 4.0 / SBU.
4. Have SIGMA AIR MANAGER 4.0/SBU connected to the power supply by an authorized and qualified electrician to national legislation and the regulations of the electricity company concerned.



The terminals in SIGMA AIR MANAGER 4.0/SBU that could still be supplied by an external voltage source even when the voltage supply is shut-off are marked:

- Orange
- Label

5. Create the connections to the power supply, the individual machines and the components as detailed in the circuit diagrams.



Avoid signal distortion by using suitable wiring and screening.

- Ensure a minimum distance of 10 cm between conductors with voltages up to 24 V (digital inputs, analogue inputs, SIGMA NETWORK, PROFIBUS, and if applicable, relay outputs [only SIGMA AIR MANAGER 4.0: conductor to the Com-module and to the user-supplied LAN]) and power cables (voltages larger than 60 V).



SIGMA AIR MANAGER 4.0: The cable gland cover (Fig. 5, 8) is realized with pre-punched passage options (right, left and bottom) for laying the conductors. Attach cable ducts or harnesses so that you can utilize the break-throughs.

6.8 Installing the RJ45 bus connector



Material: Use a FastConnect stripper for industrial Ethernet FC cables (IE FC Stripping Tool) for easy stripping of the SIGMA NETWORK conductors and to improve the connection between the cable and the plug. An Ethernet cable stripping tool can be ordered from KAESER under the material number 8.8294.0.

To connect to SIGMA NETWORK, you must connect the network subscribers according to SIGMA NETWORK conductor.

- Feed the network cable to the SIGMA NETWORK devices on both sides through one EMC cable trench each.
- Use an RJ45 bus connector at both ends of the network cable.

6.8.1 Installing the RJ plug

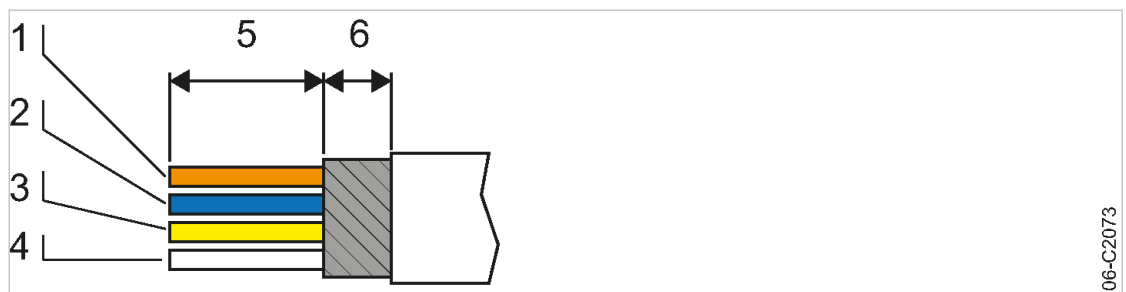


Fig. 4 Strip the isolation from the network cable

- | | |
|----------|-----------|
| ① Orange | ④ White |
| ② Blue | ⑤ 0.7 in. |
| ③ Yellow | ⑥ 0.2 in. |

1. Stripping the network cable isolation (see Fig. 4).



The RJ45 plug and the network cable can be damaged if unlocked under strain.
 ➤ Always release strain on the RJ45 plug prior to unlocking.

2. Spread the conductors according to the color coding of the contact element of the RJ45 connector (see Fig. 4).

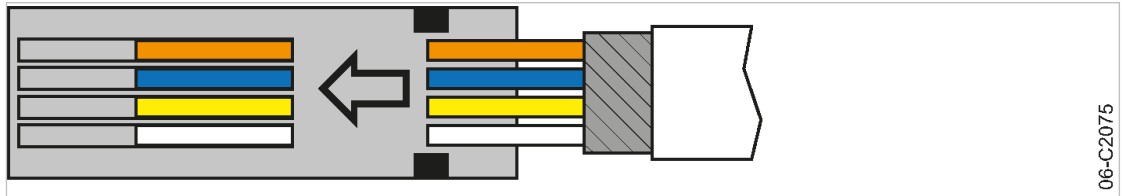


Fig. 5 Inserting the network cable conductors

3. Insert the conductors into the contact elements up to the end stop.

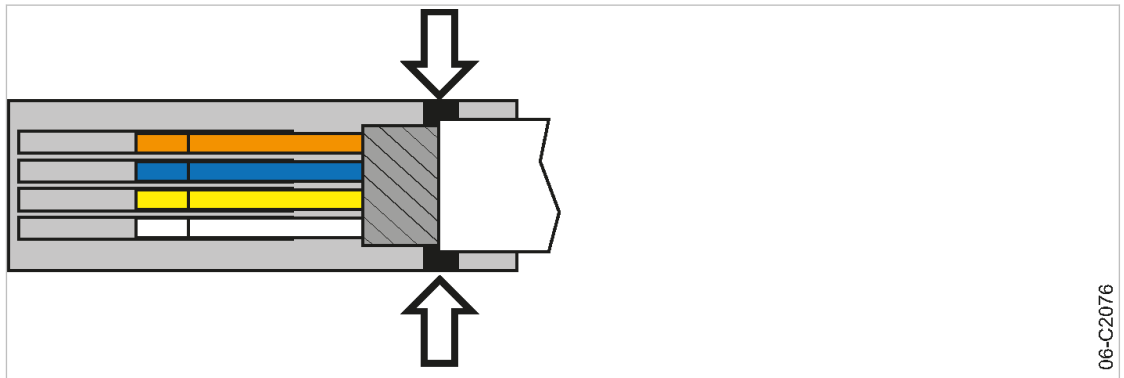


Fig. 6 Positioning the network cable

4. Position the network cable as shown (arrows, see Fig. 6).

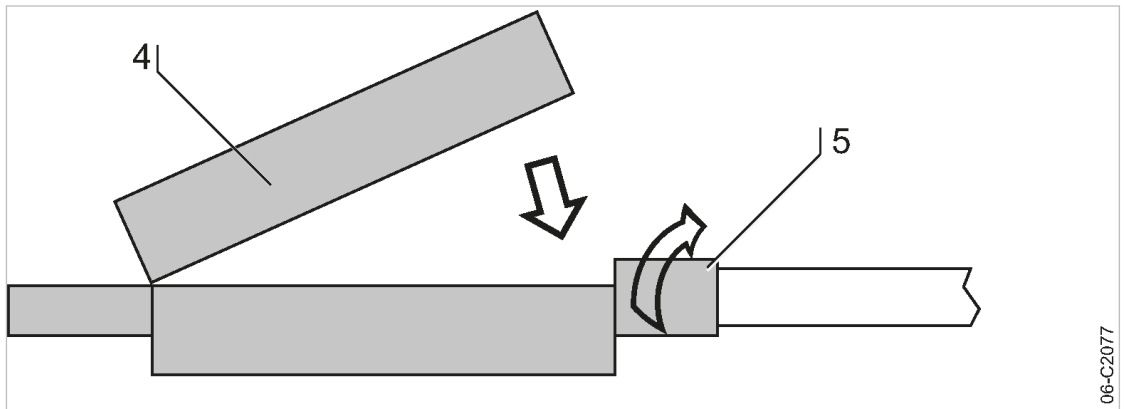


Fig. 7 Close the lid of the RJ45 plug

- ④ RJ45 plug lid
- ⑤ Rotatable locking piece

5. Close the lid and manually rotate the locking piece clockwise as far as possible.

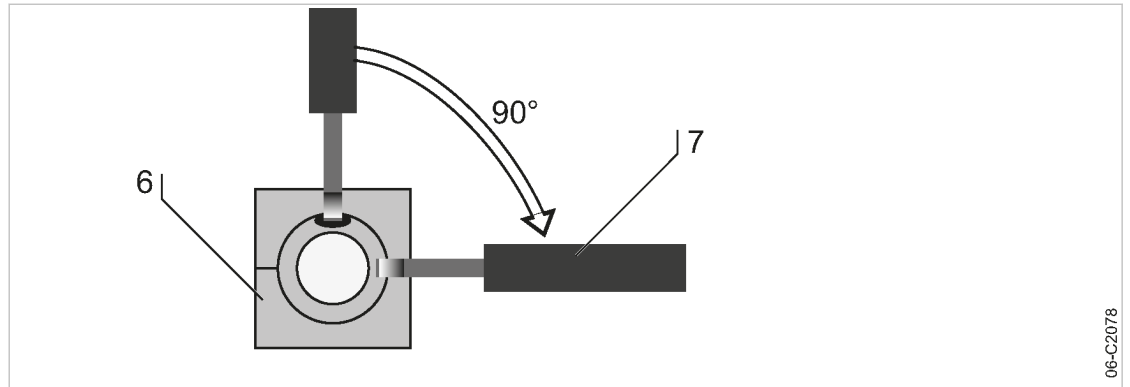


Fig. 8 Rotating the locking piece to the stop

- ⑥ RJ45 plug (view from cable end)
- ⑦ Screwdriver

6. Insert a screwdriver with 0.1 in. blade width into the bore and rotate the locking piece clockwise up to the end stop.



Contact issues with conductor ends after multiple contact is created.
➤ Cut off contacted conductor ends and again strip the conductors.



The insulation displacement contacts of the plug may be disconnected and re-contacted up to 10 times.

Result The plug is correctly locked when the opening of the locking piece is facing sideways and the side surfaces are flush with the plug.

6.9 Connecting lines

6.9.1 Wiring the control cabinet

Precondition The control cabinet is properly attached to the wall as described in chapter 6.4.
The base plate is freely accessible.

- Wire the control cabinet as described below.

6.9.2 Feeding cables and connecting the screening

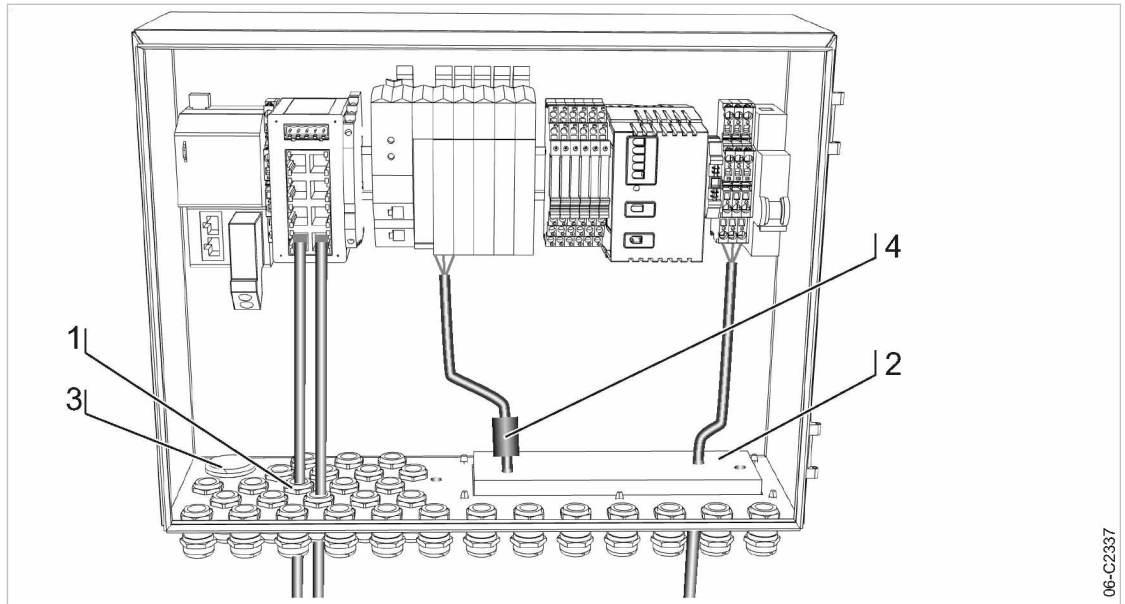


Fig. 9 Feeding cables

- | | |
|---|---|
| <p>① Metal screw fitting for screened conductors (analogue inputs and outputs, SIGMA NETWORK, PROFIBUS)</p> <p>② Plastic cable glands for unscreened cables (common supply line, equipotential bonding, digital inputs and outputs)</p> | <p>③ Plastic cable glands for fibre-optic conductors.</p> <p>④ Ferrite for digital inputs</p> |
|---|---|

1. Feed the screened conductors through the metal screw fittings ①. Connect the screening as described below.
2. Feed the unscreened conductors through the plastic cable glands ②.
3. Feed the fibre-optic conductor through the plastic cable gland ③.
4. After feeding the conductor, rotate each cable gland until the conductor is properly seated and the gland is sealed.

Connecting the screening

At the control cabinet:

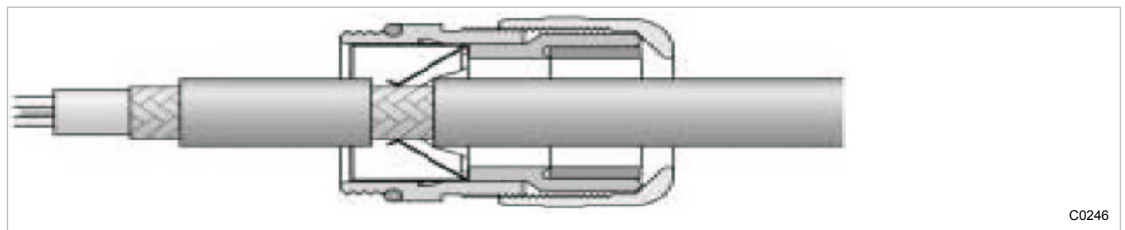




Fig. 10 Connecting the screening

1. Strip off the cable insulation by about 1 cm where the cable passes through the cable gland.
2. Push the cable through the metal cable gland on the control cabinet until the stripped section snaps in and contacts the earth clamp in the cable gland.

6.9.2.1 Attaching the ferrite sleeves

Ferrite sleeves may touch each other.

Ferrite sleeves may be placed on the plastic gland plate  or fastened to the cable at any location.

- Feed the conductors for digital inputs through one of the loosely-supplied ferrite sleeves .

6.9.3 Laying the cables in the control cabinet

1. Use cable ties to bundle conductors with voltages up to 24 VDC (digital inputs and outputs, analogue inputs and outputs, relay outputs, if provided).
2. Use cable ties to bundle bus conductors (SIGMA NETWORK, PROFIBUS).
3. Use cable ties to bundle conductors with 115/230 VAC (common supply line, relay outputs, if provided).

6.9.4 Connecting the cables

1. Make the connections to terminals and interfaces as detailed in the attached wiring diagram.
2. For installing the RJ45 bus connector, see chapter 6.8.
3. If applicable, install the PROFIBUS plug. See the operating instructions for SIGMA AIR MANAGER 4.0, chapter Installation.
4. See Chapter 8.2 for connecting the Ethernet extender.

7 Initial Start-up

7.1 Commissioning SBU 200

Precondition All installation activities and wiring tasks have been properly and completely performed according to chapter 6 "Installation"

1. Switch on the safety cut-out in the SBU.
2. Close the control cabinet.
3. Switch on the power supply disconnecting device for the SBU.

Result The control cabinet components of SBU start to run.

7.2 Commissioning SBU 400



For details regarding the commissioning of SBU, please refer to the operating instructions for SIGMA AIR MANAGER 4.0 in chapter Initial Start-up.

8 Operation

8.1 Operation SBU



For details regarding the operation of SBU, please refer to the operating instructions for SIGMA AIR MANAGER 4.0 in chapter Operation.

8.2 Display elements and interfaces of SBU with DSL

An Ethernet extender is included in converter SBU200-1 DSL. The indicator elements and interfaces are described below.

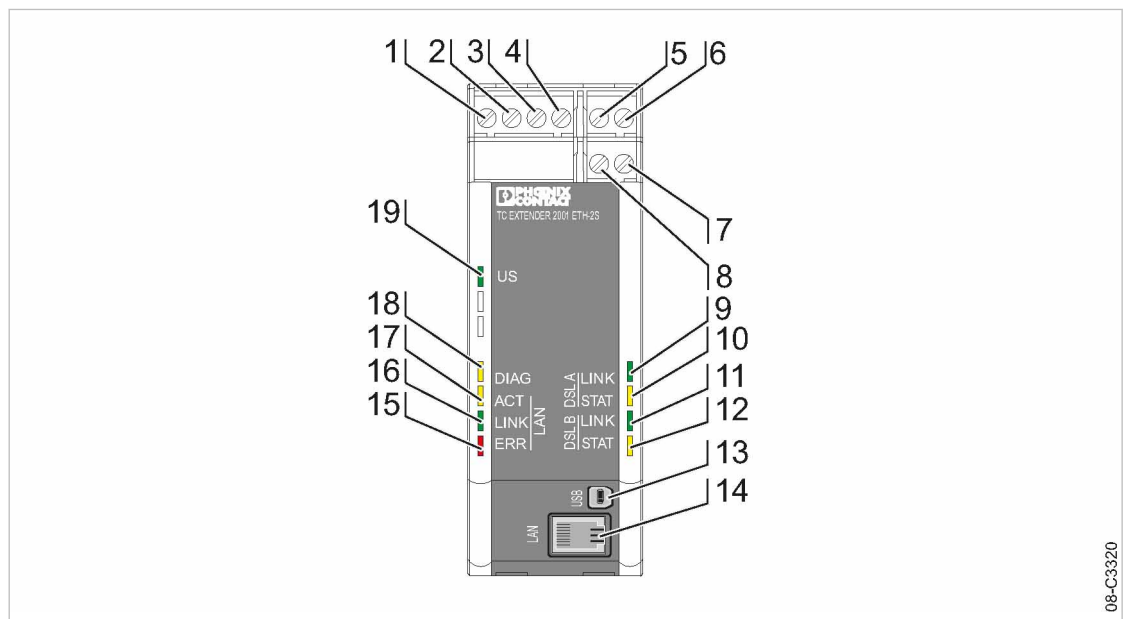


Fig. 11 Ethernet extender: Indicator elements and interfaces

Location	Description	Remark
①	24 V DC	Power supply
②	GND	
③	O1	Digital outputs
④	O2	
⑤	DSL port A, terminal (a)	First DSL port
⑥	DSL port A, terminal (b)	
⑦	DSL port B, terminal (b)	Second DSL port
⑧	DSL port B, terminal (a)	

Location	Description	Remark
⑨	LED LINK DSL A (green)	LED off: DSL port inactive LED flashes briefly (every 3 s): DSL port searches for link partner
⑪	LED LINK DSL B (green)	LED flashes (1 Hz): Link partner found LED flashes (2 Hz): Initialization of connection LED flashes (4 Hz): ERR on / STAT DSL off = installation error, e.g. line structure configured, but 4-wire point-to-point connection set up LED on: Connection active
⑩	LED STAT DSL A (yellow)	LED off: No active connection LED off (pulsating): (Flashes every 3 s) connection quality is sufficient
⑫	LED STAT DSL B (yellow)	LED on (pulsating): (Goes out every 3 s) connection quality is good LED on: Connection quality is very good
⑬	Mini-USB type B [USB]	USB interface for configuration and diagnostics
⑭	RJ45, [LAN]	Ethernet interface to connect to SIGMA NETWORK or LAN
⑮	LED ERR (red) [LAN]	LED flashes (2 Hz): Error during booting (US also flashes) LED on: Transmission error / installation error
⑯	LED LINK (green) [LAN]	LED on: Connection active
⑰	LED ACT (yellow) [LAN]	LED on: Data traffic active
⑱	LED DIAG (yellow) [LAN]	LED off: no major errors LED flashes (1 Hz): (Duration: 20 s after booting) device has been set to factory configuration LED flashes (2 Hz): Remote access from a different extender (data transmission during remote configuration, remote diagnostics, firmware update) LED on: major error - reading diagnostic data is recommended
⑲	LED US (green)	LED on: Power supply OK LED flashes (1 Hz): Feed via USB (only for configuration) LED flashes (2 Hz): Error during booting (ERR also flashes)

Tab. 24 Ethernet extender: Indicator elements and interfaces

9 Fault Recognition and Rectification

9.1 Faults and troubleshooting



For details regarding the fault detection and troubleshooting of SBU, please refer to the operating instructions for SIGMA AIR MANAGER 4.0 in chapter Fault Recognition and Rectification.

Please see chapter 8.2 for details regarding the fault detection and troubleshooting for the Ethernet extender of a SBU with DSL.

10 Spares, Operating Materials, Service

10.1 Note the nameplate

The nameplate contains all information to identify this product. This information is essential to us in order to provide you with optimal service.

- Please give the information from the nameplate with every enquiry and when ordering spare parts (see chapter 2.1).

11 Decommissioning, Storage and Transport

11.1 De-commissioning

De-commissioning is necessary, for example, under the following circumstances:

- SBU is temporarily not needed.
 - SBU is to be moved to another location.
1. Isolate SBU (power supply disconnecting device) from all power phases .
 2. Switch off external power sources.
 3. Disconnect SBU from all connections when the device is to be moved to another location.

11.2 Disposal

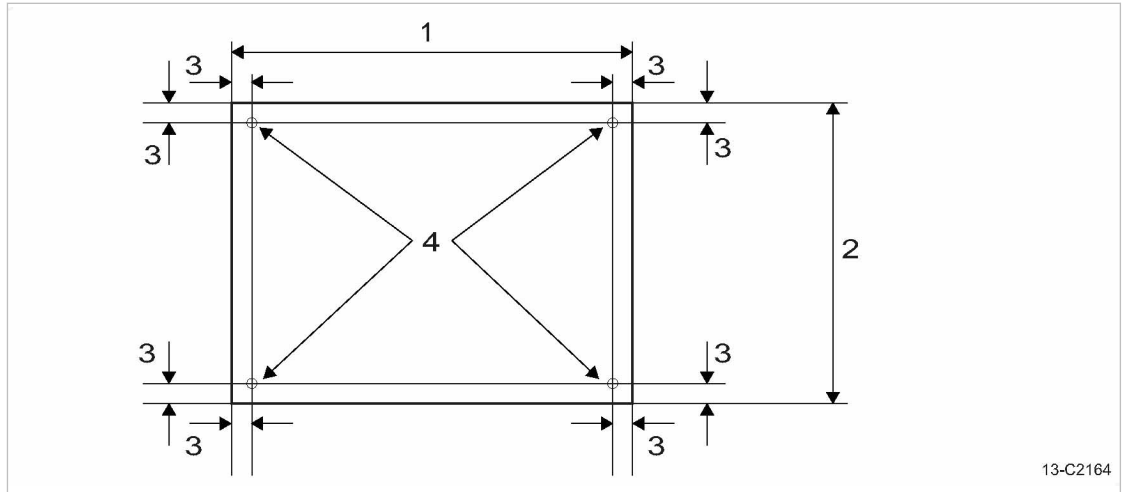
Precondition SBU is de-commissioned.

1. Disconnect SBU from all connections.
2. Hand the SBU over to an authorized disposal expert.

12 Annex

12.1 Anchor holes for the control cabinet

See instructions in chapter 6.4



13-C2164

Fig. 12 Anchor holes for the SBU 400 control cabinet SBU

- ① 16 in.
- ② 12 in.

- ③ 1 in.
- ④ 0.3 in. Ø

12.2 Installation accessories



The installation accessories are shown in the operating manual of the SIGMA AIR MANAGER 4.0, Annex "Installation accessories".

12.3 Electrical Diagram

1	2	3	4	5	6	7	8																
<div style="border: 1px solid black; padding: 10px; margin: 0 auto; width: 80%;"> <p style="font-size: 1.2em; margin: 0;">Wiring Diagram</p> <p style="font-size: 1.2em; margin: 0;">SIGMA AIR MANAGEMENT SYSTEM</p> <p style="font-size: 1.2em; margin: 0;">SIGMA NETWORK - Bus converter</p> <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%;">SBU400-1</td> <td style="width: 50%;">SBU400-1_SW</td> </tr> <tr> <td>SBU400-1_PT</td> <td>SBU400-1_OLM</td> </tr> <tr> <td>SBU400-1_FC</td> <td>SBU400-1_DP</td> </tr> <tr> <td>SBU400-1_DHS</td> <td>SBU400-1_SWDP</td> </tr> <tr> <td>SBU400-1_OLMDP</td> <td>SBU400-1_OLMSW</td> </tr> </table> </div>								SBU400-1	SBU400-1_SW	SBU400-1_PT	SBU400-1_OLM	SBU400-1_FC	SBU400-1_DP	SBU400-1_DHS	SBU400-1_SWDP	SBU400-1_OLMDP	SBU400-1_OLMSW						
SBU400-1	SBU400-1_SW																						
SBU400-1_PT	SBU400-1_OLM																						
SBU400-1_FC	SBU400-1_DP																						
SBU400-1_DHS	SBU400-1_SWDP																						
SBU400-1_OLMDP	SBU400-1_OLMSW																						
<p>ATTENTION !!! The document gives collective information on power supply voltages and frequencies for all machines. The voltage and frequency and local conditions under which any particular machine may be used are given on the nameplate of the machine and in the accompanying service manual.</p>																							
<p>The drawings remain our exclusive property. They are entrusted only for the agreed purpose. Copies or any other reproductions, including storage, treatment and dissemination by use of electronic systems must not be made for any other than the agreed purpose. Neither originals nor reproductions must be forwarded or otherwise made accessible to third parties.</p>																							
<p>manufacturer: KAESER COMPRESSORS 96450 COBURG GERMANY</p>																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">KAESER KOMPRESSOREN</td> <td style="width: 45%;">cover page SIGMA NETWORK - Bus converter</td> <td style="width: 15%; text-align: center;">=</td> <td style="width: 25%;"></td> </tr> <tr> <td style="text-align: right;">Usprung:</td> <td></td> <td style="text-align: center;">+</td> <td style="text-align: center;">DSS.SBU-U3100.01</td> </tr> <tr> <td style="text-align: right;">Ersatz durch:</td> <td></td> <td></td> <td style="text-align: center;">page 1</td> </tr> <tr> <td style="text-align: right;">Ersatz für:</td> <td></td> <td></td> <td style="text-align: center;">1 Bl.</td> </tr> </table>								KAESER KOMPRESSOREN	cover page SIGMA NETWORK - Bus converter	=		Usprung:		+	DSS.SBU-U3100.01	Ersatz durch:			page 1	Ersatz für:			1 Bl.
KAESER KOMPRESSOREN	cover page SIGMA NETWORK - Bus converter	=																					
Usprung:		+	DSS.SBU-U3100.01																				
Ersatz durch:			page 1																				
Ersatz für:			1 Bl.																				

Lfd. Nr. No.	Benennung Name	Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page		DSS.SBU-U3100.01	1	
2	list of contents		ZSS.SBU-U3100.01	1	
3	general instructions / electrical equipment identification		USS.SBU-U3100.01	1	
4	electrical component parts list		USS.SBU-U3100.01	2	
5	electrical component parts list		USS.SBU-U3100.01	3	
6	electrical component parts list		USS.SBU-U3100.01	4	
7	interconnection diagram		USS.SBU-U3100.01	5	
8	wiring diagram	power supply	SSS.SBU-U3100.01	1	
9	wiring diagram	power supply / Bus Controller	SSS.SBU-U3100.01	2	
10	wiring diagram	digital inputs	SSS.SBU-U3100.01	3	
11	wiring diagram	Signal doubler	SSS.SBU-U3100.01	4	
12	wiring diagram	digital inputs	SSS.SBU-U3100.01	5	
13	wiring diagram	digital outputs	SSS.SBU-U3100.01	6	
14	wiring diagram	analog inputs	SSS.SBU-U3100.01	7	
15	wiring diagram	Potential distributor	SSS.SBU-U3100.01	8	
16	wiring diagram	analog inputs electrically isolated	SSS.SBU-U3100.01	9	
17	wiring diagram	analog outputs	SSS.SBU-U3100.01	10	
18	wiring diagram	analog inputs PT100	SSS.SBU-U3100.01	11	
19	wiring diagram	Switch	SSS.SBU-U3100.01	12	
20	wiring diagram	Optical link module	SSS.SBU-U3100.01	13	
21	wiring diagram	converter	SSS.SBU-U3100.01	14	
22	wiring diagram	volt-free contacts	SSS.SBU-U3100.01	15	
23	wiring diagram	volt-free contacts	SSS.SBU-U3100.01	16	
24	wiring diagram	connection variants	SSS.SBU-U3100.01	17	
25	wiring diagram	connection variants	SSS.SBU-U3100.01	18	
26	wiring diagram	connection variants	SSS.SBU-U3100.01	19	
27	lay-out		ASS.SBU-U3100.01	1	
28	lay-out		ASS.SBU-U3100.01	2	

list of contents		=	
SIGMA NETWORK - Bus converter		+	ZSS.SBU-U3100.01
			page 1
			1 Bl.

1	2	3	4	5	6	7	8
<p>general instructions</p> <p>ATTENTION !!!</p> <p>Install supplies, grounding and shock protection to local safety regulations.</p> <p>Do not make or break live plug-in connectors.</p>							
<p>control cabinet wiring for non-designated conductors with multi-standard stranded conductors</p> <p>primary circuits ungrounded: black</p> <p>control voltage DC ungrounded: blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW</p> <p>primary circuits grounded: grey</p> <p>control voltage DC grounded: white/blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW</p> <p>ground conductor: green/yellow H07V-K, UL-Style 1015, CSA-TEW</p>							
<p>-F1 disconnect switch power supply</p> <p>-K1 I/O-Module Bus Controller</p> <p>-K1-X0 I/O-Module power supply</p> <p>-K1-X1 I/O-Module digital inputs</p> <p>-K1-X2 I/O-Module digital outputs</p> <p>-K1-X3 I/O-Module analog inputs 20mA</p> <p>-K1-X4 I/O-Module Potential distributor</p> <p>-K1-X5 I/O-Module analog inputs PT100</p> <p>-K1-X5 I/O-Module analog outputs 20mA</p> <p>-K10 Ethernet Switch</p> <p>-K11 Optical link module</p> <p>-K21...-K26 coupling relay</p> <p>-K31...-K46 coupling relay</p>							
<p>-T1 power unit</p> <p>-T10 protocol converter SIGMA NETWORK - PROFIBUS DP</p> <p>-T40 isolating amplifier</p> <p>-W80...-W81 SIGMA NETWORK cable</p> <p>-X1 terminal strip power supply</p> <p>-X10 terminal strip control 24VDC</p> <p>-X12 terminal strip control 24VDC</p>							
<p>general instructions / electrical equipment identification</p> <p>KAESER KOMPRESSOREN</p> <p>SIGMA NETWORK - Bus converter</p> <p>Ursprung:</p>							
Datum		05.10.2017		Ersatz durch:		Ersatz für:	
Bearbeiter		Siller/Taubmann		Ersatz durch:		Ersatz für:	
Geprüft		Büchner		Ersatz durch:		Ersatz für:	
Name		Norm		Ersatz durch:		Ersatz für:	
Datum		Norm		Ersatz durch:		Ersatz für:	
C/Anderung		Datum		Ersatz durch:		Ersatz für:	
				USS		SBU-U3100.01	
				=		+	
				page		1	
				page		5 Bl.	

		electrical component parts list					
model		SBU400-1_SW	SBU400-1_OLM	SBU400-1_DP	SBU400-1_SWDP		
machine power supply		100-240 V ±10 %, 60 Hz 1) 24 V ±10 %, DC	100-240 V ±10 %, 60 Hz 1) 24 V ±10 %, DC	100-240 V ±10 %, 60 Hz 1) 24 V ±10 %, DC	100-240 V ±10 %, 60 Hz 1) 24 V ±10 %, DC		
I/O-Module	-K1	7.9631.0	7.9631.0	7.9631.0	7.9631.0		
Bus Controller	B&R	X20BC0087-C01	X20BC0087-C01	X20BC0087-C01	X20BC0087-C01		
I/O-Module	-K1-X0	7.9631.00010	7.9631.00010	7.9631.00010	7.9631.00010		
power supply	B&R	X20PS9400	X20PS9400	X20PS9400	X20PS9400		
I/O-Module	-K1-X1	7.9631.00020	7.9631.00020	7.9631.00020	7.9631.00020		
6DI	B&R	X20DI6371	X20DI6371	X20DI6371	X20DI6371		
I/O-Module	-K1-X2	7.9631.00030	7.9631.00030	7.9631.00030	7.9631.00030		
6DOT	B&R	X20DO6322	X20DO6322	X20DO6322	X20DO6322		
I/O-Module	-K1-X3	7.9631.00041	7.9631.00041	7.9631.00041	7.9631.00041		
4 All	B&R	X20AI4632-1	X20AI4632-1	X20AI4632-1	X20AI4632-1		
I/O-Module	-K1-X4	7.9631.00090	7.9631.00090	7.9631.00090	7.9631.00090		
Potential distributor	B&R	X20PD2113	X20PD2113	X20PD2113	X20PD2113		
I/O-Module	-K1	7.9630.0	7.9630.0	7.9630.0	7.9630.0		
lower part	B&R	X20BB80	X20BB80	X20BB80	X20BB80		
I/O-Module	-K1-X1.-X4	7.9630.00010	7.9630.00010	7.9630.00010	7.9630.00010		
lower part	B&R	X20BM11	X20BM11	X20BM11	X20BM11		
I/O-Module	-K1-X0.-X4	7.9632.0	7.9632.0	7.9632.0	7.9632.0		
terminal block	B&R	X20TB12	X20TB12	X20TB12	X20TB12		
Switch	-K10	7.9662.0	---	---	7.9662.0		
	Wieland	WIENET UMS 8			WIENET UMS 8		
Switch LWL	-K11	---	7.9663.0	---	---		
	Wieland		WIENET UMS4-1FM				
protocol converter	-T10	---	---	7.9661.1	7.9661.1		
	Hilscher			NT100-RE-DP/KAES	NT100-RE-DP/KAES		
Patchkabel	-W80	7.7818.1	7.7818.1	7.7818.1	7.7818.1		
	Weidmüller	LSZH grey 0.5m	LSZH grey 0.5m	LSZH grey 0.5m	LSZH grey 0.5m		
Patchkabel	-W81	---	---	---	7.7818.1		
	Weidmüller				LSZH grey 0.5m		
terminals	-X1	2x 7.3149.02600 WKFN 4 D2/2/35	2x 7.3149.02600 WKFN 4 D2/2/35	2x 7.3149.02600 WKFN 4 D2/2/35	2x 7.3149.02600 WKFN 4 D2/2/35		
	Wieland	2x 7.3149.01850 WKFN 4 D2/2/SL/35	2x 7.3149.01850 WKFN 4 D2/2/SL/35	2x 7.3149.01850 WKFN 4 D2/2/SL/35	2x 7.3149.01850 WKFN 4 D2/2/SL/35		
terminals	-X10	2x 7.3149.02620 WKFN 2.5 E1/2/VB/35	2x 7.3149.02620 WKFN 2.5 E1/2/VB/35	2x 7.3149.02620 WKFN 2.5 E1/2/VB/35	2x 7.3149.02620 WKFN 2.5 E1/2/VB/35		
	Wieland						
disconnect switch	-F1	7.3140.05110	7.3140.05110	7.3140.05110	7.3140.05110		
	Siemens	5SJ4203-8HG41	5SJ4203-8HG41	5SJ4203-8HG41	5SJ4203-8HG41		
power supply 1)	-T1	7.9665.0	7.9665.0	7.9665.0	7.9665.0		
	Wieland	WIPOS P1 24-2.5	WIPOS P1 24-2.5	WIPOS P1 24-2.5	WIPOS P1 24-2.5		
coupling relay	-K21.-K26	7.3172.00310	7.3172.00310	7.3172.00310	7.3172.00310		
	Phoenix	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21		
ferrit bead		7.4890.00070	7.4890.00070	7.4890.00070	7.4890.00070		
hinged	Würth	74271112	74271112	74271112	74271112		
ferrit bead		7.4890.00020	7.4890.00020	7.4890.00020	7.4890.00020		
closed	Würth	74270081	74270081	74270081	74270081		
cable entry		7.9680.00100	7.9680.00100	7.9680.00100	7.9680.00100		
221 mm x 90 mm	icotek	KEL-DPZ-KL72	KEL-DPZ-KL72	KEL-DPZ-KL72	KEL-DPZ-KL72		
cable entry		7.9680.00110	7.9680.00120	7.9680.00110	7.9680.00110		
d = 32 mm	icotek	KEL-DP32/10	QVT32	KEL-DP32/10	KEL-DP32/10		
		---	7.9680.00200	---	---		
			QT7				
screwed cable gland		7.5781.00780	7.5781.00780	7.5781.00780	7.5781.00780		
M 16 x 1.5 EMV	Lapp	SKINTOP MS-SC-M16x 1.5	SKINTOP MS-SC-M16x 1.5	SKINTOP MS-SC-M16x 1.5	SKINTOP MS-SC-M16x 1.5		
control cabinet	KAESER	7.9680.00020	7.9680.00020	7.9680.00020	7.9680.00020		

page 3
5 Bl.

+ =

USS-SBU-U3100.01

electrical component parts list

SIGMA NETWORK - Bus converter

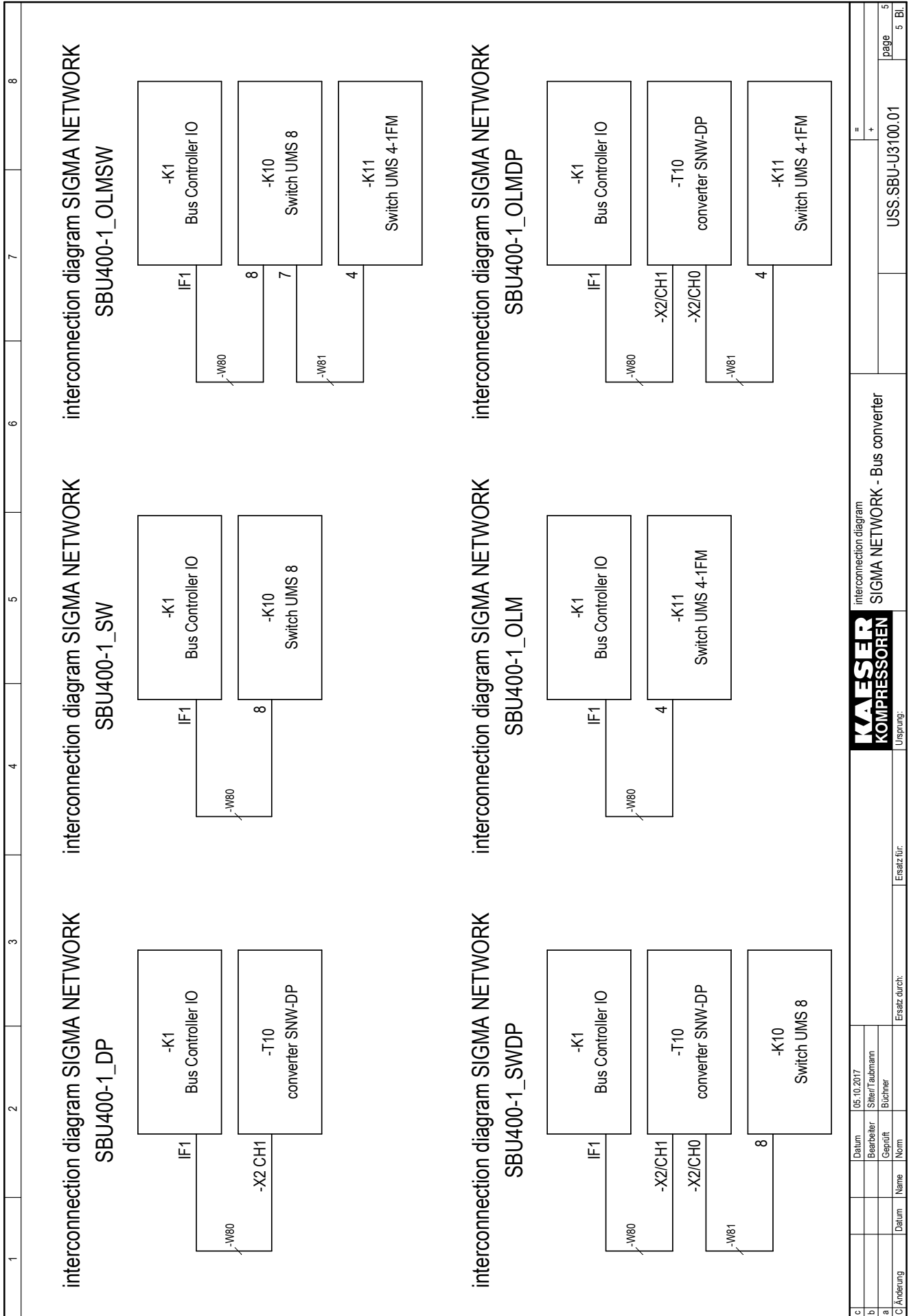
KAESER
KOMPRESSOREN

Ursprung:

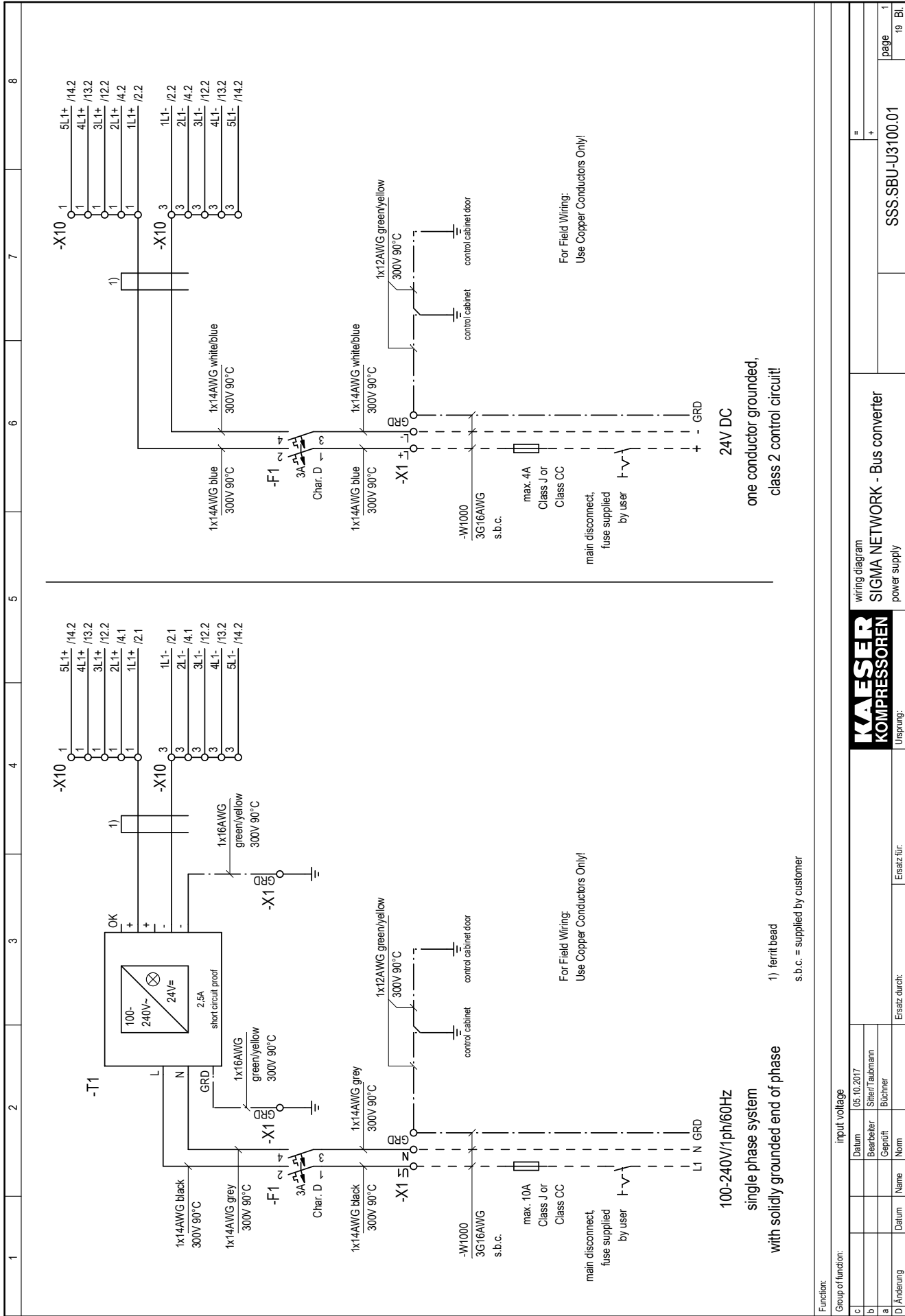
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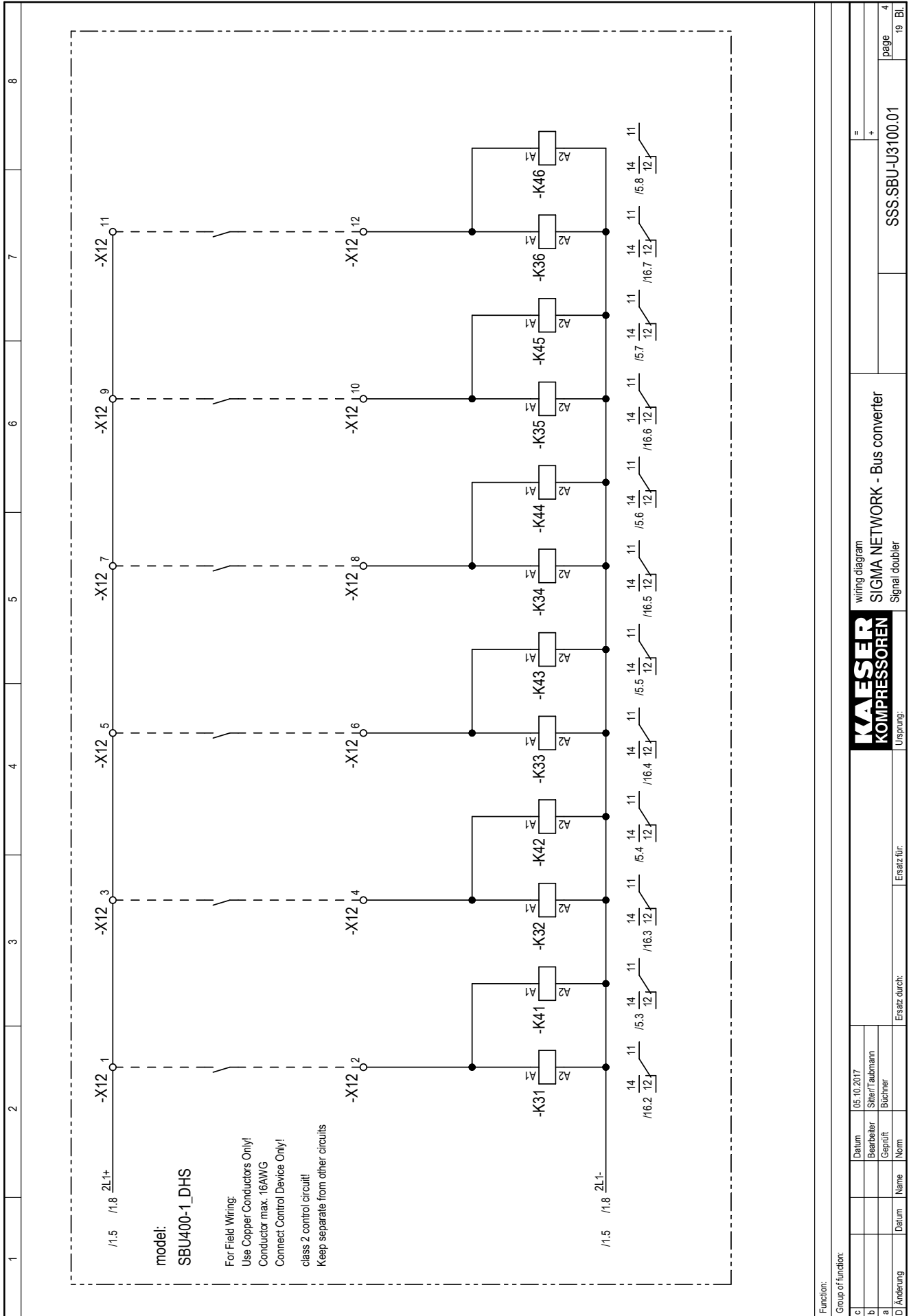
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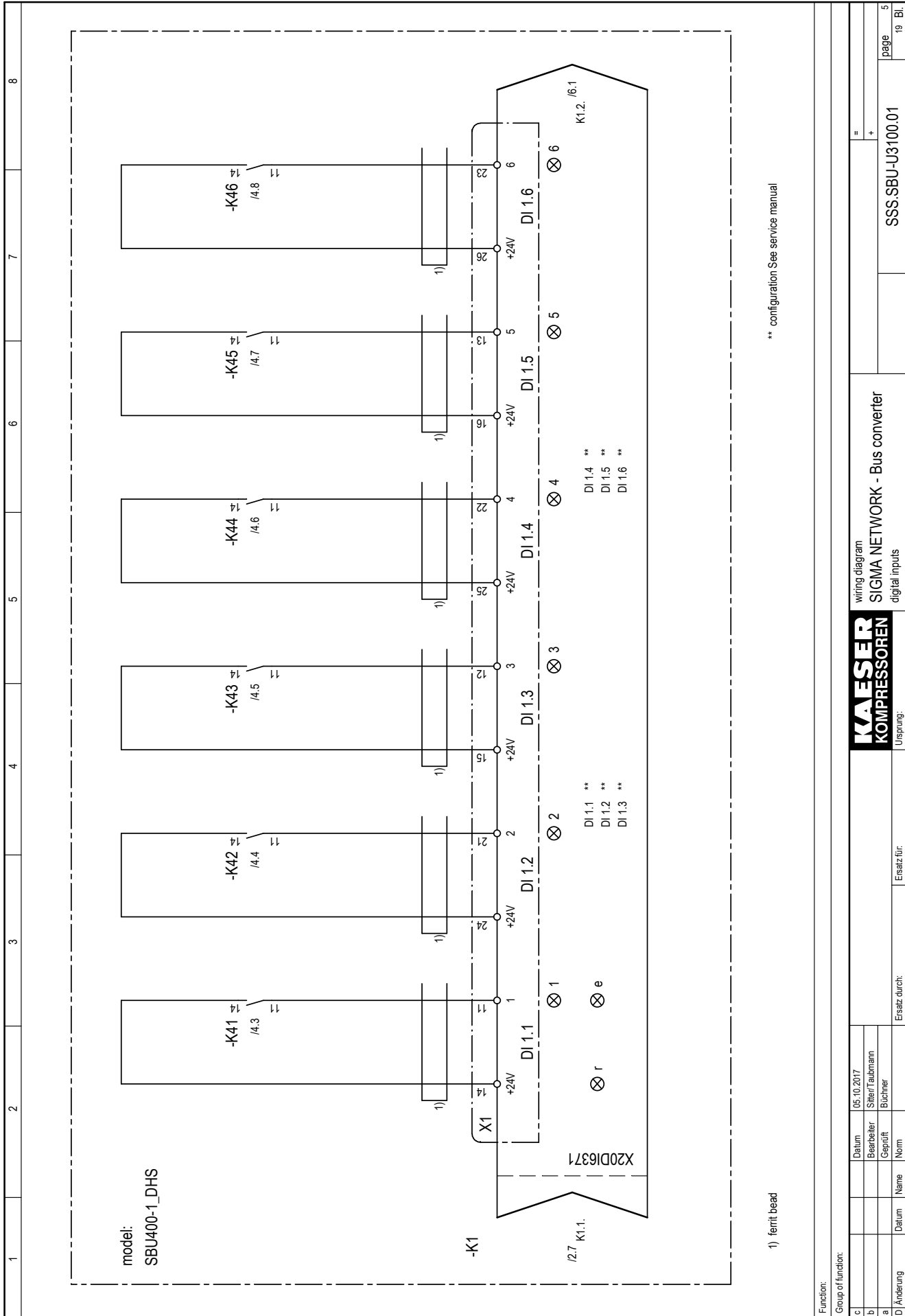
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Geprüft		Büchner	
Norm			
Name			
Datum			
Anderung			

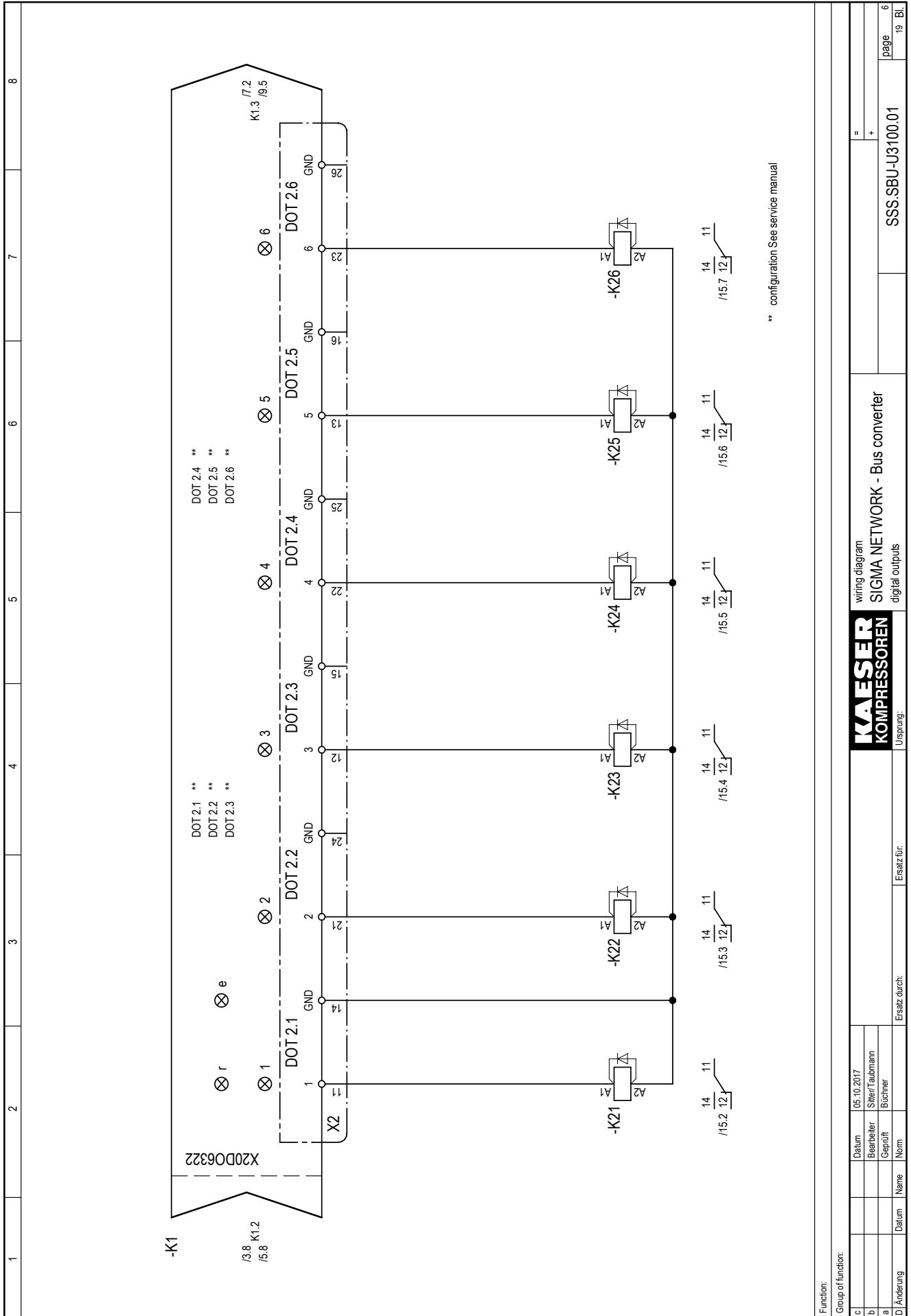


c	Datum	05.10.2017	Interconnection diagram SIGMA NETWORK - Bus converter		=	
b	Bearbeiter	Silber/ Taubmann			+	
a	Geprüft	Bücher				page
C/	Anderung	Datum	Name	Norm	Ersatz durch:	5
					Ersatz für:	5 Bl.
					Ursprung:	
					USS_SBU-U3100.01	

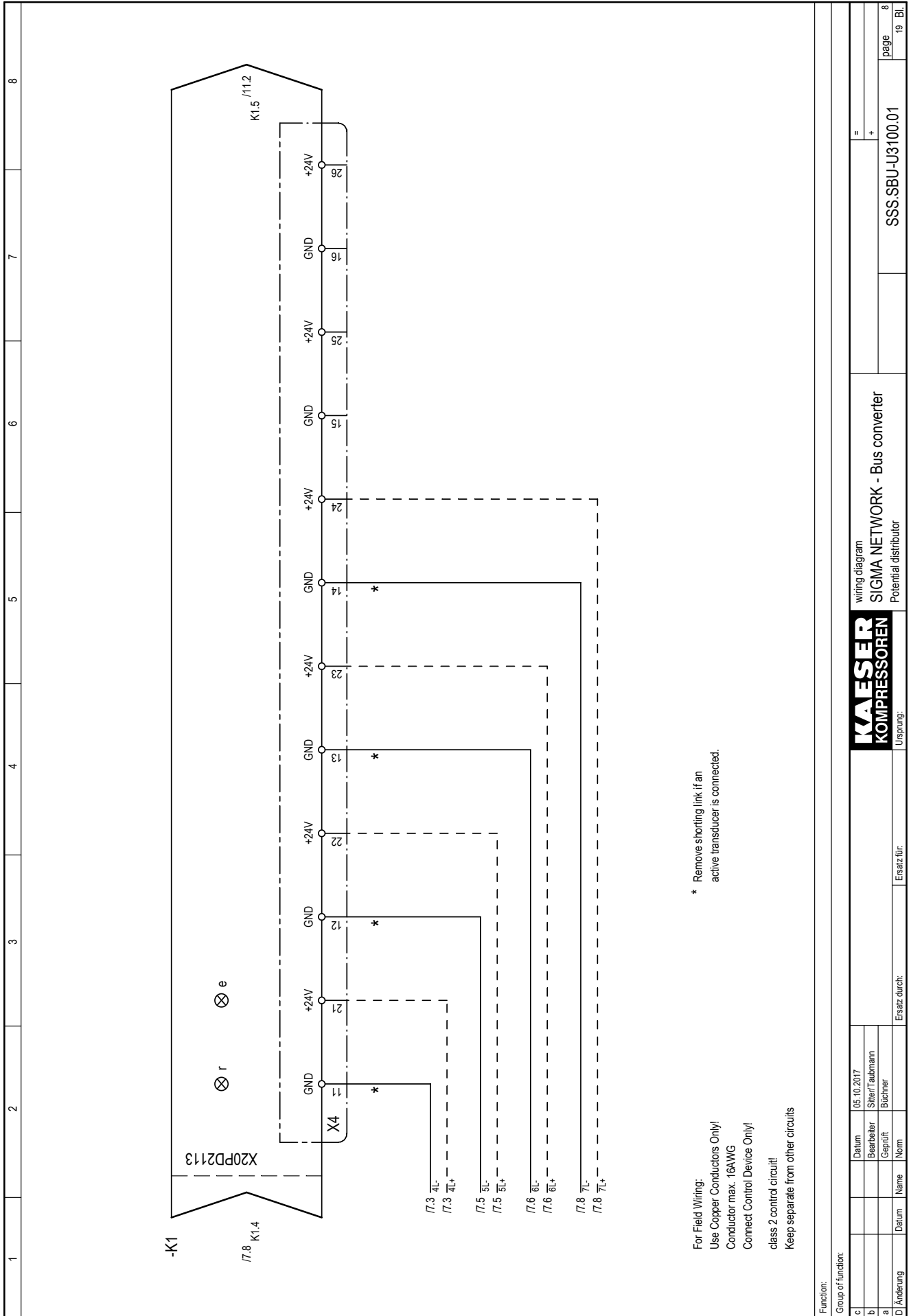




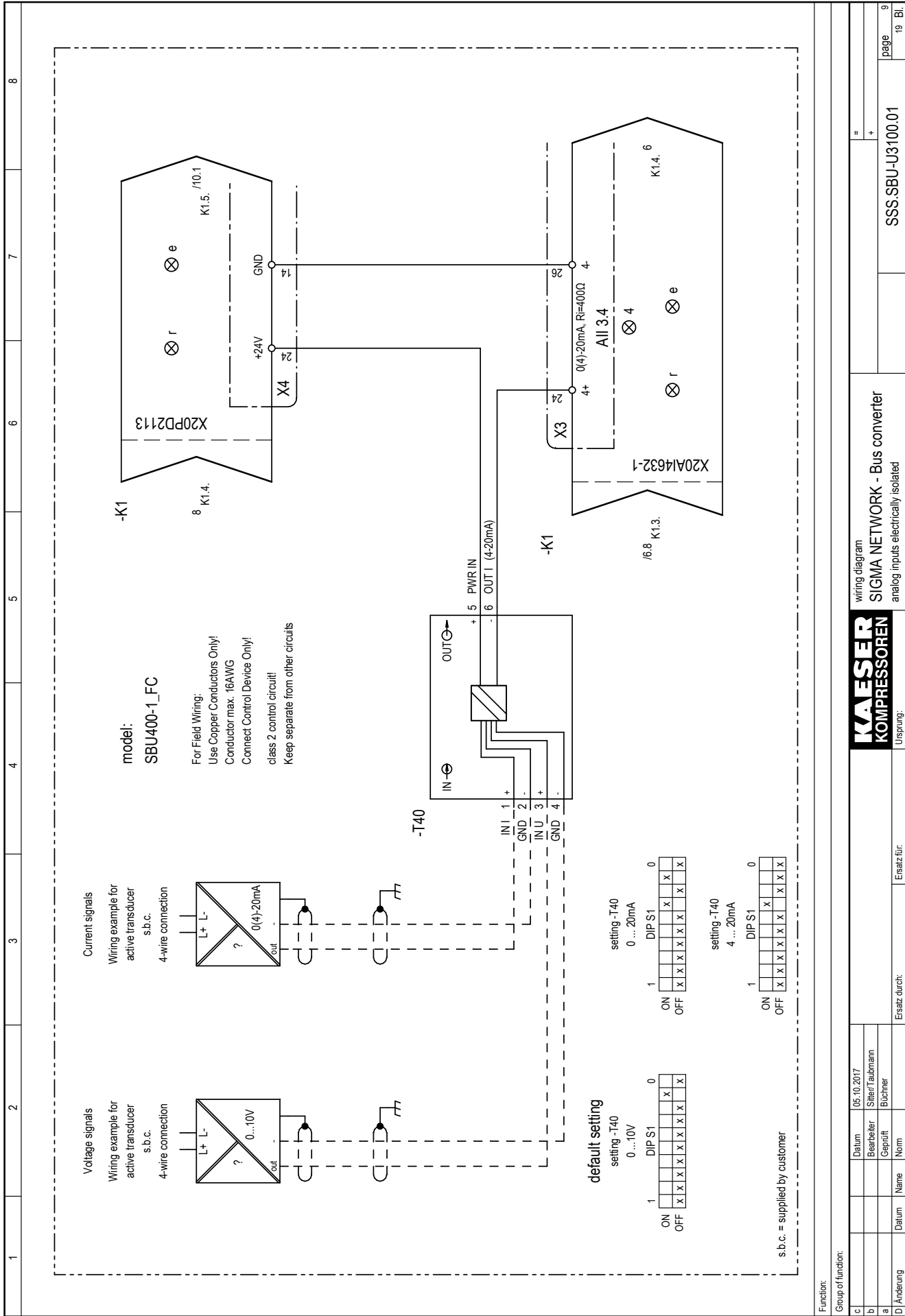


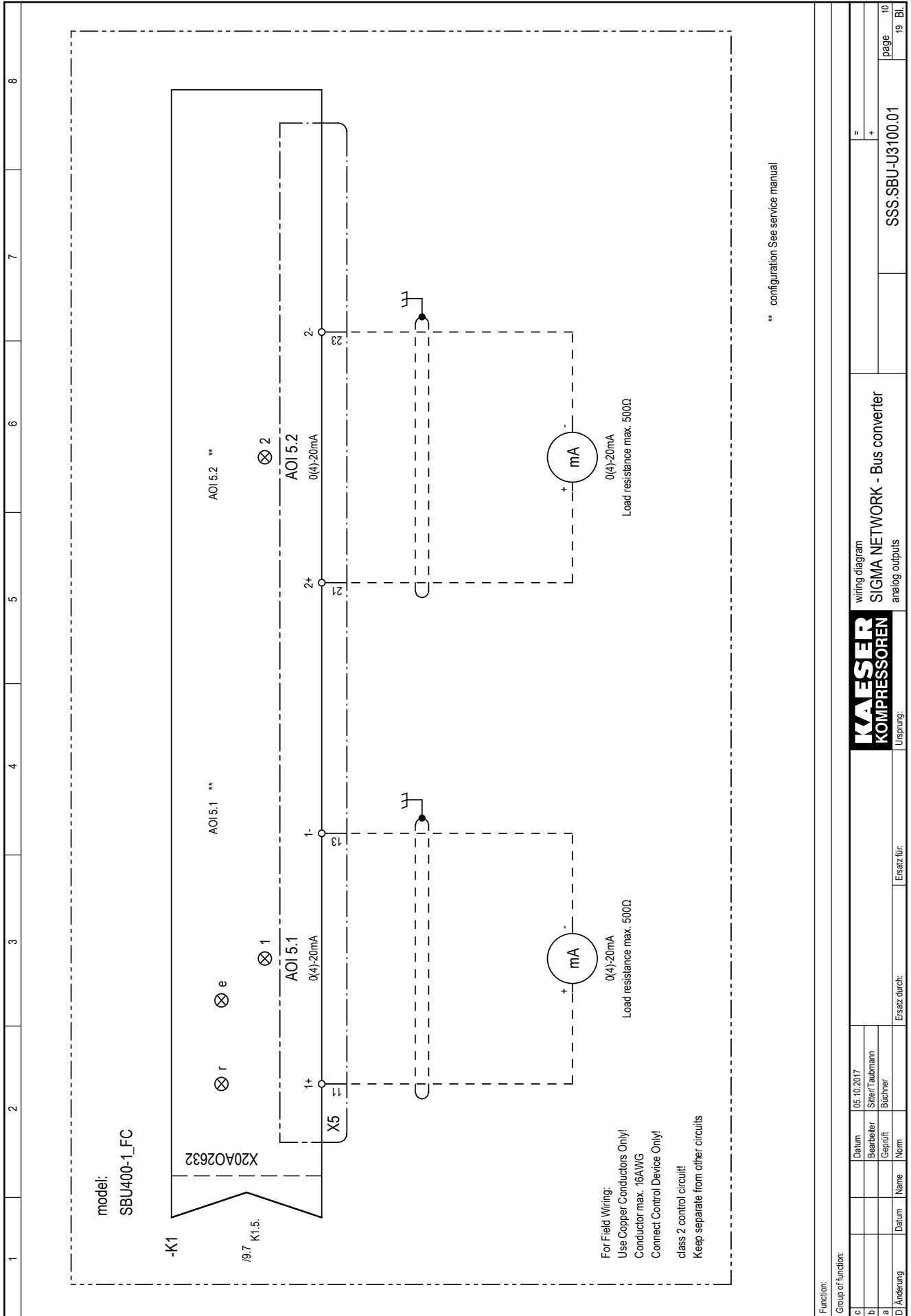


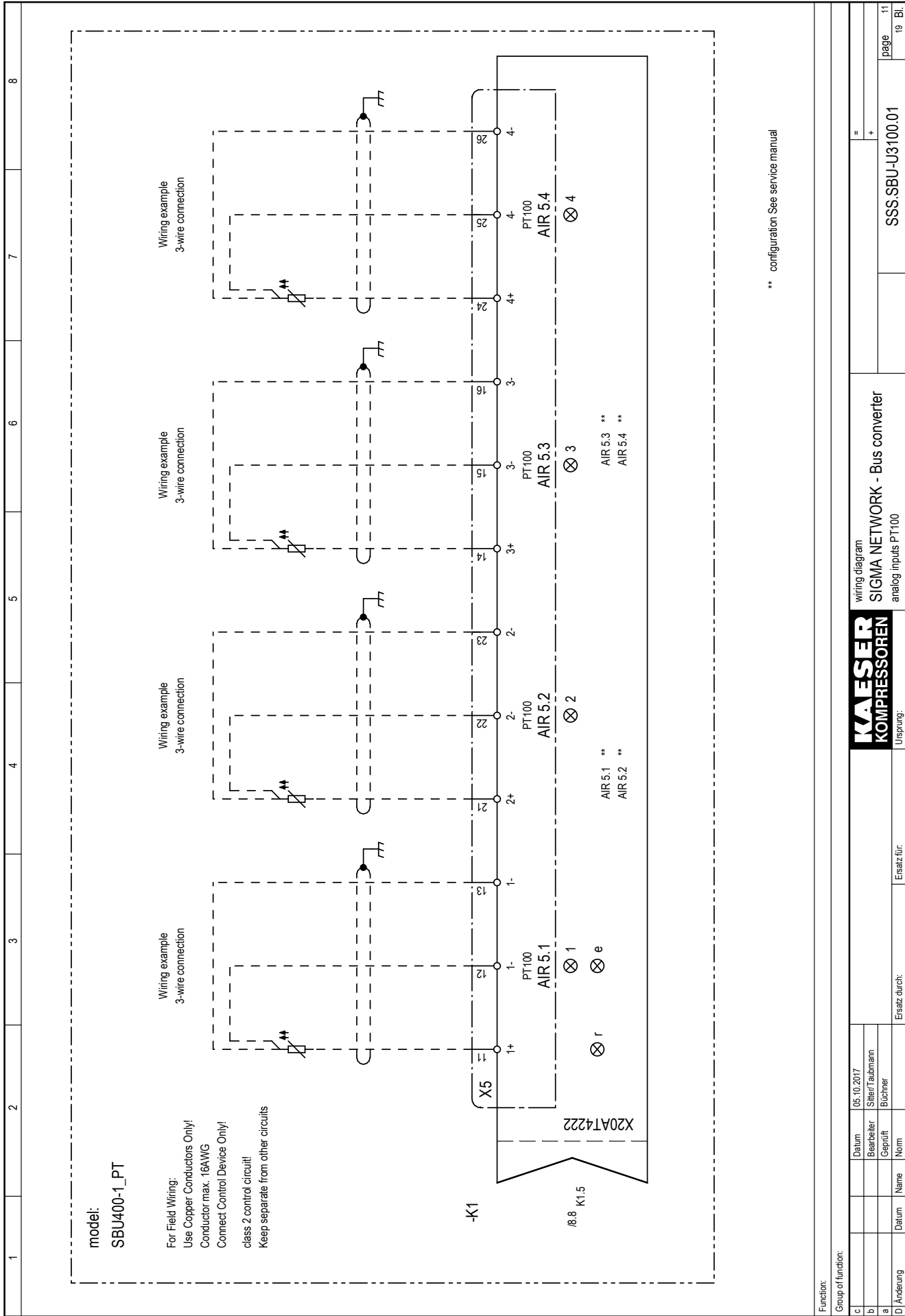
Function:		Group of function:	
c	Datum	05.10.2017	
b	Bearbeiter	Silber/ Taubmann	
a	Geprüft	Bücher	
D	Änderung	Datum	Name
	Ersatz durch:		
	Ersatz für:		
	Ursprung:	KAESER KOMPRESSOREN	
	wiring diagram	SIGMA NETWORK - Bus converter	
		digital outputs	
		SSS-SBU-U3100.01	
	page	6	
	19 Bl.		



Function:		Date:		Date:	
Group of function:		05.10.2017		05.10.2017	
		Siller/Taubmann		Siller/Taubmann	
		Geprüft		Geprüft	
		Buchner		Buchner	
Datum		Name		Ersatz durch:	
				Ersatz für:	
				Ursprung:	
				SIGMA NETWORK - Bus converter	
				Potential distributor	
				SSS-SBU-U3100.01	
				page 8	
				19 Bl.	







Function:		Group of function:	
c	Datum	05.10.2017	
b	Bearbeiter	Silber/ Taubmann	
a	Geprüft	Bücher	
D	Änderung	Datum	Name
	Ersatz durch:	Ersatz für:	

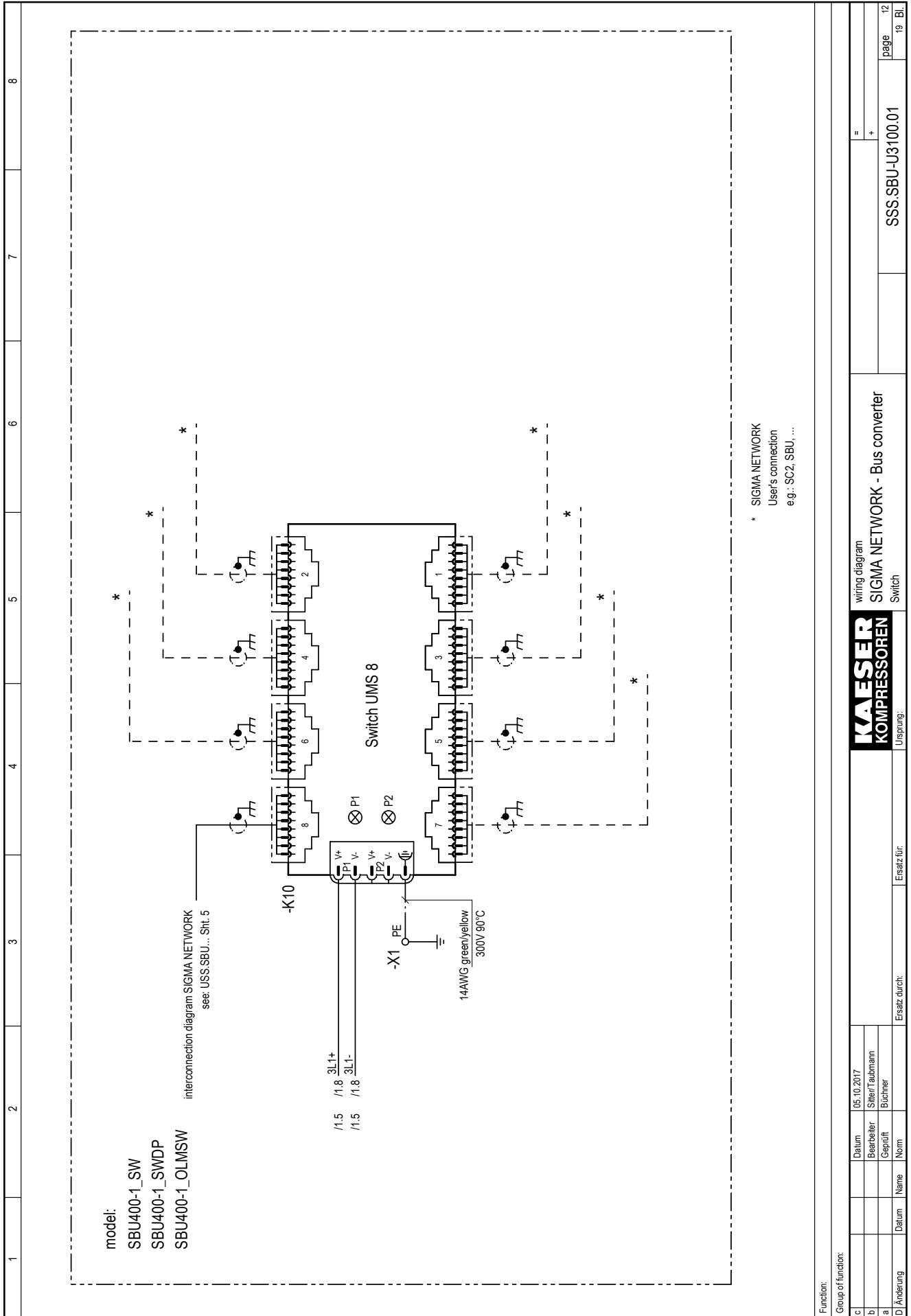
wiring diagram
SIGMA NETWORK - Bus converter
analog inputs PT100

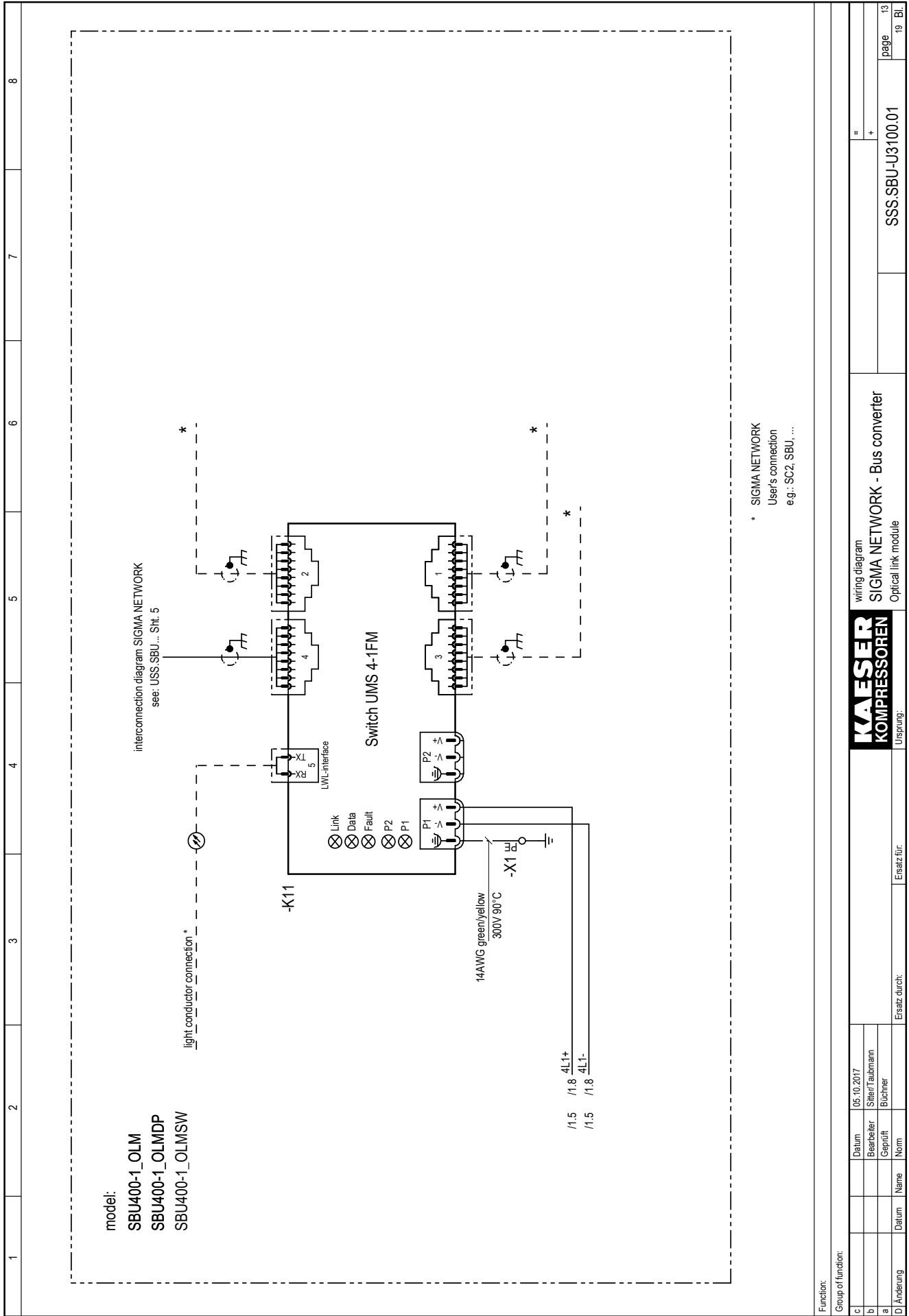
KAESER
KOMPRESSOREN

Ursprung:

SSS.SBU-U3100.01

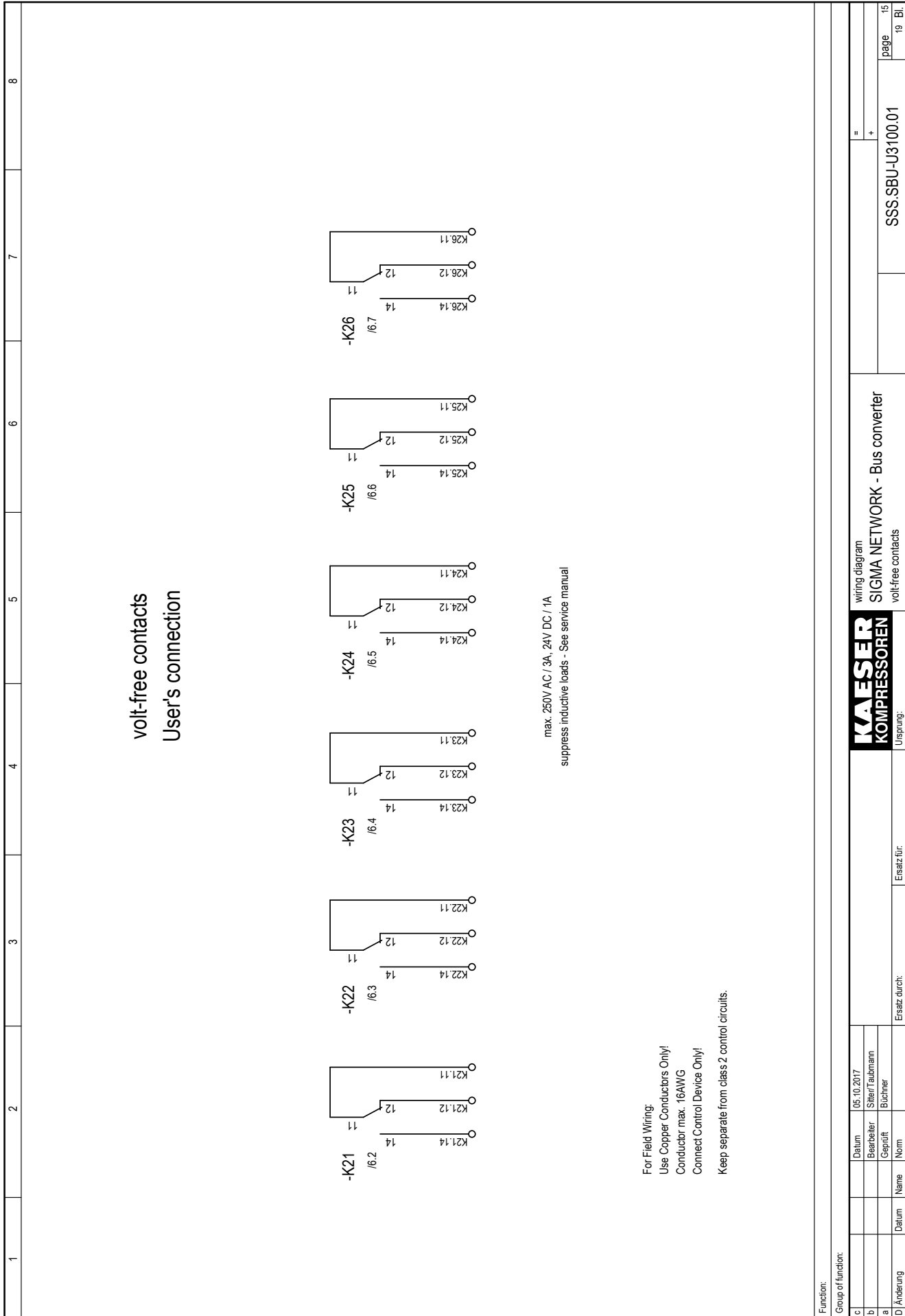
page 11
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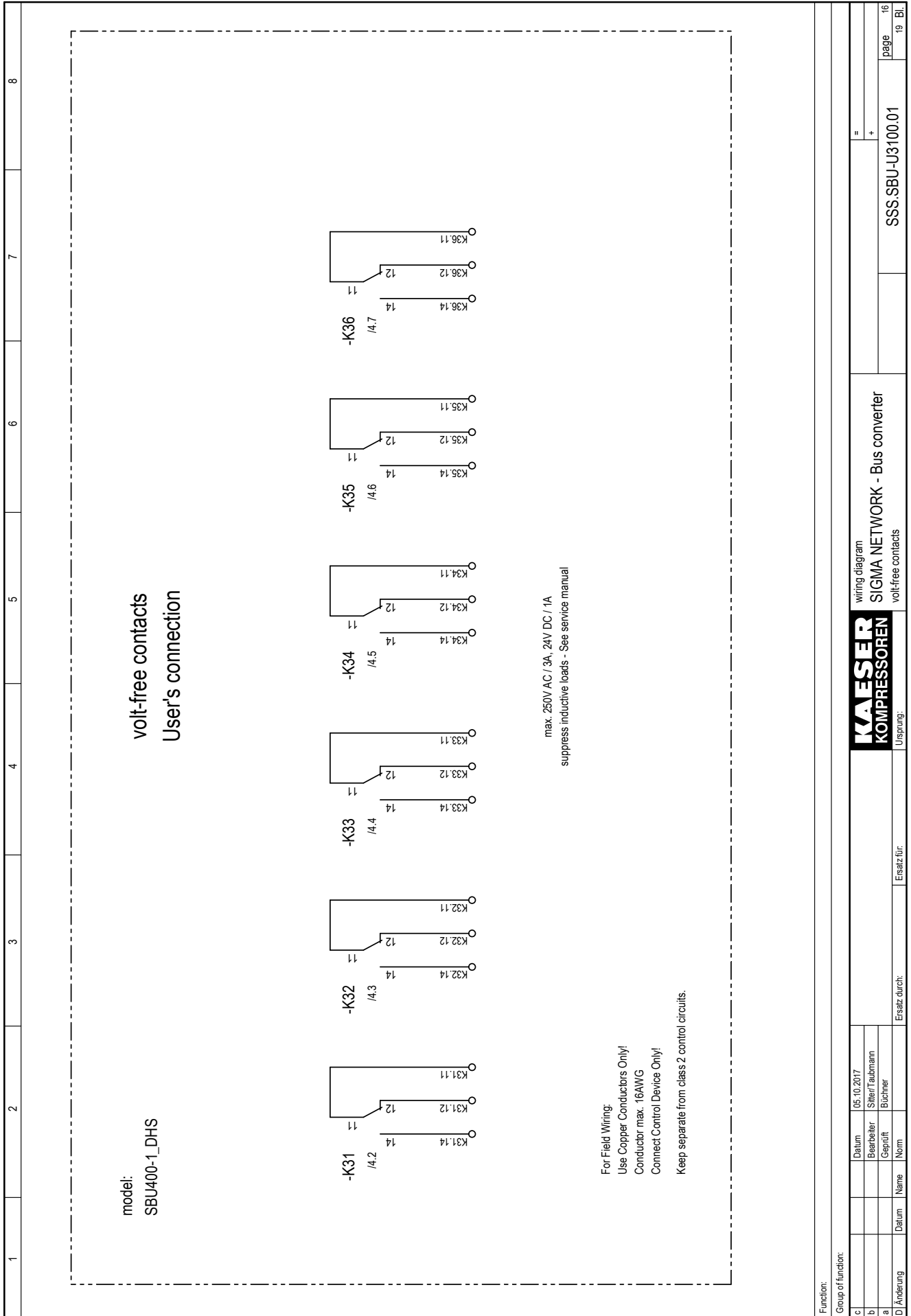


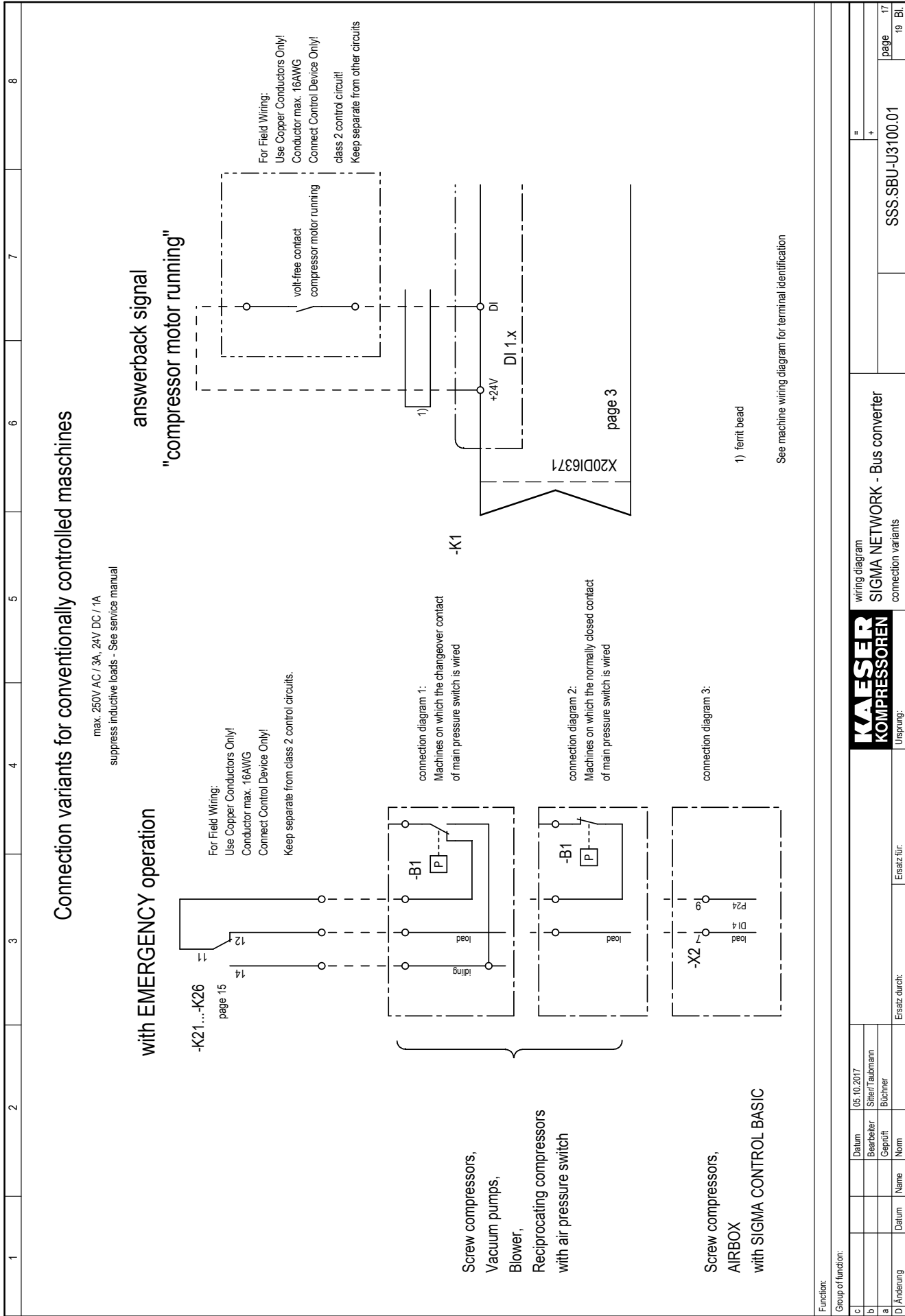


Funktion:		Group of function:	
c	Datum	05.10.2017	
b	Bearbeiter	Silber/ Taubmann	
a	Geprüft	Bücher	
D	Änderung	Datum	Name
	Ersatz durch:		
	Ersatz für:		

wiring diagram
SIGMA NETWORK - Bus converter
Optical link module





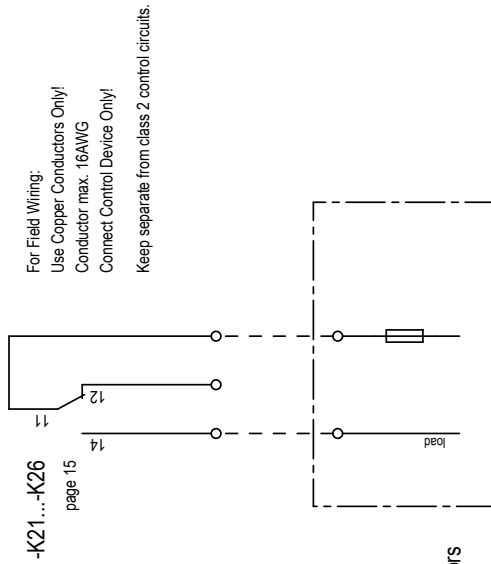


Function:		wiring diagram	
Group of function:		SIGMA NETWORK - Bus converter	
Date:		SSS-SBU-U3100.01	
Author:		page 17	
Checked:		page 19 Bl.	
Revised by:			
Date:			
Name:			
Ersatz durch:		Ersatz für:	
Ursprung:			

Connection variants for conventionally controlled machines

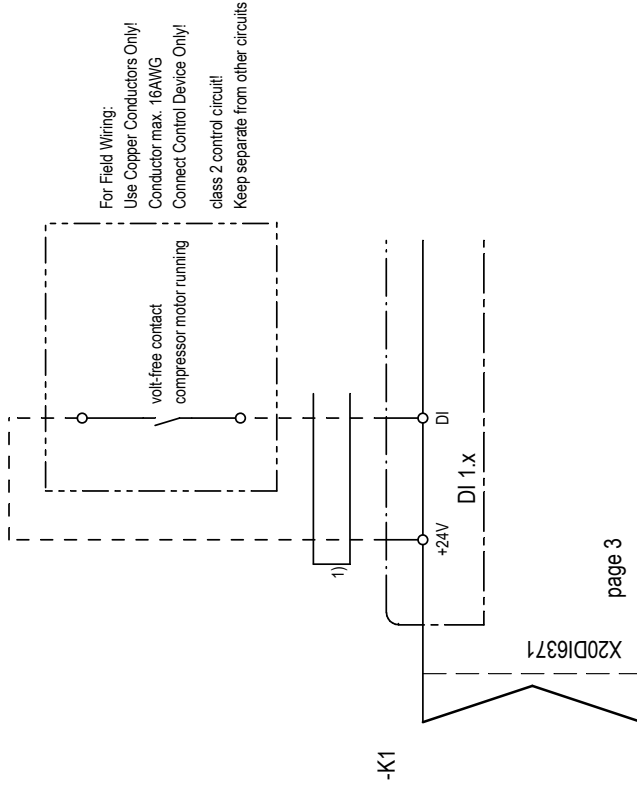
max. 250V AC / 3A, 24V DC / 1A
suppress inductive loads - See service manual

without EMERGENCY operation



Blower,
Reciprocating compressors

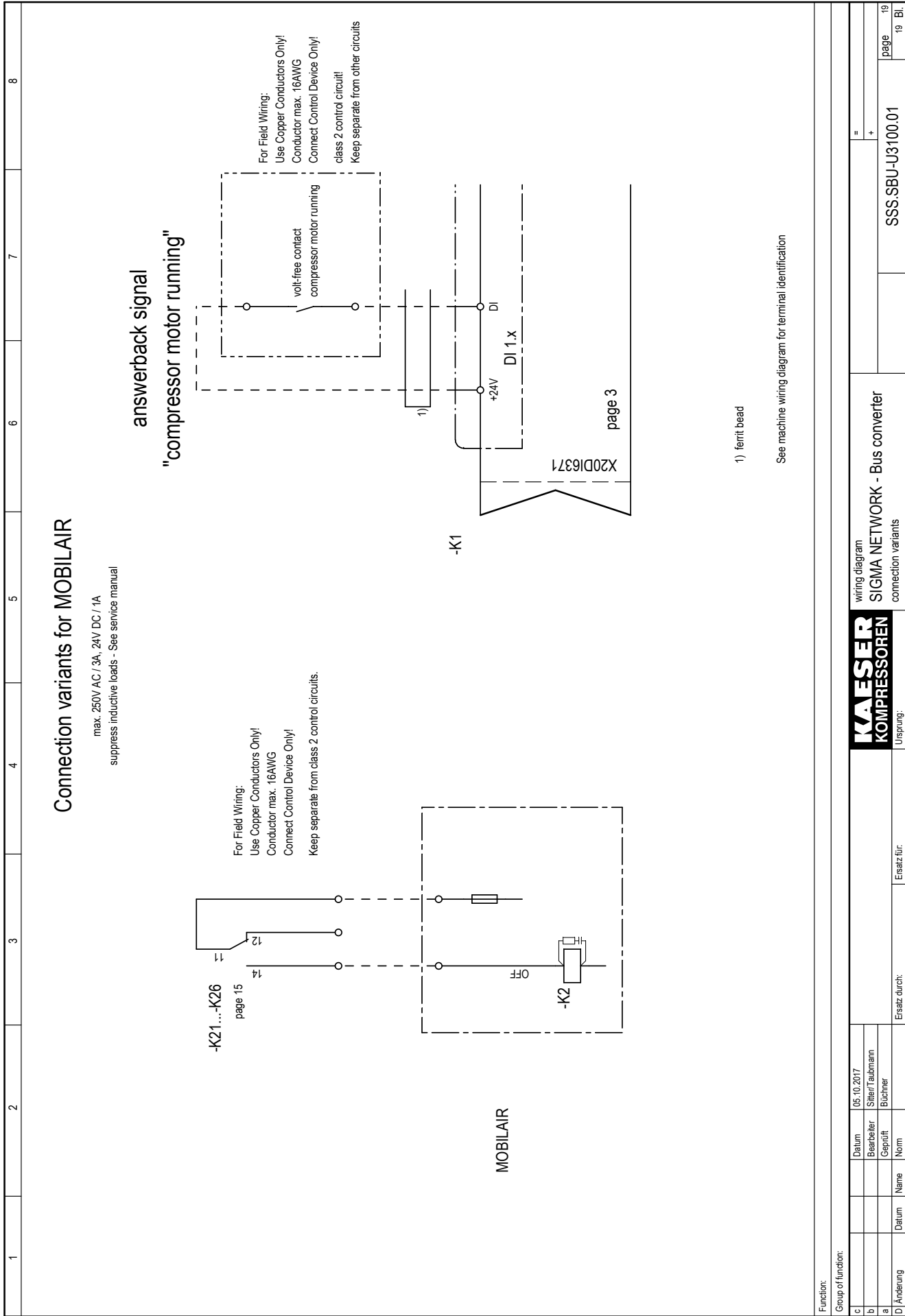
"compressor motor running"
answerback signal

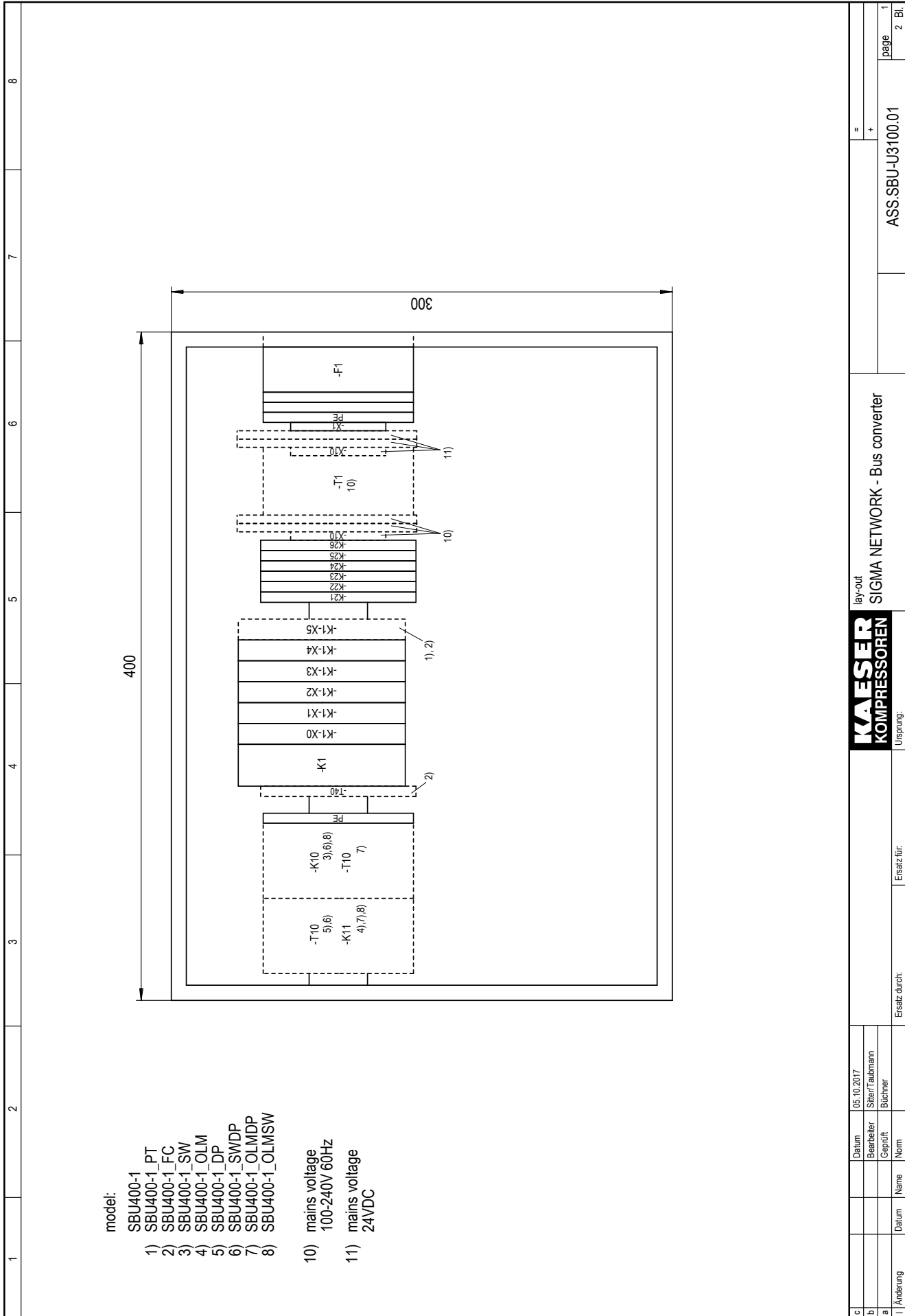


1) ferrit bead

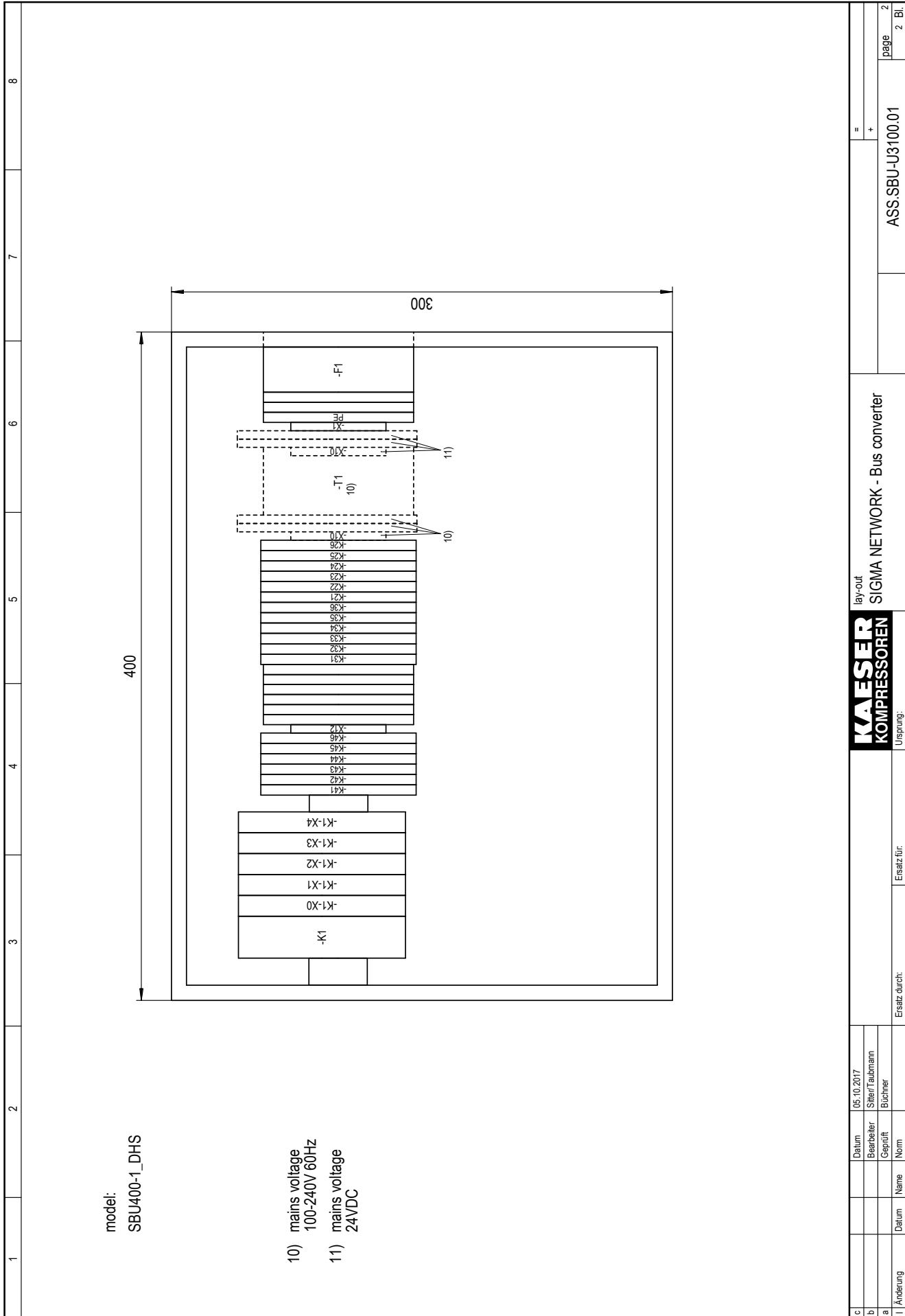
See machine wiring diagram for terminal identification

Function:		wiring diagram	
Group of function:		SIGMA NETWORK - Bus converter	
c	Datum	05.10.2017	=
b	Bearbeiter	Silber/ Taubmann	+
a	Geprüft	Bücher	
D/Änderung	Datum	Name	
Ersatz durch:		Ersatz für:	
		SSS-SBU-U3100.01	
		page	18
		19 Bl.	





c	Datum	05.10.2017	Ursprung:	ASS-SBU-U3100.01	page 1
b	Bearbeiter	Silber/ Taubmann	Ersatz durch:		2 Bl.
a	Geprüft	Büchner			
l	Anderung	Datum	Name		
		Ersatz für:		SIGMA NETWORK - Bus converter	
		Ersatz durch:		lay-out	
		Ersatz durch:		KOMPRESSOREN	
		Ersatz durch:		KAESER	



c	Datum	05.10.2017	Ersatz durch:		ASS-SBU-U3100.01	page	2
b	Bearbeiter	Slieri/taubmann	Ersatz durch:			+	
a	Geprüft	Büchner	Ersatz durch:				2 Bl.
l	Anderung	Datum	Name	Norm			
KAESER KOMPRESSOREN					lay-out SIGMA NETWORK - Bus converter		
Ursprung:							

12.4 I/O block 6DI & 6DOT & 4 All with relays

Enter the wiring information of the actual application into the following tables.

Sample entry in assignment table

Input	Terminal	Line	Destination	Application
DI 1.1	1 X1	W7625 2x 16 AWG: 1	Compressor 3 -X1:25	Motor running K3
	+24V X1	W7625 2x 16 AWG: 2	Compressor 3 -X1:26	Motor running K3
DOT 2.1	1 X2	1x1 mm ² : SM	-K21: A1	Internal wiring
	GND X2	1x1 mm ² : SM	-K21: A2	Internal wiring
All 3.1	1+ X3	W4713 2x 16 AWG: BN	DHS -X1:19	Pressure from air main charging system
	1- X3	W4713 2x 16 AWG: SW	DHS -X1:20	
	+24V X4			
	GND X4			
Relay -K21		A1 1x1 mm ² : SM	-K1-X2: 11	Internal wiring
		A2 1x1 mm ² : SM	-K1-X2: 14	Internal wiring
	CC	W4633 3G 16 AWG: BN	Compressor 3 -X3: 18	C3 load
	NC	12		
	NO	W4633 3G 16 AWG: SM	Compressor 3 -X3: 19	C3 load

Tab. 25 Sample entry in assignment table I/O block with relays

Module 1: X1 DI1.x

Input	Terminal	Line	Destination	Application
DI 1.1	1 X1	11		
	+24V X1	14		
DI 1.2	2 X1	21		
	+24V X1	24		
DI 1.3	3 X1	12		
	+24V X1	15		
DI 1.4	4 X1	22		
	+24V X1	25		
DI 1.5	5 X1	13		
	+24V X1	16		
DI 1.6	6 X1	23		
	+24V X1	26		

Tab. 26 Assignment I/O block – Module 1: X1 DI1.x – 20DI6371 – 6x DI 24VDC

Module 2: X2 DOT2.x (wiring when shipped)

Input	Terminal	Line	Destination	Application
DOT 2.1	1 X2	11 1x1 mm ² : SM	-K21: A1	Internal wiring
	GND X2	14 1x1 mm ² : SM	-K21: A2	Internal wiring
Relay -K21		A1 1x1 mm ² : SM	-K1-X2: 11	Internal wiring
		A2 1x1 mm ² : SM	-K1-X2: 14	Internal wiring
	CC	11		
	NC	12		
	NO	14		
DOT 2.2	2 X2	21 1x1 mm ² : SM	-K22: A1	Internal wiring
	GND X2	24		
Relay -K22		A1 1x1 mm ² : SM	-K1-X2: 21	Internal wiring
		A2 Wire jumper	-K21: A2	Internal wiring
	CC	11		
	NC	12		
	NO	14		
DOT 2.3	3 X2	12 1x1 mm ² : SM	-K23: A1	Internal wiring
	GND X2	15		

Input	Terminal	Line	Destination	Application
Relay -K23		A1 1x1 mm ² : SM	-K1-X2: 12	Internal wiring
		A2 Wire jumper	-K21: A2	Internal wiring
	CC	11		
	NC	12		
	NO	14		
DOT 2.4	4 X4	22 1x1 mm ² : SM	-K24: A1	Internal wiring
	GND X4	25		
Relay -K24		A1 1x1 mm ² : SM	-K1-X2: 22	Internal wiring
		A2 Wire jumper	-K21: A2	Internal wiring
	CC	11		
	NC	12		
	NO	14		
DOT 2.5	5 X5	13 1x1 mm ² : SM	-K25: A1	Internal wiring
	GND X5	16		

Input	Terminal	Line	Destination	Application
Relay -K25		A1 1x1 mm ² : SM	-K1-X2: 13	Internal wiring
		A2 Wire jumper	-K21: A2	Internal wiring
	CC	11		
	NC	12		
	NO	14		
DOT 2.6	6	23 1x1 mm ² : SM	SBU: -K26: A1 SIGMA AIR MANAGER 4.0: Control cabinet fan	Internal wiring
	X6			
	GND	26 SIGMA AIR MANAGER 4.0: 1x1 mm ² : SM	SIGMA AIR MANAGER 4.0: Control cabinet fan	
SBU: Relay -K26		A1 1x1 mm ² : SM	-K1-X2: 23	Internal wiring
		A2 Wire jumper	-K21: A2	Internal wiring
	CC	11		
	NC	12		
	NO	14		

Tab. 27 Assignment I/O block – Module 2: X2 DOT2.x – X20DO6322 – 6x relays

Modules 3 & 4: X3 & X4 All3.x

Input	Terminal	Line	Destination	Application
All 3.1	1+ X3	11		
	1- X3	13		
	+24V X4	21		
	GND X4	11		
All 3.2	2+ X3	21		
	2- X3	23		
	+24V X4	22		
	GND X4	12		
All 3.3	3+ X3	14		
	3- X3	16		
	+24V X4	23		
	GND X4	13		
All 3.4	4+ X3	24		
	4- X3	26		
	+24V X4	24		
	GND X4	14		

Tab. 28 Assignment I/O block Modules 3 & 4 – X3 & X4 All3.x – X20AI4632-1 – 4x All 0-22mA 16Bit & X20PD2113

12.5 Module 6DI – Digital inputs

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ DI__x

Input	Terminal	Line	Objective	Application
DI __.1	1 X__	11		
	+24V X__	14		
DI __.2	2 X__	21		
	+24V X__	24		
DI __.3	3 X__	12		
	+24V X__	15		
DI __.4	4 X__	22		
	+24V X__	25		
DI __.5	5 X__	13		
	+24V X__	16		
DI __.6	6 X__	23		
	+24V X__	26		

Tab. 29 Assignment Module 6DI – X20DI63716x – DI 24VDC

12.6 Module 2DII - Digital inputs impulse

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ DII__x

Input	Terminal	Conductor	Destination	Application
DII __.1	1 X__	11		
	+24V X__	12		
	GND X__	13		
DII __.2	2 X__	21		
	+24V X__	22		
	GND X__	23		

Tab. 30 Assignment Module 2DII – X20DI2377

12.7 Module 6DOT – Digital outputs 24VDC 0.5A

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ DOT __.x

Input	Terminal	Line	Objective	Application
DOT __.1	1 X__	11		
	GND X__	14		
DOT __.2	2 X__	21		
	GND X__	24		
DOT __.3	3 X__	12		
	GND X__	15		
DOT __.4	4 X__	22		
	GND X__	25		
DOT __.5	5 X__	13		
	GND X__	16		
DOT __.6	6 X__	23		
	GND X__	26		

Tab. 31 Assignment Module 6DOT – X20DO6322 – 6x DOT 24VDC 0,5A

12.8 Module 4All – Analogue inputs 0-22mA

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __ & __: X__ & X__ All __.x

Input	Terminal	Line	Destination	Application
All __.1	1+ X__	11		
	1- X__	13		
	+24V X__	21		
	GND X__	11		
All __.2	2+ X__	21		
	2- X__	23		
	+24V X__	22		
	GND X__	12		
All __.3	3+ X__	14		
	3- X__	16		
	+24V X__	23		
	GND X__	13		
All __.4	4+ X__	24		
	4- X__	26		
	+24V X__	24		
	GND X__	14		

Tab. 32 Assignment 4All – X20AI4632-1 – 4x All 0-22mA 16Bit & X20PD2113

12.9 Module 4AIR – Analogue inputs PT100

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ AIR __.x

Input	Terminal	Line	Destination	Application
AIR __.1	1+	X__ 11		
	1-	X__ 12		
	1-	X__ 13		
AIR __.2	2+	X__ 21		
	2-	X__ 22		
	2-	X__ 23		
AIR __.3	3+	X__ 14		
	3-	X__ 15		
	3-	X__ 16		
AIR __.4	4+	X__ 24		
	4-	X__ 25		
	4-	X__ 26		

Tab. 33 Assignment Module 4AIR – X20AT4222

12.10 Module 2AOI – Analogue outputs 0-20mA

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ AOI__x

Input	Terminal	Line	Destination	Application
AOI __.1	1+	X__ 11		
	1-	X__ 13		
AOI __.2	2+	X__ 21		
	2-	X__ 23		

Tab. 34 Assignment Module 2AOI – X20AO2632

12.11 Module 4AIP – Power measurement

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ AIP __.x

Input	Terminal	Line	Destination	Application
AIP __.1	UL1 X__	11		
	UL2 X__	12		
	UL3 X__	13		
	INa X__	14		
	INb X__	15		
	UN X__	16		
	IL1a X__	21		
	IL1b X__	22		
	IL2a X__	23		
	IL2b X__	24		
	IL3a X__	25		
	IL3b X__	26		

Tab. 35 Assignment Module 1AIP – X20AP3121

12.12 Relay 6x - Digital outputs Relay 1 Converter 6A

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Module __: X__ DOT __.x

Input	Terminal	Line	Destination	Application
DOT __1	1 X__	11		
	GND X__	14		
		A1		
		A2		
Relay -K__1	CC	11		
	NC	12		
	NO	14		
DOT __2	2 X__	11		
	GND X__	14		
		A1		
		A2		
Relay -K__2	CC	11		
	NC	12		
	NO	14		
DOT __3	3 X__	11		
	GND X__	14		
		A1		
		A2		
Relay -K__3	CC	11		
	NC	12		
	NO	14		

Input	Terminal	Line	Destination	Application
DOT __4	X __	11		
	GND	14		
Relay -K__4	__	A1		
	__	A2		
	CC	11		
	NC	12		
	NO	14		
DOT __5	X __	11		
	GND	14		
Relay -K__5	__	A1		
	__	A2		
	CC	11		
	NC	12		
	NO	14		
DOT __6	X __	11		
	GND	14		
Relay -K__6	__	A1		
	__	A2		
	CC	11		
	NC	12		
	NO	14		

Tab. 36 Assignment relay 6x – X20DO6322 – 6x DOT 24VDC 0,5A

12.13 Hub

Enter the wiring information of the actual application into the following table. If you require more than table, please use this table to create photocopies.

Switch __: K __

Input	Conductor	Destination
Port 1		
Port 2		
Port 3		
Port 4		
Port 5		
Port 6		
Port 7		
Port 8		

Tab. 37 Switch allocation

Switch __: K __

Input	Conductor	Destination
Port 1		
Port 2		
Port 3		
Port 4		
Port 5		
Port 6		
Port 7		
Port 8		

Tab. 38 Switch allocation

