SERVICE MANUAL

جهان کمپرسور
Jahan Compressor

Screw Compressor

Model: CSD

No.: 9.5700.02E

Manufacturer:

KAESER KOMPRESSOREN GmbH

96410 Coburg • PO Box 2143 • GERMANY • Tel. + 49–(0)9561–6400 • Fax + 49–(0)9561–640130

http://www.kaeser.com

KAESER KOMPRESSOREN

Contents

Chapter – page

1 Regarding this Document ..... 1 – 1

1.1 Handling the Document ..... 1 – 1
1.2 Further Documents ..... 1 – 1
1.3 Copyright ..... 1 – 1
1.4 Symbols and Identifications ..... 1 – 1
1.4.1 Warning notices ..... 1 – 1
1.4.2 Miscellaneous notices and symbols ..... 1 – 2

2 Technical Specification ..... 2 – 3

2.1 Weight ..... 2 – 3
2.2 Temperature ..... 2 – 3
2.3 Ambient Conditions ..... 2 – 4
2.4 Pressure ..... 2 – 4
2.5 Sound Pressure Level ..... 2 – 4
2.6 Motor and Performance ..... 2 – 4
2.6.1 Compressor motor: ..... 2 – 4
2.6.2 Fan Motor ..... 2 – 5
2.7 Cooling oil ..... 2 – 5
2.7.1 Recommended cooling oil ..... 2 – 5
2.7.2 Cooling Oil Volumes ..... 2 – 6
2.8 Power supply ..... 2 – 6
2.8.1 Power supply ..... 2 – 6
2.8.2 Power supply specifications ..... 2 – 6
2.9 Water cooling (option K2) ..... 2 – 8
2.9.1 Design data ..... 2 – 8
2.9.2 Cooling Water Quality ..... 2 – 8
2.10 Internal Heat Recovery (option W2 / W3) ..... 2 – 9

3 Safety and Responsibility ..... 3 – 11

3.1 Correct Use ..... 3 – 11
3.2 Incorrect Use ..... 3 – 11
3.3 User’s Responsibilities ..... 3 – 11
3.4 Safety Devices ..... 3 – 12
3.5 Hazards ..... 3 – 12
3.5.1 Danger from electric current ..... 3 – 12
3.5.2 Danger from released spring force ..... 3 – 13
3.5.3 Danger from released compressed air ..... 3 – 13
3.5.4 Further dangers ..... 3 – 13
3.6 Warning Symbols ..... 3 – 14
3.7 Emergencies ..... 3 – 14
3.7.1 Fire fighting ..... 3 – 14
3.7.2 Cooling oil ..... 3 – 14
3.8 Environmental Protection ..... 3 – 14

Contents

Chapter – page

4 Design and Function . . . . . 4 – 15

4.1 Machine Overview . . . . . 4 – 15
4.1.1 Cabinet . . . . . 4 – 15
4.1.2 Function . . . . . 4 – 15
4.2 Options . . . . . 4 – 17
4.2.1 Machine mountings (option H1) . . . . . 4 – 17
4.2.2 Cooling air filter mats (option K3) . . . . . 4 – 17
4.2.3 Water cooling (option K2) . . . . . 4 – 17
4.2.4 Heat recovery . . . . . 4 – 17
4.3 Operating States and Control Modes . . . . . 4 – 18
4.3.1 Operating states . . . . . 4 – 18
4.3.2 Tasks of the controller . . . . . 4 – 18
4.3.3 Control Modes . . . . . 4 – 18
4.3.4 Modulating control (option C1) . . . . . 4 – 19
4.4 Safety Devices . . . . . 4 – 19
4.5 SIGMA CONTROL Keys and Indicators . . . . . 4 – 20

5 Installation and Operating Conditions . . . . . 5 – 22

5.1 Ambient Conditions . . . . . 5 – 22
5.2 Installation Conditions . . . . . 5 – 22
5.2.1 Place of installation and space required . . . . . 5 – 22
5.2.2 Ventilation . . . . . 5 – 23
5.2.3 Operating in a compressed air network . . . . . 5 – 24

6 Installation . . . . . 6 – 25

6.1 Safety . . . . . 6 – 25
6.2 Report any Transport Damage . . . . . 6 – 25
6.3 Install the Compressed Air Connection . . . . . 6 – 25
6.4 Electrical Connection . . . . . 6 – 26
6.5 Options . . . . . 6 – 26
6.5.1 Machine fixing (option H1) . . . . . 6 – 26
6.5.2 Water cooling connection (option K2) . . . . . 6 – 26
6.5.3 Heat recovery system connection . . . . . 6 – 27

7 Initial Start–up . . . . . 7 – 29

7.1 Before Initial Start–up (or Recommissioning) . . . . . 7 – 29
7.2 Check Installation and Operating Conditions . . . . . 7 – 29
7.3 Setting the overload protection cut–out . . . . . 7 – 29
7.4 Motor Protection Switch Setting . . . . . 7 – 30
7.5 Pour Cooling Oil into the Inlet Port . . . . . 7 – 30
7.6 Checking Direction of Rotation . . . . . 7 – 31
7.7 Initial Start–up . . . . . 7 – 31
7.8 Setting Network Pressure . . . . . 7 – 31

Contents

Chapter – page

8 Operation ..... 8 – 32

8.1 Switching On and Off ..... 8 – 32
8.1.1 Switching on ..... 8 – 32
8.1.2 Automatic restart ..... 8 – 32
8.1.3 Switching off ..... 8 – 33
8.2 Switching Off in an Emergency and Switching On Again ..... 8 – 33
8.3 Remote On and Off Switching ..... 8 – 33
8.4 Switching on and off with the Clock ..... 8 – 34
8.5 Acknowledging and Resetting Warning and Alarm Messages ..... 8 – 34
8.5.1 Resetting alarm messages ..... 8 – 34
8.5.2 Resetting warning messages ..... 8 – 35

9 Event Recognition and Fault Rectification ..... 9 – 36

9.1 Alarms (machine shut–down, red LED blinking) ..... 9 – 36
9.2 Warning Messages (yellow LED blinking) ..... 9 – 41
9.3 Miscellaneous events (faults) ..... 9 – 44

10 Maintenance ..... 10 – 46

10.1 Safety ..... 10 – 46
10.2 Maintenance Schedule ..... 10 – 47
10.2.1 Resetting maintenance interval counters ..... 10 – 47
10.2.2 Regular maintenance work ..... 10 – 48
10.2.3 Oil change intervals ..... 10 – 48
10.2.4 Regular service work ..... 10 – 49
10.3 Cooler Maintenance ..... 10 – 50
10.3.1 Air cooling (option K1) ..... 10 – 50
10.3.2 Filter mat maintenance (option K3) ..... 10 – 50
10.3.3 Water cooling maintenance (option K2) ..... 10 – 51
10.4 Internal Heat Recovery Maintenance (option W2 / W3) ..... 10 – 52
10.5 Air Filter Maintenance. ..... 10 – 52
10.6 Filter mat maintenance (control cabinet ventilator) ..... 10 – 53
10.7 Electric motor maintenance ..... 10 – 54
10.8 Checking the Coupling ..... 10 – 55
10.9 Venting the Machine Manually ..... 10 – 56
10.10 Checking and Topping up the Cooling Oil ..... 10 – 57
10.10.1 Check cooling oil level. ..... 10 – 57
10.10.2 Topping up the cooling oil ..... 10 – 58
10.11 Changing the Cooling Oil ..... 10 – 60
10.12 Oil filter maintenance ..... 10 – 63
10.13 Checking the Pressure Relief Valve. ..... 10 – 64
10.14 Changing the Oil Separator Cartridge ..... 10 – 65
10.15 Logging Maintenance Work ..... 10 – 67

Contents

Chapter – page

11 Spares, Operating Materials, Service . . . . . 11 – 68

11.1 Note the nameplate . . . . . 11 – 68
11.2 Ordering Maintenance Parts and Operating Materials . . . . . 11 – 68
11.3 Maintenance Contract . . . . . 11 – 68
11.4 Service Addresses . . . . . 11 – 68
11.5 Spare Parts for Service and Repair . . . . . 11 – 68

12 De–commissioning, Storage and Transport . . . . . 12 – 75

12.1 De–commissioning . . . . . 12 – 75
12.2 Packing . . . . . 12 – 75
12.3 Storage . . . . . 12 – 75
12.4 Transporting . . . . . 12 – 76
12.5 Disposal . . . . . 12 – 76

13 Annex . . . . . 13 – 77

13.1 Conformity . . . . . 13 – 77
13.2 Diagrams and Drawings . . . . . 13 – 77
13.2.1 Pipeline and instrument flow diagram (P&I diagrams) . . . . . 13 – 77
13.2.2 Pipeline and instrument flow diagram (option C1) . . . . . 13 – 83
13.2.3 Dimensional drawing . . . . . 13 – 89
13.2.4 Electrical diagram . . . . . 13 – 95

Directory of Illustrations

Chapter – page

Fig. 1 Cabinet . . . . . 4 – 15
Fig. 2 Air–cooled machine . . . . . 4 – 16
Fig. 3 Cooling air filter mats . . . . . 4 – 17
Fig. 4 Water cooling . . . . . 4 – 17
Fig. 5 Internal heat recovery . . . . . 4 – 18
Fig. 6 SIGMA CONTROL keys . . . . . 4 – 20
Fig. 7 SIGMA CONTROL indicators . . . . . 4 – 21
Fig. 8 Installation recommendation, dimensions [mm] . . . . . 5 – 23
Fig. 9 Compressed Air Connection . . . . . 6 – 25
Fig. 10 Water cooling connection . . . . . 6 – 27
Fig. 11 Heat recovery . . . . . 6 – 28
Fig. 12 Inlet valve oil filling port . . . . . 7 – 30
Fig. 13 Coupling . . . . . 7 – 30
Fig. 14 Switching On and Off . . . . . 8 – 32
Fig. 15 Switching off in an emergency . . . . . 8 – 33
Fig. 16 Acknowledging and Resetting Warning and Alarm Messages . . . . . 8 – 34
Fig. 17 Cleaning the cooler . . . . . 10 – 50
Fig. 18 Cooler filter mats . . . . . 10 – 51
Fig. 19 Air filter maintenance. . . . . 10 – 52
Fig. 20 Control cabinet ventilator . . . . . 10 – 53
Fig. 21 Compressor motor maintenance . . . . . 10 – 54
Fig. 22 Checking the Coupling . . . . . 10 – 55
Fig. 23 Ventilate the machine. . . . . 10 – 57
Fig. 24 Check cooling oil level. . . . . 10 – 58
Fig. 25 Topping up the cooling oil . . . . . 10 – 59
Fig. 26 Changing the Cooling Oil, Oil Separator Tank . . . . . 10 – 60
Fig. 27 Changing the Cooling Oil . . . . . 10 – 62
Fig. 28 Changing the Oil Filter . . . . . 10 – 63
Fig. 29 Changing the Oil Separator Cartridge . . . . . 10 – 65
Fig. 30 Transport by fork truck . . . . . 12 – 76
Fig. 31 Transport by lifting cradle . . . . . 12 – 76

Table Directory

Chapter – page

Tab. 1 Nameplate . . . . . 2 – 3
Tab. 2 Options . . . . . 2 – 3
Tab. 3 Machine weights . . . . . 2 – 3
Tab. 4 Machine temperatures . . . . . 2 – 3
Tab. 5 Ambient Conditions . . . . . 2 – 4
Tab. 6 Pressure relief valve setting . . . . . 2 – 4
Tab. 7 Sound Pressure Level . . . . . 2 – 4
Tab. 8 Compressor motor data . . . . . 2 – 5
Tab. 9 Fan motor data (option K1) . . . . . 2 – 5
Tab. 10 Fan motor data (option K2) . . . . . 2 – 5
Tab. 11 Recommended cooling oil . . . . . 2 – 6
Tab. 12 Cooling oil volumes . . . . . 2 – 6
Tab. 13 Supply 230V/3/50Hz . . . . . 2 – 7
Tab. 14 Supply 400V/3/50Hz . . . . . 2 – 7
Tab. 15 Supply 230V/3/60Hz . . . . . 2 – 7
Tab. 16 Supply 380V/3/60Hz . . . . . 2 – 7
Tab. 17 Supply 440V/3/60Hz . . . . . 2 – 7
Tab. 18 Supply 460V/3/60Hz . . . . . 2 – 7
Tab. 19 Water cooling design data: ΔT= 10 K . . . . . 2 – 8
Tab. 20 Water cooling design data: ΔT= 30 K . . . . . 2 – 8
Tab. 21 Cooler specification; water cooling . . . . . 2 – 8
Tab. 22 Cooling Water Quality . . . . . 2 – 9
Tab. 23 Water Quality Specification . . . . . 2 – 9
Tab. 24 General specification of the heat exchanger . . . . . 2 – 10
Tab. 25 Flow rate and heat available (option W2) . . . . . 2 – 10
Tab. 26 Flow rate and heat available (option W3) . . . . . 2 – 10
Tab. 27 Inspection schedule for Germany . . . . . 3 – 12
Tab. 28 SIGMA CONTROL keys . . . . . 4 – 21
Tab. 29 SIGMA CONTROL indicators . . . . . 4 – 21
Tab. 30 Ventilation . . . . . 5 – 24
Tab. 31 Checklist, installation conditions . . . . . 7 – 29
Tab. 32 Alarm messages and actions . . . . . 9 – 40
Tab. 33 Warning messages and actions . . . . . 9 – 44
Tab. 34 Miscellaneous events (faults) . . . . . 9 – 45
Tab. 35 Regular maintenance work . . . . . 10 – 48
Tab. 36 Oil change intervals . . . . . 10 – 48
Tab. 37 Regular service work . . . . . 10 – 49
Tab. 38 Maintenance log . . . . . 10 – 67
Tab. 39 Machine maintenance parts . . . . . 11 – 68

1 Regarding this Document

1.1 Handling the Document

The service manual is part of the machine.

☞ Keep the service manual in a safe place throughout the life of the machine.

☞ Pass the manual on the next owner/user of the machine.

☞ Ensure that all amendments are entered in the manual.

☞ Enter details from the machine nameplate in the table in chapter 2 'Technical Specifications'.

1.2 Further Documents

Included with this Service Manual are documents intended to assist in safe and sure operation of the machine:

- certificate of acceptance / operating instructions for the pressure vessel
- manufacturer's declaration or declaration of conformity in accordance with applicable directives
- SIGMA CONTROL Service Manual

☞ Make sure all documents are to hand and their contents understood.

Request the supply of any missing documents from KAESER.
Make sure you give the data from the nameplate.

1.3 Copyright

This service manual is copyright protected. Queries regarding use or duplication of the documentation should be referred to KAESER. Correct use of information will be fully supported.

1.4 Symbols and Identifications

1.4.1 Warning notices

DANGER

Here is a notice warning of danger.

Here are consequences of ignoring the warning notice.
The word 'Danger' indicates that death or severe injury can result from ignoring the notice.

☞ Always read and diligently comply with warning notices.

Danger levels

Warning notices indicate three levels of danger identified by the signal word under the danger symbol.

Signal word	Meaning	Consequences of ignoring the warning
DANGER	Warns of imminent threatening danger	Death or severe injury or serious damage to the machine is possible
WARNING	Warns of possible threatening danger	Death or severe injury or serious damage to the machine is possible
CAUTION	Warns of a possibly dangerous situation	Light injury or slight damage possible

1.4.2 Miscellaneous notices and symbols

☞ Here is a task to be carried out.

This symbol identifies environmental protection measures.

This indicates important information.

2 Technical Specification

Model and important technical information is to me found on the machine nameplate.

Please transfer data from the nameplate.

Model	
Material no.	
Serial no.	
Year of manufacture	
Rated power	
Motor speed	
Maximum working pressure	
Ambient temperature	

Tab. 1 Nameplate

A summary of the included options helps to relate the service manual information to your machine.
Please enter details of options.

Option	**Code**	**Exists**
Air cooling	K1	
Water cooling	K2	
Cooling air filter mat	K3	
Additional fan for fitted exhaust ducting	K4	
Machine mountings	H1	
Prepared for heat recovery	W1	
Internal heat recovery ΔT= 25K	W2	
Internal heat recovery ΔT= 55K	W3	
Modulating control	C1	
Transformer power supply for refrigeration dryer	T2	

Tab. 2 Options

2.1 Weight

Maximum weights are shown. Actual weights of individual machines are dependent on equipment fitted.

	CSD 82	**CSD 102**	**CSD 122**
Weight [kg]	1300	1350	1400

Tab. 3 Machine weights

2.2 Temperature

	CSD 82	**CSD 102**	**CSD 122**
Minimum cut–in temperature [˚C]	3	3	3
Typical airend discharge temperature during operation [˚C]	75 – 100	75 – 100	75 – 100
Max. airend discharge temp. (automatic shut–down) [˚C]	110	110	110

Tab. 4 Machine temperatures

2.3 Ambient Conditions

	CSD 82	CSD 102	CSD 122
Maximum elevation [m]	1000	1000	1000
Ambient temperature [˚C]	3 – 45	3 – 45	3 – 45
Inlet air / cooling air temperature [˚C]	3 – 45	3 – 45	3 – 45
Maximum relative inlet air humidity at 31 ˚C [%]	100	100	100
Maximum relative inlet air humidity at 45 ˚C [%]	50	50	50

* Higher elevation permissible only after consultation with the manufacturer

Tab. 5 Ambient Conditions

2.4 Pressure

See nameplate for maximum working pressure

Maximum working pressure [bar]	Blow–off setting of the pressure relief valve [bar]		
	CSD 82	CSD 102	CSD 122
8	11,5	11,5	11,5
11	14	14	14
15	16	16	16

Tab. 6 Pressure relief valve setting

2.5 Sound Pressure Level

Operational state

- under load at rated speed, rated delivery and rated pressure.

Measuring conditions:

- Free–field measurement to CAGI/PNEUROP PN8 NTC 2.3 at 1 m distance

	CSD 82	CSD 102	CSD 122
Sound pressure level (50Hz) [dB(A)]	68	69	70
Sound pressure level (60Hz) [dB(A)]	69	70	71

Tab. 7 Sound Pressure Level

2.6 Motor and Performance

2.6.1 Compressor motor:

	CSD 82	CSD 102	CSD 122
Rated power [kW]	45	55	75
Rated speed [rpm] (50 Hz)	2965	2965	2978
Rated speed [rpm] (60 Hz)	3568	3568	3580
Enclosure protection	IP 55	IP 55	IP 55

* Transfer data from motor nameplate to the table

	CSD 82	CSD 102	CSD 122
Motor bearing greasing [operating hours]	2000	2000	2000
Grease requirement, each bearing [g]*			

* Transfer data from motor nameplate to the table

Tab. 8 Compressor motor data

2.6.2 Fan Motor

Air cooling (option K1)

	CSD 82	CSD 102	CSD 122
Rated power [kW]	1,1	1,1	1,1
Rated speed [rpm] (50 Hz)	940	940	940
Rated speed [rpm] (60 Hz)	1120	1120	1120
Enclosure protection	IP 54	IP 54	IP 54

Tab. 9 Fan motor data (option K1)

Water cooling (option K2)

	CSD 82	CSD 102	CSD 122
Rated power [kW] (50 Hz)	0,12	0,12	0,12
Rated power [kW] (60 Hz)	0,17	0,17	0,17
Rated speed [rpm] (50 Hz)	2500	2500	2500
Rated speed [rpm] (60 Hz)	2700	2700	2700
Enclosure protection	IP 54	IP 54	IP 54

Tab. 10 Fan motor data (option K2)

2.7 Cooling oil

Ordering: see 'Spare Parts, Operating Materials, Service' chapter 11.

2.7.1 Recommended cooling oil

The standard factory filling is SIGMA FLUID PLUS. SIGMA FLUID FGL/FGH is recommended for use in connection with foodstuff.

A sticker showing the type of oil filled is to be found near the oil separator filling port.

	SIGMA FLUID PLUS	SIGMA FLUID MOL	SIGMA FLUID FGL / FGH
Description	Synthetic oil	Mineral oil	Synthetic oil
Application:	Standard oil for all applications except in connection with foodstuffs. Designed for high loading and long operational life.	Standard oil for all applications except in connection with foodstuffs. Designed for light loading.	Specially for use in compressors where the air comes in direct contact with foodstuff.
Authorization	—	—	USDA H–1, approved for the manufacture of foodstuff packaging, meat processing and other food processing.

	SIGMA FLUID PLUS	SIGMA FLUID MOL	SIGMA FLUID FGL / FGH
Viscosity at 40 ˚C	70 mm^2/s (DIN 51562–1)	44 mm^2/s (DIN 51562–1)	50.7 / 70 mm^2/s (D 445; ASTM test)
Viscosity at 100 ˚C	10.6 mm^2/s (DIN 51562–1)	6.8 mm^2/s (DIN 51562–1)	8.2 / 10.4 mm^2/s (D 445; ASTM test)
Flash point	260 ˚C (DIN ISO 2592)	220 ˚C (DIN ISO 2592)	254 ˚C (D92; ASTM test)
Density at 15 ˚C	843 kg/m^3 (DIN 51757)	—	—
Pour point	–39 ˚C (DIN ISO 3016)	–33 ˚C (DIN ISO 3016)	—
Demulsibility at 54 ˚C	30 min (DIN ISO 6614)	—	—

Tab. 11 Recommended cooling oil

2.7.2 Cooling Oil Volumes

	CSD 82	CSD 102	CSD 122
Total charge [l]	28	28	28
Top–up volume [l] (minimum – maximum	4	4	4
Additional volume [l] (option W2)	4,7	4,7	4,7
Additional volume [l] (option W3)	3,8	3,8	3,8
Additional volume [l] (option W1) *			

* Input the additional volume corresponding to your heat recovery system.

Tab. 12 Cooling oil volumes

2.8 Power supply

See electrical diagrams in chapter 13.2.4.

2.8.1 Power supply

The machine is designed for an electrical supply in accordance with EN60204–1 (IEC 204–1), section 4.3. In the absence of user–specified alternatives, the limits given in this standard must be adhered to. It is recommended that the supplier and user confer and agree on the basis of EN60204–1, annex B.

The machine requires a symmetrical three–phase power supply.
In a symmetrical three–phase supply the phase angles and voltages are all the same.

The machine may only be operated with a neutral point earthed TN or TT three–phase supply. An IT supply is not permitted.

2.8.2 Power supply specifications

The following conductor cross–sections (multicore Cu) and fusing (HRC fuse slow blow) are given according to VDE 0100, parts 430 and 523, for ambient temperatures of 30 ˚C. If other local conditions prevail (high temperature, non–standard cable laying or cable lengths above > 50 m) the cross–section should be checked and adjusted accordingly.

Rated power supply 230V ±10%, 3 – ph, 50Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	200	224	–
Supply [mm^2]	4 x 95	4 x 120	–
Consumption [A]	155	189	–

Tab. 13 Supply 230V/3/50Hz

Rated power supply 400V ±10%, 3 – ph, 50Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	100	125	160
Supply [mm^2]	4 x 35	4 x 50	4 x 70
Consumption [A]	88	108	138

Tab. 14 Supply 400V/3/50Hz

Rated power supply 230V ±10%, 3 – ph, 60Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	200	224	–
Supply [mm^2]	4 x 95	4 x 120	–
Consumption [A]	160	191	–

Tab. 15 Supply 230V/3/60Hz

Rated power supply 380V ±10%, 3 – ph, 60Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	125	125	160
Supply [mm^2]	4 x 50	4 x 50	4 x 70
Consumption [A]	98	115	147

Tab. 16 Supply 380V/3/60Hz

Rated power supply 440V ±10%, 3 – ph, 60Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	100	125	160
Supply [mm^2]	4 x 35	4 x 50	4 x 70
Consumption [A]	84	102	124

Tab. 17 Supply 440V/3/60Hz

Rated power supply 460V ±10%, 3 – ph, 60Hz

	CSD 82	CSD 102	CSD 122
Pre – fuse [A]	100	125	160
Supply [mm^2]	4 x 35	4 x 50	4 x 70
Consumption [A]	81	98	119

Tab. 18 Supply 460V/3/60Hz

2.9 Water cooling (option K2)

2.9.1 Design data

Cooling water temperature rise 10 K

	CSD 82	CSD 102	CSD 122
Max. permissible discharge temperature [° C]	70	70	70
Max. permissible inlet temperature [° C]	40	40	40
Cooling water volume [m^3/h]	4,4	5,4	6,3
Water pressure drop [bar]	1,2	1,7	2,4

Tab. 19 Water cooling design data: ΔT= 10 K

Cooling water temperature rise 30 K

	CSD 82	CSD 102	CSD 122
Max. permissible discharge temperature [°C]	70	70	70
Max. permissible inlet temperature [°C]	20	20	20
Cooling water volume [m^3/h]	1,5	1,8	2,1
Water pressure drop [bar]	0,5	0,5	0,5

Tab. 20 Water cooling design data: ΔT= 30 K

Cooler specification

Material of manufacture	1.4401
Solder	Copper
Maximum working pressure (cooling water end) [bar]	10
UNsuitable cooling medium	Seawater Consult Kaeser before using cooling water solutions

Tab. 21 Cooler specification; water cooling

2.9.2 Cooling Water Quality

Measures for cooling water treatment and filtration are essential and must be carried out.

The addresses of companies specialising in the analysis of cooling water and supplying suitable equipment for the its treatment can be obtained from KAESER on request.

To avoid operating breakdowns from a corroded or clogged cooler, the cooling water must meet certain minimum requirements:

pH value	7.5 to 9
Hardness [dH]	4,0–8,5
Chloride (Cl) [mg/l]	< 150
Free chlorine gas (Cl_2) [mg/l]	< 1
Sulphate (SO_3) [mg/l]	< 1
Dissolved iron (Fe) [mg/l]	< 0.2

Hydrogen carbonate (HCO_3) [mg/l]	70 – 300
Sulphate (SO_4) [mg/l]	< 70
HCO_3 / SO_4	> 1
Electrical conductivity [μS/cm]	10 – 500
Ammonia (NH_3) [mg/l]	< 2
Dissolved magnesium (Mn) [mg/l]	< 0,1
Dissolved aluminium (Al) [mg/l]	< 0,2
Nitrate (NO_3), dissolved [mg/l]	< 100
Hydrogen sulphate (SO_2) [mg/l]	< 0,05
Free aggressive carbon dioxide (CO_2) [mg/l]	< 5
Glycol [%]	< 50
Solids (particle size) [mm]	< 0,1
Alge	not permissible

Tab. 22 Cooling Water Quality

2.10 Internal Heat Recovery (option W2 / W3)

A soldered, plate heat exchanger is installed for heat recovery.

Generally water is used as the heat transfer medium. This must conform to the specification given below.

The manufacturer should be consulted before another type of heat transfer medium is used.

Water Quality Specification

pH value	7.5 to 9
Hardness [dH]	4,0 – 8,5
Chloride (Cl)* [mg/l]	< 150
Free chlorine gass (Cl_2) [mg/l]	< 1
Sulphate (SO_3) [mg/l]	< 1
Dissolved iron (Fe) [mg/l]	< 0.2
Hydrogen carbonate (HCO_3) [mg/l]	70 – 300
Sulphate (SO_4) [mg/l]	< 70
HCO_3 / SO_4	> 1
Electrical conductivity [μS/cm]	10 – 500
Ammonia (NH_3) [mg/l]	< 2
Dissolved magnesium (Mn) [mg/l]	< 0,1
Dissolved aluminium (Al) [mg/l]	< 0,2
Nitrate (NO_3), dissolved [mg/l]	< 100
Hydrogen sulphate (SO_2) [mg/l]	< 0,05
Free aggressive carbon dioxide (CO_2) [mg/l]	< 5
Glycol [%]	< 50
Solids (particle size) [mm]	< 0,1
Alge	not permissible

Tab. 23 Water Quality Specification

If the heat transfer medium outlet temperature is to be kept constant, the user must install an appropriate regulating device.

Heat Exchanger Specification

	CSD 82	CSD 102	CSD 122
Maximum working pressure of the heat transfer medium [bar]	10	10	10
Pressure drop [bar]	< 0,1	< 0,1	< 0,1
Plate material	1.4401	1.4401	1.4401
Solder	Cu	Cu	Cu
Maximum permissible temperature of the heat transfer medium [°C]	100	100	100

Tab. 24 General specification of the heat exchanger

Flow rate and heat capacity by heating from 45 °C to 70 °C (equivalent to ΔT= 25 K), (option W2)

	CSD 82	CSD 102	CSD 122
Flow rate [m^3/h]	1,39	1,70	2,00
Max. heat capacity available [kW]	40,3	49,4	58,1
Max. heat capacity available [MJ/h]	145	178	209
Max. heat capacity available [kcal/h]	34669	42511	49940

Tab. 25 Flow rate and heat available (option W2)

Flow rate and heat capacity by heating from 15 °C to 70 °C (equivalent to ΔT= 55 K), (option W3)

	CSD 82	CSD 102	CSD 122
Flow rate [m^3/h]	0,63	0,77	0,91
Max. heat capacity available [kW]	40,3	49,4	58,1
Max. heat capacity available [MJ/h]	145	178	209
Max. heat capacity available [kcal/h]	34669	42511	49940

Tab. 26 Flow rate and heat available (option W3)

3 Safety and Responsibility

Disregarding this notice can result in serious injury!

The machine is made to the latest technical safety standards and acknowledged safety regulations. Nevertheless, risk of injury and death for the user and third parties and damage to the machine and other property can arise from its use.

The machine may only be used: when it is in technically perfect condition; for the purpose for which it is intended; and when all safety measures as detailed in the service manual are put into practice.

In particular, any faults relating to safety must be rectified immediately.

3.1 Correct Use

The machine is intended solely for industrial use in generating compressed air. Any other use is considered incorrect. The manufacturer is not liable for any damages resulting from such unspecified use or application. The responsibility, in case, lies solely with the user.

Correct use also includes compliance with the data contained in this manual.

The machine may only be used in consideration of the installation conditions.

3.2 Incorrect Use

Untreated compressed air may not be used:

- as breathing air,
- for any process in which the air can come into contact with foodstuff.

3.3 User's Responsibilities

Personnel

Allow only specialists or persons who have been trained or instructed on this machine to carry out work on the machine. This applies particularly for:

- installation and initial start–up,
- maintenance and service work,
- repairs,
- inspections.

Allow work to be carried out on electrical equipment only by a qualified electrician or trained personnel under the supervision of a qualified electrician, and according to electrical engineering regulations.

Ensure that all persons working on the machine have read, understood and observe the safety–relevant passages in the service manual.

Give clear instructions on reporting faults and damage to the machine.

Observe the relevant regulations during installation, operation, maintenance and repair of the machine. These are, for example, nationally applied European directives and/or valid national laws and safety and accident prevention regulations.

Adhere to inspection schedules and accident prevention regulations

The machine is subject to local inspection schedules.

Operation in Germany:

- Recurring inspections in accordance with VBG 16 – § 18

The company (user) must ensure that recurring inspections of safety devices on compressors with motor power greater than 0.5 kW are carried out by qualified persons. Inspection intervals of one year are generally sufficient.

- Oil change in accordance with VBG16 – §17

Oil change as required but at least once a year. The oil need not be changed if analysis shows it to be still useable.

- Inspection schedule in accordance with operating safety regulations and with the strictest according to §15.

Inspection	Schedule	Inspecting authority
Installation and equipping	before initial start–up	approved supervisory board
Internal inspection	every 5 years after installation or the last inspection	approved supervisory board
Strength test	every 10 years after installation or the last inspection	approved supervisory board

Tab. 27 Inspection schedule for Germany

3.4 Safety Devices

Do not change, bypass or disable safety devices.

Do not remove or obliterate labels and notices.

Ensure that labels and notices are clearly legible.

More information on safety devices is contained in chapter 4 'Design and Function', section 4.4 'Safety Devices'.

3.5 Hazards

Fundamentals: observe the accepted safety regulations

Observe safety regulations at all times when working on the machine.

Examples of these are directives and national regulations concerning safety and accident prevention.

3.5.1 Danger from electric current

DANGER

Electric shock can kill!

Touching electrically live components can cause serious injury or death.

☞ Isolate completely from the mains supply (all conductors) (switch off at the main isolator)

☞ Ensure the supply cannot be switched on again (lock off).

☞ Check that no voltage is present.

☞ Only work on electrical components when they are voltage–free.

☞ Work carefully.

☞ Before switching on again ensure that:

- no one is working on the machine,
- all panels are in place and secured,
- all access doors are closed.

Work on the electrical equipment may only be carried out by a qualified electrician or by instructed persons under the supervision of a qualified electrician.

Before the machine is switched on for the first time the user must provide and check measures to guard against electric shock by direct or indirect contact.

3.5.2 Danger from released spring force

Springs under tension or compression contain force. Uncontrolled release of this force can be life–threatening.

WARNING

There is considerable danger of injury or death from the release of spring–loaded components are incorrectly opened (dismantled).

Minimum pressure/check valves, pressure relief valves and inlet valves are under powerful spring loading.

☞ Do not open (dismantle) valves.

3.5.3 Danger from released compressed air

Compressed air is a contained force. Uncontrolled release of this force can be life–threatening.

WARNING

Compressed air can cause injury or death.

Serious injury or death can result from loosening or opening components under pressure.

☞ Close shut–off valves or otherwise isolate the machine from the air main to ensure that no compressed air can flow back into the machine.

☞ De–pressurize all pressurized components and enclosures.

☞ Check all machine hose connectors with a hand–held pressure gauge to ensure that all read zero.

Extension or change to the compressed air supply system

If a compressed air installation is changed or a new machine installed, check the blow–off capacity of the pressure relief valves on air receivers and pipelines.

Any pressure relief vales of insufficient capacity must be replaced with larger models.

3.5.4 Further dangers

Handling cooling and lubricating fluids

- Avoid contact with skin and eyes.
- Do not inhale oil mist or vapour.
- Do not eat or drink while handling cooling and lubricating fluids.
- Fire, open flame and smoking are strictly forbidden.

Welding

When welding is taking place on or near the machine take adequate measures to ensure that no parts of the machine or any oil vapours are ignited by sparks.

Spare parts

The use of unsuitable parts may adversely influence the safe working of the machine.
Use only genuine KAESER spares for parts subject to pressure.

3.6 Warning Symbols

	Beware of life–threatening electrical voltage. ☞ Do not touch electrical components; danger of electric shock. ☞ Before opening, switch off at the main switch and lock off to secure against unwanted or accidental switching on.
	Warning of hot surface. ☞ Do not touch surface – danger of burning. ☞ Wear long–arm garments (not synthetics such as polyester) and protective gloves.
	Beware – machine starts automatically. ☞ Machine can start automatically or by remote start command. ☞ Before opening the machine, switch off at the main switch and lock off to secure against unwanted or accidental switching on.

3.7 Emergencies

3.7.1 Fire fighting

Suitable extinguishing media:

- foam
- powder
- carbon dioxide
- sand or earth

Unsuitable or unsafe extinguishing media:

- powerful water jet

3.7.2 Cooling oil

Skin contact:

☞ wash off immediately

Eye contact:

☞ rinse thoroughly with lukewarm water and seek medical assistance.

If necessary, request a copy of the safety data sheet for KAESER SIGMA FLUID.

3.8 Environmental Protection

Do not allow cooling oil to escape to the environment or into the sewage system.

Store and dispose of operating materials and replaced parts in accordance with local environment protection regulations. Observe national regulations. This applies particularly to parts contaminated with cooling oil.

4 Design and Function

4.1 Machine Overview

4.1.1 Cabinet

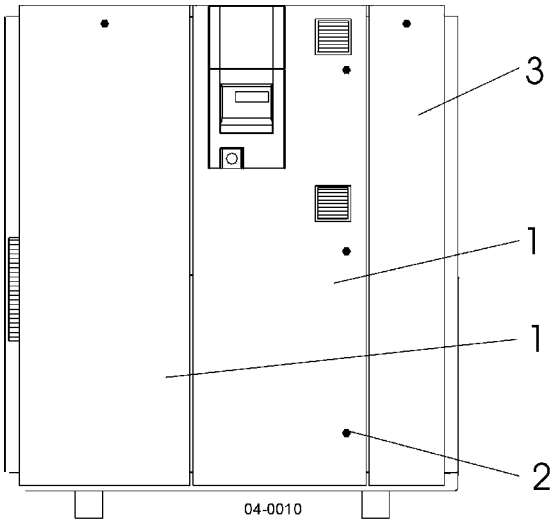


Fig. 1 Cabinet

1 Control cabinet door
2 Latch
3 Removable panel

The cabinet serves various purposes:

- sound damping
- protection
- cooling air flow control

Safe and reliable operation can only be ensured with the cabinet closed.

Latches are released by a key supplied with the machine.

Access doors are hinged to swing open, removable panels must be lifted off.

4.1.2 Function

Items in brackets [ ] correspond to the Pipe and Instrument Flow Diagram (P & I Diagram) in chapter 13.2.1.

An air–cooled machine serves to illustrate function.

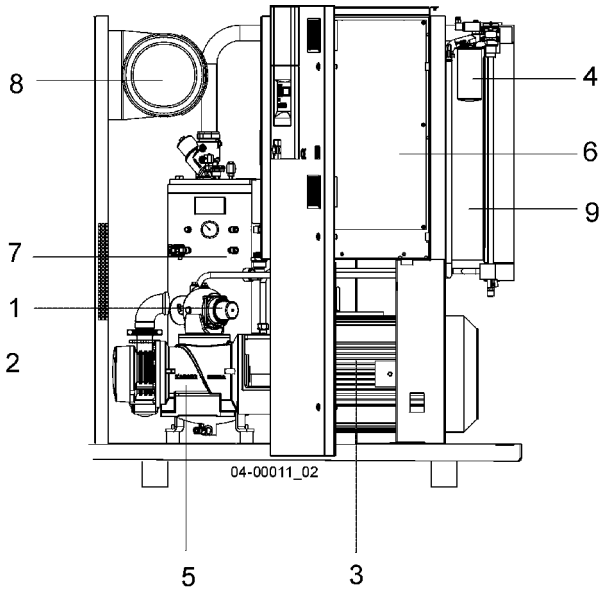


Fig. 2 Air–cooled machine

1 Inlet valve [2]
2 Coupling [5]
3 Drive motor [3]
4 Oil filter [10]
5 Airend [4]
6 Control cabinet
7 Oil separator tank [6]
8 Air filter [1]
9 Oil/air cooler [11/13]

Compressor

Atmospheric air is cleaned as it is drawn in through the filter (8).

The air is then compressed in the airend (5).

The airend is driven by an electric motor (3).

Cooling oil is injected into the airend. It lubricates moving parts and forms a seal between the rotors themselves and between them and the airend casing. The cooling effect directly within the compression chamber ensures a low airend discharge temperature.

Cooling oil is recovered from the compressed air in the oil separator tank (7) gives up its heat in the oil cooler (9). The oil then flows through the filter (4) and back to the point of injection. Air pressure within the machine keeps the oil circulating. A separate pump is not necessary. A thermostatic valve maintains optimum oil temperature.

Compressed air, freed of its oil content in the separator tank (7), flows through the minimum pressure/check valve (8) into the aftercooler (9). The minimum pressure/check valve ensures there is always sufficient air pressure to maintain cooling oil circulation.

The aftercooler brings down the compressed air temperature to 5 to 10 K above ambient. Most of the moisture carried in the air is removed in the aftercooler.

4.2 Options

4.2.1 Machine mountings (option H1)

The machine mountings enable the machine to be anchored to the floor.

4.2.2 Cooling air filter mats (option K3)

Mats filter the cooling air and keep the cooler surface clean.

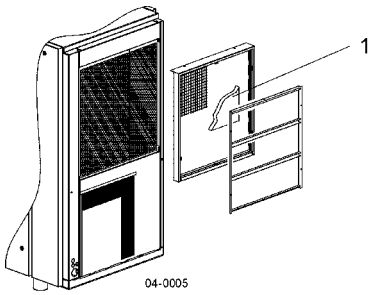


Fig. 3 Cooling air filter mats

1 Cooling air filter mat

4.2.3 Water cooling (option K2)

Plate heat exchangers in stainless steel are used for water–cooled machines.

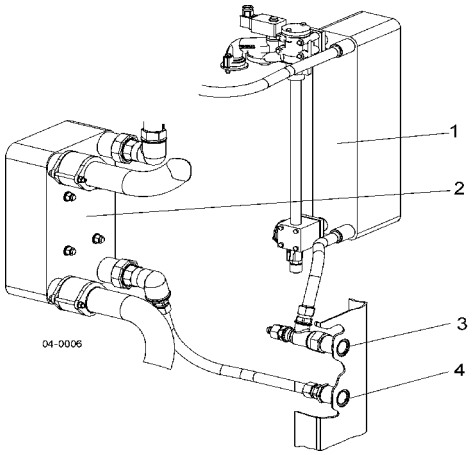


Fig. 4 Water cooling

1 Oil cooler [11]
2 Compressed air aftercooler [13]
3 Cooling water connection
4 Cooling water connection

4.2.4 Heat recovery

Prepared for external heat recovery (option W1)

Connections are provided and bridged.

An external heat recovery system can be retro–fitted at any time.

Internal heat recovery (option W2 / W3)

A plate heat exchanger (1) is installed for heat recovery.

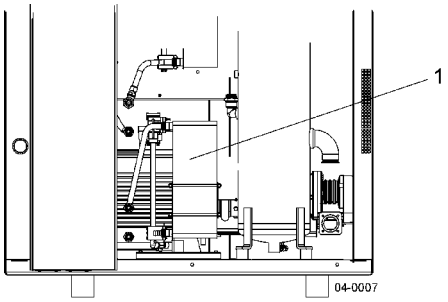


Fig. 5 Internal heat recovery

1 Plate heat exchanger [26]

4.3 Operating States and Control Modes

4.3.1 Operating states

There are three operating states:

- LOAD: the inlet valve is open. The airend delivers compressed air to the system.
  The drive motor runs under full load.
- IDLING: The inlet valve is closed. The minimum pressure/check valve shuts off the oil separator from the air system. The oil separator tank is vented.
  A small volume of air circulates through the bleed hole in the inlet valve, through the airend and back to the inlet valve via the venting valve.
  The drive motor runs without load and draws little current.
- STANDSTILL: The inlet valve is closed. The minimum pressure/check valve shuts off the oil separator from the air system. The oil separator tank is vented.
  The drive motor is stopped.
- PARTIAL LOAD (option C1): The proportional controller continuously varies the degree of opening of the inlet valve, and thereby the delivery rate of the compressor, in response and in proportion to the air demand. The airend delivers compressed air to the system.
  The load and power consumption of the drive motor rises and falls with the air demand.

4.3.2 Tasks of the controller

Using the selected control mode, the controller switches the compressor between its various operational states in order to maintain system pressure between the set minimum and maximum values.

According to the individual compressed air demand one of the various control modes available will provide the optimum duty cycle for the machine.

4.3.3 Control Modes

The following control modes are available:

- DUAL
- VARIO
- QUADRO

DUAL

In the DUAL control mode, the compressor is switched back and forth between full load and idle to maintain system pressure between the set minimum and maximum values.

When the maximum pressure is reached the machine switches to IDLING. When the preset *idling time* has elapsed the machine is switched to STANDSTILL.

The shorter the *idling time* setting, the sooner and more frequently the motor is stopped.

VARIO

The VARIO control mode is an extension of DUAL control. The difference being that under DUAL control the *idling time* is automatically increased or decreased corresponding to the increased or decreased switching frequency of the drive motor.

QUADRO

In QUADRO control mode the machine switches from LOAD to IDLE during periods of high air demand and directly from LOAD to STANDSTILL during periods of low air demand.

This mode of control requires two pre–set time periods: the *running time* and the *idle/ standstill time*. The shorter these time settings, the sooner and more frequently the motor is stopped.

4.3.4 Modulating control (option C1)

The modulating control mode is an extension of DUAL control. The difference being that, in this mode, the delivery of the compressor is steplessly varied within the control range of the machine.

- Increasing air demand

The machine operates between PARTIAL LOAD and LOAD.

- Falling air demand

The machine operates between PARTIAL LOAD, IDLE RUNNING and STANDSTILL.

4.4 Safety Devices

The following safety devices are provided and may not be changed:

- EMERGENCY STOP button
  The EMERGENCY STOP button shuts down the compressor immediately. The motor remains still. The pressure system is vented.
- Pressure relief valve
  The pressure relief valve protects the system from excessive pressure. This is factory set.
- Housing and covers for moving parts and electrical connections.
  Protection from accidental contact.

4.5 SIGMA CONTROL Keys and Indicators

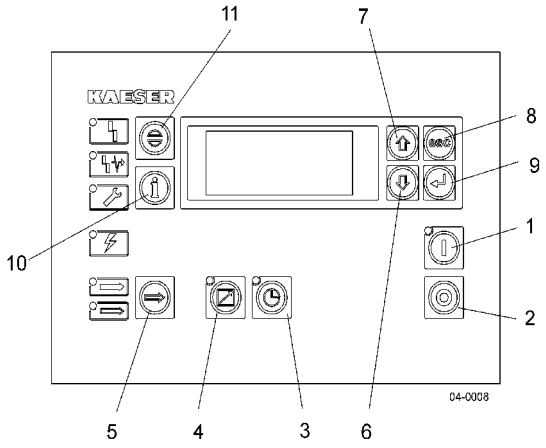


Fig. 6 SIGMA CONTROL keys

Symbol	Item	Description	Function
	1	ON (I)	Switch the machine on. Programmed operating mode is active.
	2	OFF (0)	Switch the machine off.
	3	Operating mode: Clock	Switching clock–control on and off. The LED lights when the machine is under clock control.
	4	Operating mode: Remote control	Switching remote control on and off. The LED illuminates when the machine is under remote control.
	5	Operating mode: LOAD / *IDLE*	Toggles the machine between LOAD and IDLE.
	6	Arrow key	Scrolls down menu. Reduces a parameter value.
	7	Arrow key	Scrolls menu up. Increases a parameter value.
esc	8	Escape	Returns to the next higher menu level. Exits the edit mode without saving. Returns to the main menu when held down at least 10 seconds.
	9	Return/enter/save key	Only affects the message in the third line of the display (12). Returns to the selected submenu. Saves and leaves the edit mode.

Symbol	Item	Description	Function
	10	Events and information key	Displays the event memory. Selection from every menu. Returns together with 'esc' key (8).
	11	Acknowledge (reset) key	Acknowledges (re–sets) messages and resets the event memory (if permitted).

Tab. 28 SIGMA CONTROL keys

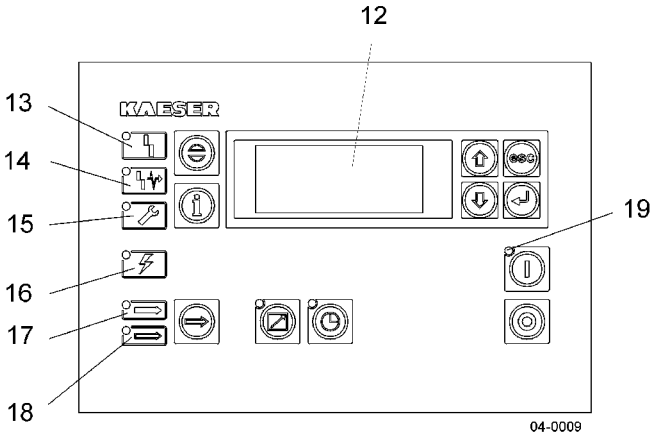
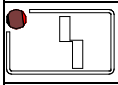
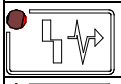
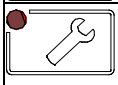
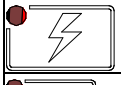
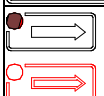
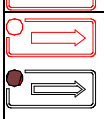


Fig. 7 SIGMA CONTROL indicators

Symbol	Item	Description	Function
	12	Display	Alphanumeric display with 4 lines.
	13	Alarm	Blinks red when an alarm occurs. Lights continuously when acknowledged.
	14	Communication	Lights red if communication via the Profibus is interrupted.
	15	Service/warning LED	Blinks yellow for: – maintenance work required – warning message
	16	Controller power ON	Lights green when the power supply to the controller is switched on.
	17	LOAD	Lights green when the machine is in the operating state LOAD
	18	Operating mode *IDLE*	Lights green when the machine is in the IDLE mode. Blinks green if the manualLOAD/IDLING changeover key *(5) is used.*
	19	Machine ON	The machine is switched on.

Tab. 29 SIGMA CONTROL indicators

5 Installation and Operating Conditions

5.1 Ambient Conditions

- There must be no open flames or sparks at the place of installation.
- Any welding work carried out on the equipment must not cause a fire hazard through flying sparks or excessive temperature.
- The machine is not explosion–proof.
  Do not operate in areas in which specific requirements with regard to explosion protection are applied.
  For instance, the requirements of 94/9/EU (ATEX directive) for correct use in explosion hazardous areas.
- Clean inlet air with no damaging contaminants.
- Inlet air free of explosive or chemically unstable gas or vapour.
- Ambient temperature must be acceptable and stable.
- The airend discharge temperature must remain constant to prevent the build–up of condensate.
- Suitable fire extinguishing material must be to hand.

5.2 Installation Conditions

5.2.1 Place of installation and space required

- The floor must be level, firm and able to bear the weight of the equipment.
- If installed outdoors, the equipment must be protected from frost, direct sunlight, dust and rain.

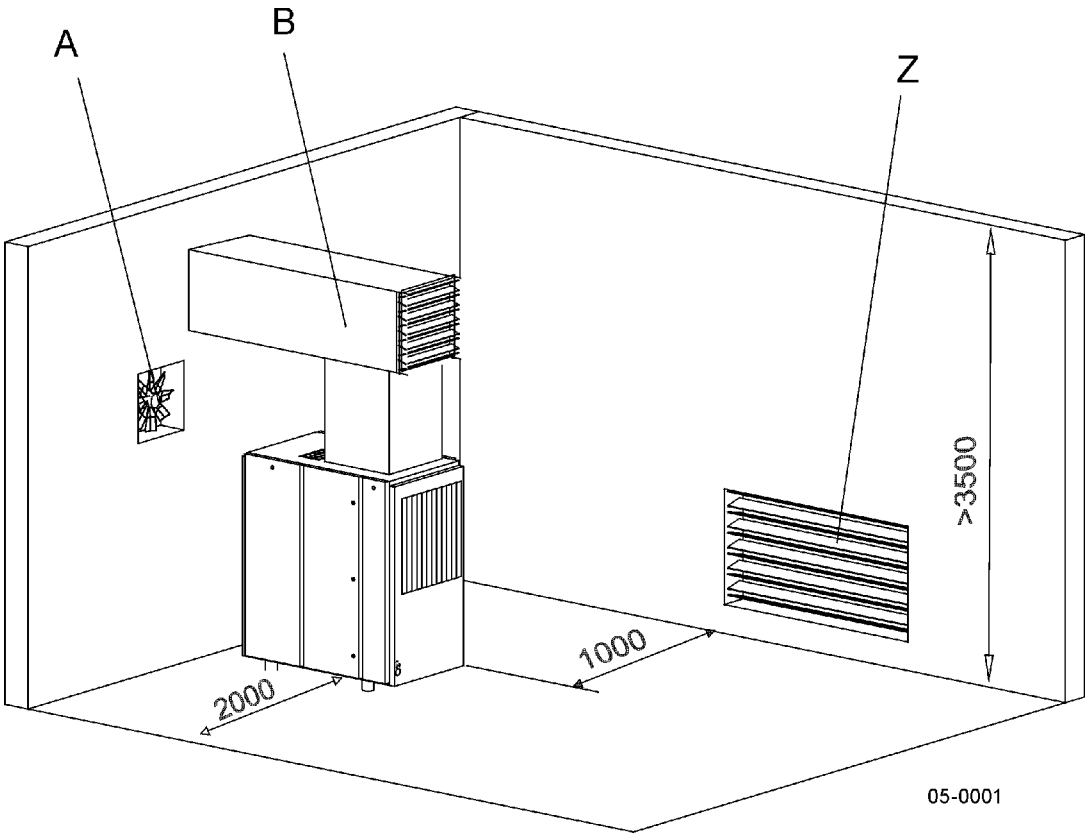


Fig. 8 Installation recommendation, dimensions [mm]

A Exhaust fan
B Exhaust air duct
Z Inlet air opening

5.2.2 Ventilation

Values given are minimum guidelines.

If the inlet aperture is insufficient a dangerous vacuum can be created in the compressor room.

☞ Ensure that the volume of air flowing into the compressor room is at least equivalent to that being removed from it by the compressor and exhaust fan.

☞ Make sure that the machine and exhaust fan can only operate when the inlet aperture is actually open.

	CSD 82	CSD 102	CSD 122
Inlet opening [m²] (option K1)	1	1,3	1,6
Extractor for forced ventilating: Flow rate [m³/h] at 100 Pa (option K1)	16000	22000	25000
Inlet opening [m²] (option K2)	0,3	0,3	0,3

	CSD 82	CSD 102	CSD 122
Extractor for forced ventilating: Flow rate [m³/h] at 100 Pa (option K2)	3000	3000	3000
Exhaust air duct: Dimensions [mm]	700 x 700	700 x 700	700 x 700

Tab. 30 Ventilation

Exhaust ducting

Consult the manufacturer on the design of the ducting, length, number of bends, etc.

Further information on exhaust air ducts can be found in chapter 13.2.3.

Air–cooled compressors (option K1) have two exhaust apertures, a large one for the oil cooler and a smaller one for the rest of the machine.

If a single exhaust duct is to be connected to both exhaust apertures an auxiliary fan (option K4) must be installed.
If the machine is ordered with option K4, the auxiliary fan is already installed.

☞ If necessary, the auxiliary fan must be installed by an authorised KAESER technician.

5.2.3 Operating in a compressed air network

When the machine is connected to an air network, the network operating pressure must not exceed 16 bar.

Initial filling of a fully vented air network generally creates very a high rate of flow through air treatment devices. These conditions are detrimental to correct air treatment. Air quality suffers.

To ensure maintenance of desired air quality when filling a vented air main we recommend the installation of an air main charging system.

KAESER is ready to offer good advice.

6 Installation

6.1 Safety

DANGER

There is considerable danger of injury or death if insufficiently or inadequately treated compressed air is used.

Injury and/or poisoning caused by the use of insufficiently treated compressed air as breathing air or for the processing of foodstuffs.

☞ Never use compressed air as breathing air unless it has been suitably treated, the pressure is appropriately reduced and breathing apparatus is used.

☞ Use foodstuff–compatible cooling oil and suitable treatment whenever compressed air is to come into contact with foodstuffs.

WARNING

There is considerable danger of injury or death because of spring forces when spring–loaded components are incorrectly opened (dismantled).

Minimum pressure/check valves, pressure relief valves and inlet valves are heavily spring loaded.

☞ Do not open (dismantle) valves.

All functioning parts are factory set.
Changes may not be made without the permission of the manufacturer.

Installation may only be carried out by persons fully conversant with the basic safety concepts of compressed air engineering.

6.2 Report any Transport Damage

☞ Check the machine for visible and hidden transport damage.

☞ Inform the carrier and the manufacturer in writing of any damage.

6.3 Install the Compressed Air Connection

Pre–condition: air main completely vented.

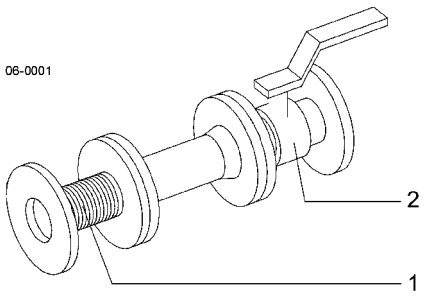


Fig. 9 Compressed Air Connection

1 Axial compensator or flexible hose
2 Shut–off valve

☞ Shut–off valve (2) to be installed by the user in the connection line.

☞ Make the compressed air connection with a flexible hose (1) or an axial compensator (1).

6.4 Electrical Connection

Have the electrical connection made only by a qualified and authorised electrician.

Carry out protection measures as stipulated in relevant regulations (IEC 364 or DIN VDE 0100, for example) and in national accident prevention regulations (BGV A2 in Germany). Also observe the regulations of the local power utility company.

Use wire conductor dimensions and fuse ratings in accordance with local regulations (DIN VDE 0100 parts 430 and 523 in Germany, for example).
Check the reaction time of overload protection devices (e.g. DIN VDE 0100 part 413). Guide values are given in chapter 2.8.

☞ The user must provide the machine with a lockable supply–disconnecting device. This could be, for example, a switch–disconnector with fuses. If a circuit breaker is used it must be suitable for the motor starting characteristics.

Before initial start–up

☞ The control transformer in the control cabinet has connections for various supply voltages. Check that the correct connections are made for the supply voltage provided for the machine. If necessary, re–connect the transformer using the ±5% taps to match the supply voltage.

☞ Connect the machine to the mains power supply in accordance with the electrical diagram in chapter 13.2.4.

6.5 Options

6.5.1 Machine fixing (option H1)

If the machine is supplied with mountings, these can be used to anchor it to the floor. Details of the fixing holes are contained in the dimensional drawing in chapter 13.2.3.

☞ Use appropriate bolts to anchor the machine.

6.5.2 Water cooling connection (option K2)

The dimensional drawing in chapter 13.2.3 gives the flow direction, size and position of the cooling water connection ports.

Use connecting lines made of the appropriate material for the water system. Take into account the effect of electro–chemical reaction.

Keep the effect of pressure surge on the cooler as low as possible.

Where pressure surges are unavoidable provide an expansion tank to damp pulsations.

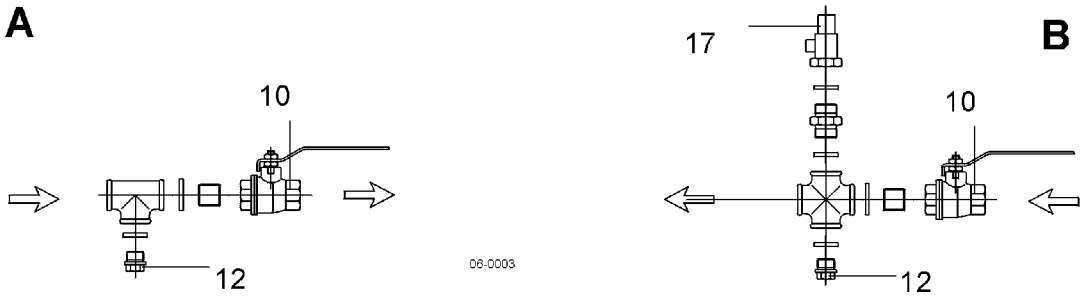


Fig. 10 Water cooling connection

A Cooling water outlet
B Cooling water inlet
10 Shut–off valve
12 Connection port with stopper
17 Pressure relief valve

The user is to provide the following fittings:

- Dirt trap with max. 0.1 mm strainer mesh.
- Shut–off valves (10) and connection ports (12) for maintenance and venting.
- Pressure relief valve (17) prevents build–up of excessive pressure.

Blowoff pressure and capacity are related to the user's installation design. Keep to the cooler technical specification.

☞ Connect the cooling water line to the fitting.

☞ Open the shut–off valve on the cooling water outlet (A).

☞ Slowly open the cooling water inlet shut–off valve (B) to gradually fill the cooler with water.

☞ Vent the water lines.

6.5.3 Heat recovery system connection

6.5.3.1 Internal heat recovery (option W2, W3)

The dimensional drawing in chapter 13.2.3 gives the flow direction, size and position of the connection ports.

Use connecting lines of suitable material. Take into account the effect of electro–chemical reaction.

Keep the effect of pressure surge on the heat exchanger as low as possible.
Where pressure surges are unavoidable provide an expansion tank as a damper.

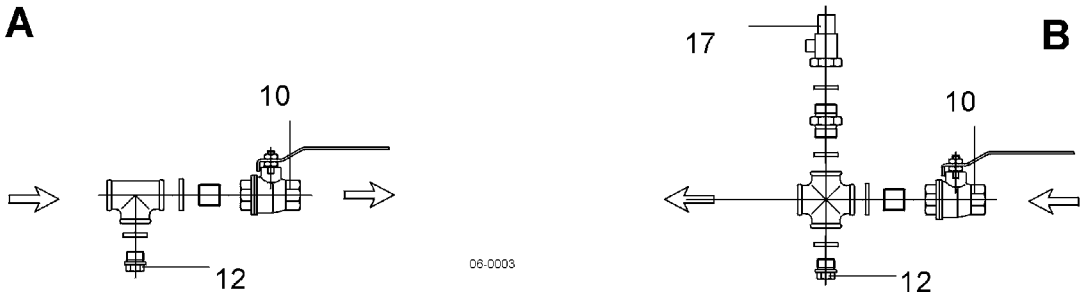


Fig. 11 Heat recovery

A Outlet
B Inlet
10 Shut–off valve
12 Connection port with stopper
17 Pressure relief valve

The user is to provide the following fittings:

- Dirt trap with max. 0.1 mm strainer mesh.
- Shut–off valves (10) and connection ports (12) for maintenance and venting.
- Pressure relief valve (17) on the inlet (B) prevents build–up of excessive pressure.

Blowoff pressure and capacity are related to the user's installation design. Keep to the heat exchanger technical specification.

☞ Connect the water lines to the fittings.

☞ Open the shut–off valve on the outlet (A).

☞ Slowly open the inlet (B) shut–off tap to gradually fill the heat exchanger with water.

☞ Vent the lines.

6.5.3.2 External heat recovery system (option W1)

The dimensional drawing in chapter 13.2.3 gives the flow direction, size and position of the connection ports.

☞ Follow the manufacturer's instructions on connecting the external heat exchanger.

7 Initial Start – up

7.1 Before Initial Start – up (or Recommissioning)

A trained specialist may only carry out the initial start – up procedure.

Incorrect start – up can cause damage to the machine.

Special measures on recommissioning after storage

Storage period longer than	Action
12 months	☞ Change the oil filter. ☞ Change the oil separator cartridge. ☞ Change the cooling oil. ☞ Have the motor bearings checked by an authorised KAESER service agent.
36 months	☞ Have the overall technical condition checked by an authorised KAESER service agent.

7.2 Check Installation and Operating Conditions

Cover all points in the check list before starting the machine.

	Check	Chapter	Done?
1	☞ All installation conditions fulfilled?	5	
2	☞ User's lockable supply disconnecting device installed?	6.4	
3	☞ Is the power supply as specified on the nameplate?	2	
4	☞ Supply cable section and fuse rating adequate?	2.8.2	
5	☞ All electrical connections checked for tightness?		
6	☞ Shut – off valve fitted to compressed air outlet?	6.3	
7	☞ Connection made to air main with hose or axial compensator?	6.3	
8	☞ Sufficient cooling oil in the oil separator tank? (cooling oil indicator outside the red zone?)		
9	☞ Required quantity of cooling oil poured into the inlet port?	7.5	
10	☞ Motor protection relay set correctly with regard to the power supply?	7.4	
11	☞ Operators full conversant with safety regulations?		
12	☞ Supply of cooling water ensured? (option K2)	6.5.2	
13	☞ Machine anchored to the floor? (option H1)	6.5.1	
14	☞ All access doors closed and latched and all removable panels in place and secured?	4.1.1	

Tab. 31 Checklist, installation conditions

7.3 Setting the overload protection cut – out

Compressor motor

In the star – delta configuration the phase current is fed via the overload protection cut – out. This phase current is 0.58 times the rated motor current (see motor nameplate).

Setting

The standard setting is made at the factory.

To prevent the overload protection cutout from being triggered by voltage fluctuations, temperature influences or component tolerances, the setting can be up to 15% higher than the arithmetical phase current.

7.4 Motor Protection Switch Setting

Fan motor

In direct on – line start the starting current is fed via the motor overload protection switch.

Setting

The standard setting is made at the factory.

To prevent the overload protection switch from being triggered by voltage fluctuations, temperature influences or component tolerances, the setting can be higher than the motor rated current (see motor nameplate).

7.5 Pour Cooling Oil into the Inlet Port

The airend must be manually filled with cooling oil before initial start – up and after being out of use for more than 3 months.

Use the same type of oil.

A sticker giving the type of oil used is found near the oil separator tank filling port.

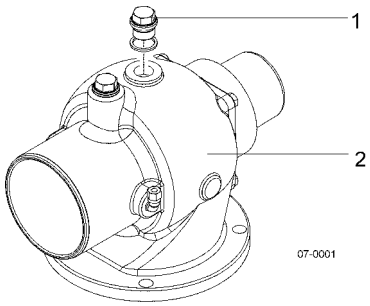


Fig. 12 Inlet valve oil filling port

1 Screw plug
2 Inlet valve

☞ Remove the plug (1) from the inlet valve (2).

☞ Pour cooling oil into the airend.

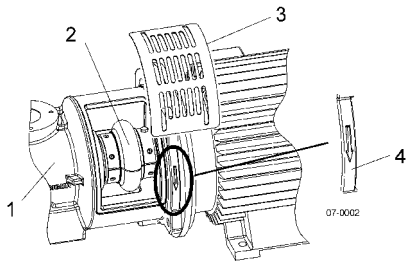


Fig. 13 Coupling

1 Compressor block
2 Coupling
3 Cover
4 Rotational direction arrow

☞ Remove the cover (3).

☞ Note the rotational direction arrow (4).

☞ Grasp the coupling (2) and turn it and the airend shaft (1).

☞ Replace the coupling cover (3).

7.6 Checking Direction of Rotation

The machine is designed for a clockwise field.

☞ Check the supply with a phase sequence indicator.

☞ If the compressor motor turns in the wrong direction, change the motor supply phases L1 and L2.

Alternatively, the direction of rotation can be checked by briefly switching the machine on and off again.

☞ Switch the machine off as soon as the direction of rotation is seen and compare it with the direction arrows on the motor and airend.

7.7 Initial Start – up

☞ Open the shut – off valve to the air network.

☞ Switch on at the main supply isolator.

The controller makes a self – test and the green LED 'Power ON' (16) lights.

☞ Press the 'Operating state LOAD/IDLE' key.

☞ Press the 'ON' key (2).

The green LED 'Machine ON' lights (1).

☞ Allow the machine to idle for at least one minute.

This ensures good distribution of cooling oil.

☞ Press the 'Operating state LOAD/IDLE' key.

The machine switches to the LOAD state and delivers compressed air.

Watch for any faults occurring in the first hour of operation.

After the first 50 operating hours carry out the following:

☞ Check that all electrical connections are tight.

7.8 Setting Network Pressure

The network pressure (working pressure) is set at the works.

Adjustment is possible to suit individual operating conditions.

☞ Network pressure setting is described in the SIGMA CONTROL service manual.

The machine may toggle a maximum of twice per minute between LOAD and IDLE.

Reducing starting frequency:

☞ Increase the difference between cut – in and cut – out pressure.

☞ Add an air receiver downstream to increase buffer capacity.

8 Operation

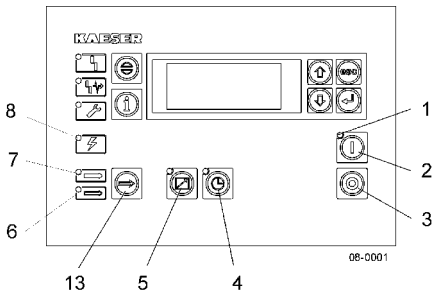


Fig. 14 Switching On and Off

1 'Machine ON' LED (green)
2 'ON' key ('I')
3 OFF key ('0')
4 'Clock' key
5 'Remote' key
6 'LOAD' LED
7 'IDLE'LED
8 'Power ON' LED (green)
13 LOAD / IDLE toggle key

8.1 Switching On and Off

Always switch the machine on and off with the 'ON' and 'OFF' keys.

The supply disconnecting device is installed by the user.

8.1.1 Switching on

WARNING

Compressed air can cause serious injury!

Serious injury possible.

☞ Never direct compressed air at a person or animal!

☞ Ensure that:

- no one is working on the machine,
- all panels are in place,
- all access doors are closed,
- no parts of the machine are colder than + 3 ˚C.

☞ Switch on at the main supply isolator.

The controller makes a self–test and the green LED 'Power ON' (16) lights.

☞ Press the 'ON' key (2).

The green LED 'Machine ON' lights (1).

The compressor motor runs, assuming the network pressure is lower than the cut–out pressure.

8.1.2 Automatic restart

Pre–condition: Network pressure is lower than cut–out pressure.

Automatic restart is factory–set.

The machine restarts automatically when power is resumed after a power cut.

8.1.3 Switching off

☞ Press the 'LOAD/IDLE' toggle key (13).

The machine switches to IDLE and the LED (7) blinks.

☞ After running in idle for 20 seconds, press the OFF key (3).

The 'Machine ON' LED goes out (1).

☞ Switch off and lock out the main supply isolator.

8.2 Switching Off in an Emergency and Switching On Again

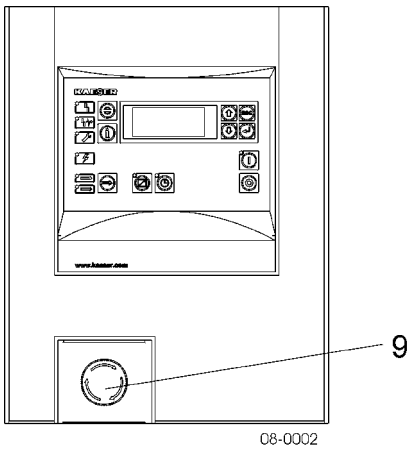


Fig. 15 Switching off in an emergency

9 EMERGENCY STOP button

Switching off

☞ Press the 'EMERGENCY STOP' button (9)

The 'EMERGENCY STOP' remains latched in.

The machine pressure system is vented and the machine is prevented from re–starting.

Starting again

Pre–condition: Fault rectified.

☞ Turn the 'EMERGENCY STOP' button in the direction of the arrow to unlatch it.

☞ Press the 'Reset' key (11).

☞ Switch the machine on.

8.3 Remote On and Off Switching

Pre–condition: Connection to a remote control device.

☞ Press the 'Remote' key (5).

The LED in the corner of the key lights. The remote control device has control of the machine.

The machine can still be switched on and off by the 'ON' and 'OFF' keys (2 and 3) if required.

Apply the remote warning label to the machine where it is plainly visible.
BEWARE! This machine is remotely controlled and can start at any time.

Label the remote control device accordingly:
"Before starting, make sure that no one is working on the machine and it can be safely started."

8.4 Switching on and off with the Clock

Pre–condition: Clock programmed

☞ Press the 'Clock' key (4).

The LED in the corner of the key lights. The integrated clock has control of the machine.

Apply the time–controlled warning label to the machine where it is plainly visible.
"BEWARE! This machine is clock–controlled and can start at any time."

8.5 Acknowledging and Resetting Warning and Alarm Messages

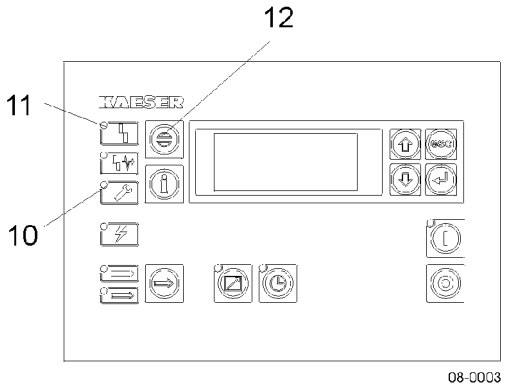


Fig. 16 Acknowledging and Resetting Warning and Alarm Messages

10 'Warning' LED (yellow)
11 'Alarm' LED (red)
12 'Acknowledge' (reset) key

Alarm

An alarm shuts the machine down automatically. The red 'Alarm' LED blinks (11).

Warning

The display shows a maintenance or warning message.

The yellow warning LED (10) blinks, for example, if a maintenance task is due.

8.5.1 Resetting alarm messages

Pre–condition: Fault rectified.

☞ Press the 'Acknowledgement (reset)' key (12).

The alarm LED (red) goes out (11).

The machine is now ready to start again.

8.5.2 Resetting warning messages

Pre – condition: The cause of the warning eliminated.
Maintenance task completed.

☞ Press the 'Acknowledgement (reset)' key (12).

The warning LED (yellow) goes out (10).

9 Event Recognition and Fault Rectification

Inform KAESER service if the event cannot be rectified by the action suggested.

Do not attempt rectifications other than those given in this manual.

The measures valid for your machine are dependant on the individual equipment.

There are three types of event:

Description	Indicated by	see chapter
An event that triggers an alarm (with automatic shut–down)	Blinking red LED	9.1
An event that triggers a warning (no shut–down)	Blinking yellow LED	9.2
Miscellaneous events (faults)	No indication	9.3

9.1 Alarms (machine shut–down, red LED blinking)

Message	Possible cause	Action	KAESER service technician only
access doors	Door opened during machine operation.	Close the door(s).	
ADT ↕	Maximum airend discharge temperature exceeded.	Ensure adequate ventilation. Ensure permitted room temperature not exceeded. Clean the cooler. Cooling air outlet too near a wall Check the cooling oil level.	
ADT dT/dt	Maximum airend discharge temperature rise rate exceeded.	Check airend and piping to airend. Check the cooling oil level. Check oil circulation.	
airend rotation	The motor is turning in the wrong direction.	Changeover phase lines L1 and L2.	
AI 1 open cct.	Connection is broken between the system pressure transducer and analog input 1. Short circuit to earth.	Check line and connection.	Check the sensor.
AI 2 open cct.	Connection is broken between the internal pressure transducer and analog input 2. Short circuit to earth.	Check line and connection.	Check the sensor.

Message	Possible cause	Action	KAESER service technician only
AI 3 open cct.	No connection between the sensor measuring airend discharge temperature and the analog input 3.	Check line and connection.	Check the sensor.
AI 4 open cct.	No connection between the sensor measuring motor temperature and the analog input 4.	Check line and connection.	Check the sensor.
AI 5 open cct.	There is no connection between the sensor allocated to analog input 5 and the input itself. Short circuit to earth.	Check line and connection.	Check the sensor.
AI 6 open cct.	There is no connection between the sensor allocated to an analog input and the input itself. Short circuit to earth.	Check line and connection.	Check the sensor.
...			
AI 8 open cct.			
AI 1 short cct.	The connection between the sensor and the analog input is shorted.	Check line and connection.	Replace defective sensor.
...			
AI 8 short cct.			
back pressure	Back pressure in the oil separator tank caused by poor venting.	Check venting line.	Check venting valve. Check minimum pressure/check valve.
blowoff prot.	The blowoff pressure of the pressure relief valve on the oil separator tank has been exceeded.	Change the oil separator cartridge. Open the shut–off valve in the venting line.	Check the minimum pressure/check valve, the control valve and the inlet valve. Check sensor, line and connection.
condensate drain	Fault in condensate drainage.	Check condensate drainage.	
coolingwater low	Cooling water pressure too low.	Check cooling water supply. Check that cooling water shut–off valve is fully open.	

Message	Possible cause	Action	KAESER service technician only
EMERGENCYSTOP	EMERGENCY STOP button pressed.	Unlatch the push-button.	
ext. message 0 ... ext. message 5		Rectify fault.	
Fan M2 I ↕	First fan motor shut down because of overload.	Investigate cause. Reset overload trip.	
Fan M3 I ↕	Second fan motor shut down because of overload.	Investigate cause. Reset overload trip.	
Fan M4 I ↕	Third fan motor shut down because of overload.	Investigate cause. Reset overload trip.	
HT cell	Fault in the high tension cell.		Check high tension cell.
mains cont. off?	The mains contactor does not drop out despite an OFF command.		Check auxiliary contact block. Check 230 V available for the contactor.
mains cont. on?	The mains contactor does not pull in despite an ON command.		Check auxiliary contact block on K1M. Check 230 V available for the contactor.
mains monitor	Fault in mains power supply.	Have the mains power supply checked.	
model	Machine model indistinct		Re–enter model name Exchange controller
motor I ↕	Drive motor shut-down because of overload.	Change the oil separator cartridge. Check minimum pressure/check valve. Investigate cause.	
motor T ↕	Drive motor overheated.	Ensure adequate ventilation. Install an extractor. Clean the motor.	
motor bearings	Drive motor bearings overheated.	Grease the motor bearings with the greasing device.	Change motor bearings.
neutral p–switch		Rectify fault	
neutral T–switch		Rectify fault	

Message	Possible cause	Action	KAESER service technician only
no press. buildup	Machine produces no compressed air. The setpoint pressure does not rise above 3.5 bar for a preset period.	Check for air leaks. Check the coupling / V–belts.	Check the inlet valve. Check minimum pressure/check valve. Compare the 'internal pressure' indicated with the reading shown on the oil separator tank pressure gauge.
O 0.6/A 0.7	Short circuit in the line between output O 0.6 or O 0.7 and a consumer.	Check line and connection.	Check the consumer.
O 1.6/A 1.7	Short circuit in the line between output O 1.6 or O 1.7 and a consumer.	Check line and connection.	Check the consumer.
oil p ↓	No changeover to load as long as the minimum oil pressure is not reached.	Check oil circulation. Check pressure switch, line and connection.	Replace defective switch.
PD temperature ↕	Compressor outlet temperature too low.		Check sensor, regulator. Check the frequency converter.
PD temperature ↕	Compressor outlet temperature too high.	Check the fan motor. Clean the cooler. Check the cooling oil level.	Check sensor, regulator. Check the frequency converter.
Power supply ↕	2. Power failure	Check power supply voltage. Check door interlock.	
pRV ↕	The blowoff pressure of the pressure relief valve on the oil separator tank has been exceeded.	Replace the pressure relief valve.	
RD compr. p ↕	Pressure switch on the refrigerant compressor activated.	Ensure adequate ventilation. Clean the refrigerant condenser. Clean the cooler.	Replace defective sensor.

Message	Possible cause	Action	KAESER service technician only
RD compr. T ↑	Refrigerant compressor overheating.	Clean the refrigerant condenser. Ensure adequate ventilation. Install an extractor. Cleaning the cooler	
RD compr. T ↓	Refrigerant compressor too cold.		Check refrigeration dryer.
separator dp ↕	Oil separator cartridge clogged.	Replace the oil separator cartridge.	
separator T ↕	Maximum temperature on oil separator tank outlet exceeded.	Check the cutout line.	Check the cutout on the oil separator tank outlet.
SIGMA CONTROL T ↕	SIGMA controller housing temperature exceeded 70° C.	Ensure adequate ventilation. Ensure permitted room temperature not exceeded. Check control cabinet ventilator (filter mats).	
softstart	Fault in the soft start system.		Check the soft start system.
start T ↕	Air temperature at the airend discharge port too low. Ambient temperature below + 3° C.	Heat the compressor room.	Install auxiliary heating.
V–belts broken	The V–belts parted during machine operation.	Replace the V–belts.	
VFD	Frequency converter faulty.		Check the frequency converter.

Tab. 32 Alarm messages and actions

9.2 Warning Messages (yellow LED blinking)

Message	Possible cause	Action	KAESER service technician only
access doors	Doors opened during machine operation.	Close access doors.	
ADT ↑	The maximum permissible airend discharge temperature will soon be reached.	Ensure adequate ventilation. Clean the cooler. Cooling air outlet too near a wall. Check the cooling oil level. Replace the oil filter.	
air filter dp ↑	The pressure drop across the air filter is rising. Air filter element clogged.	Clean/replace the air filter element.	
air filter h ↕	The service interval to the next air filter element check has expired.	Clean/replace the air filter element.	
Bearing maintenance h ↕	The service interval to the next bearing greasing has expired.	Grease the motor bearings.	
blowoff prot.	Warning The blowoff pressure of the pressure relief valve will soon be reached.	Change the oil separator cartridge. Open the shut–off valve in the venting line.	Check the minimum pressure/check valve, the control valve and the inlet valve. Check the pressure transducer.
Buffer battery	Data–retention battery run down.		Contact KAESER service.
bus alarm	The bus link from the Profibus DP interface is interrupted.	Check link and plug.	Check the interface configuration.
condensatedrain	Fault in condensate drainage.	Check condensate drain and lines.	
elect. equip. h ↑	The service interval for checking electrical equipment and wiring has expired.	Reset the service interval counter.	Check electrical components.
ext.load signal?	External load signal indistinct: Increased cut–out pressure exceeded. The external load control has not switched to idle.	Check settings of the external controller. Take the pressure drops across filters and dryer into account.	Check discrepancies between pressure transducers.

Message	Possible cause	Action	KAESER service technician only
error: RS 485	Wrong configuration or transmission error. Bit rate and character frame for both subscribers identical.	Check the link/interface connections between the two controllers. Check maximum cable length and screening. Check interface parameters. 1 master and 1 slave configured.	
ext. message 0 ... ext. message 5		Rectify fault.	
flash memory	Internal controller memory error.		Exchange the controller.
mains voltage ↓	1. power failure: Machine was re–started automatically.	Check power supply voltage. Check door interlock.	
modem problem	SIGMA CONTROL does not recognise the modem.	Check the link between the SIGMA controller and the modem.	
motor T ↑	Drive motor overheating.	Ensure adequate ventilation. Install an extractor. Clean the motor.	
motor bearings h ↕	The service interval to the next motor bearing change has expired.		Change motor bearings.
motorstarts /h ↕	The permissible number of motor starts was exceeded in the last 60 minutes.	Extend the idle period. Increase capacity of air receiver. Increase cross–section of piping between compressor and air receiver.	Check pressure transducer. Replace defective sensor.
motor starts /d ↕	The permissible number of motor starts was exceeded in the last 24 hours.	Extend the idle period. Increase capacity of air receiver. Increase cross–section of piping between compressor and air receiver.	Check pressure transducer. Replace defective sensor.
neutral p–switch		Rectify fault	
neutral T–switch		Rectify fault	

Message	Possible cause	Action	KAESER service technician only
no press. buildup	The compressor cannot build–up pressure.	Check for air leaks. Check the value given in the analog data menu with the reading on the oil separator tank pressure gauge.	Check the minimum pressure/check valve, the control valve and the inlet valve. Check venting valve.
oil change h ↕	The service interval to the next oil change has expired.	Change the cooling oil.	
oil filter dp ↑	Oil filter clogged.	Change the oil filter.	
oil filter h ↕	The service interval to the next oil filter check has expired.	Change the oil filter.	
oillevel ↓	Oil level too low.	Top up the cooling oil.	
oil T ↓	Cooling oil temperature too low.	Increase room temperature. Check the oil circuit. Check temperature gauge switch, line and connection.	Replace defective switch. Install auxiliary heating.
PD temperature ↓	Warning Compressor outlet temperature is low.		Check sensor, regulator. Check the frequency converter.
PD temperature ↕	Warning Compressor discharge temperature too high.	Clean the cooler. Check the cooling oil level.	Check the fan motor.
RAM	Internal RAM defective.		Check controller. Exchange the controller.
Remaining oil content ↑	Warning The purest class oil content limit will soon be reached.	Check the scavenge tube in the oil separator tank. Check the dirt trap strainer in the scavenge line.	Check the oil separator cartridge. Check oil sensor line and connection.
Remaining oil content ↕	The purest class oil content limit is exceeded.	Check the scavenge tube in the oil separator tank. Check the dirt trap strainer in the scavenge line.	Check the oil separator cartridge. Check oil sensor line and connection.
separator dp ↑	Oil separator cartridge clogged.	Change the oil separator cartridge.	

Message	Possible cause	Action	KAESER service technician only
separator h ↕	The service interval to the next oil separator cartridge check has expired.	Change the oil separator cartridge.	
set output	The 'set output' test function is activated.	End the "set output" mode.	
System pressure ↓	System pressure has fallen below the set 'low' value. Air consumption too high.	Check air demand. Check line and connection. Check 'systpress. low' setting.	Check pressure transducer. Replace defective sensor.
System pressure ↑ (vacuum machines only)	System pressure has fallen below the set 'high' value.	Check for air leaks. Check 'syspress. high' setting. Check if the machine switches to LOAD.	
VFD mains	Failure of power supply to the frequency converter.	Check power supply.	
V–belt tension	V–belt tension too low.	Re–tension the V–belts.	
V–belt tens. h ↕	The service interval to the next V–belt re–tensioning has expired.	Re–tension the V–belts.	

Tab. 33 Warning messages and actions

9.3 Miscellaneous events (faults)

Alarm	Possible cause	Action	KAESER service technician only
Motor overload protection relay tripped out.	Overload relay is defective or incorrectly set.	Check setting.	Replace the overload relay.
	Oil separator cartridge clogged.	Check pressure drop across the separator cartridge. Change the oil separator cartridge if necessary.	
	The pressure system does not vent.	Open the shut–off valve in the venting line.	Check venting valve. Check minimum pressure/check valve.
	Motor defective; bearing damage or windings shorted.		Check the motor.
	Airend defective.		Check the airend.

Alarm	Possible cause	Action	KAESER service technician only
Machine runs but produces no compressed air.	Inlet valve not opening or only opening partially.		Check the valve.
	Venting valve not closing.		Check venting valve.
	Pressure system leaking.	Check pipework and connections for leaks and tighten.	
	The air demand is greater than the capacity of the compressor.	Check air network for leaks. Shut down the consumer(s).	Install auxiliary compressor.
	Hose coupling or maintenance hose still plugged into the quick–release coupling on the oil separator tank.	Remove coupling or maintenance hose.	
Cooling oil runs out of the air filter.	Oil level in the separator tank too high.	Drain off oil until the correct level is reached.	
	Inlet valve defective		Check the valve.
Compressor switches between load and idle more than twice per minute.	Air receiver too small.		Install an air receiver of sufficient capacity.
	Flow into the air network restricted.	Increase air line diameters. Check filter elements.	
Oil leaking into the floor pan.	Hose coupling or maintenance hose still plugged into the quick–release coupling on the oil separator tank.	Remove coupling or maintenance hose.	
	Oil cooler leaking		Replace the oil cooler.
	Connection leaking.	Tighten connections. Replace seals.	
Cooling oil consumption too high.	Unsuitable oil used.	Use SIGMA FLUID cooling oil.	
	Oil separator cartridge split.	Change the oil separator cartridge.	
	Oil level in the separator tank too high.	Drain off oil until the correct level is reached.	
	Oil return line clogged.	Check dirt trap in the oil return line.	

Tab. 34 Miscellaneous events (faults)

10 Maintenance

10.1 Safety

Disregarding these notes and/or improper handling may result in serious injury.

DANGER

Electric shock can kill!

Touching electrically live components can cause serious injury or death.

- ☞ Isolate completely from the mains supply (all conductors) (switch off at the main isolator)
- ☞ Ensure the supply cannot be switched on again (lock off).
- ☞ Check that no voltage is present.
- ☞ Only work on electrical components when they are voltage–free.
- ☞ Work carefully.
- ☞ Before switching on again ensure that:
  - no one is working on the machine,
  - all panels are in place and secured,
  - all access doors are closed.

WARNING

There is considerable danger of injury or death from the release of spring–loaded components are incorrectly opened (dismantled).

Minimum pressure/check valves, pressure relief valves and inlet valves are under powerful spring loading.

- ☞ Do not open (dismantle) valves.

WARNING

Compressed air can cause injury or death.

Serious injury or death can result from loosening or opening components under pressure.

- ☞ Close shut–off valves or otherwise isolate the machine from the air main to ensure that no compressed air can flow back into the machine.
- ☞ De–pressurize all pressurized components and enclosures.
- ☞ Check all machine hose connectors with a hand–held pressure gauge to ensure that all read zero.

CAUTION

Machine damage from leakage

Leaks result in loss of oil and reduced performance.

Damage or complete breakdown can result.

- ☞ Test run after maintenance or service.
- ☞ Carry out a visual check of the machine.

Maintenance work may only be carried out:

- by persons trained in the machine and persons under the supervision of an expert,
- by experts,
- by an authorised KAESER service agent.

Work on electrical devices may only be carried out in accordance with electrical regulations:

- by persons trained in the machine under the supervision of an electrician,
- by an electrician,
- by an authorised KAESER service agent.

10.2 Maintenance Schedule

Maintenance intervals are recommendations only and should be adjusted to suit the installation and operating conditions.

According to the way a machine is equipped, sensors and/or maintenance interval counters monitor the operational state of important functional devices. Necessary maintenance tasks are signalled by the SIGMA controller.

☞ Keep a log of all service work.

This enables the frequency of individual maintenance tasks to be compared with KAESER's recommendations. A list is given in chapter 10.15.

10.2.1 Resetting maintenance interval counters

Maintenance interval counters indicate the operating hours between maintenance tasks.

When a maintenance task is completed, reset the corresponding counter to its original value.

See the SIGMA CONTROL service manual.

Pre – condition: Maintenance task completed.
Service message reset.
Activate password level 4.

☞ Select the appropriate entry from the maintenance menu.

☞ Select 'reset' and 'y' and confirm with the enter key.

10.2.2 Regular maintenance work

When operating conditions are unfavourable (e.g. dusty atmosphere) or when the equipment is heavily utilised, maintenance tasks must be carried out more frequently (shorter intervals).

☞ Heed controller maintenance messages.

☞ Have KAESER service adjust the maintenance interval counters to suit operating conditions.

Interval	Maintenance tasks	see chapter
Weekly	Check cooling oil level.	10.10.1
	Clean or renew the filter mats.	10.3.2 / 10.6
Every 1000 h	Oil and air cooler maintenance.	10.3
	Heat recovery system maintenance.	10.4
Indicated by SIGMA CONTROL	Air filter maintenance.	10.5
Indicated by SIGMA CONTROL but at least annually.	Change the oil filter.	10.12
Indicated by SIGMA CONTROL but at least every 3 years.	Change the oil separator cartridge.	10.14
Every 2000 h, but at least annually.	Grease the motor bearings.	10.7
Every 3000 h	Check the coupling.	10.8
Variable (see below)	Change the cooling oil.	10.11
Annually	Check that all electrical connections are tight.	
	Check the pressure relief valve.	10.13
	Check the oil and air coolers for leaks.	10.3

h = operating hours

Tab. 35 Regular maintenance work

10.2.3 Oil change intervals

The duty cycle and ambient conditions are important criteria for the number and length of the change intervals.

Coolant	Maximum permissible oil change interval [operating hours / year]	
	Favourable operating conditions*	Unfavourable operating conditions
SIGMA FLUID PLUS	9 000 / 3	6 000 / 1
SIGMA FLUID MOL	3 000 / 1	2 000 / 1
SIGMA FLUID FGL	3 000 / 1	2 000 / 1
SIGMA FLUID FGH	3 000 / 1	2 000 / 1

* Cool to moderate ambient temperatures, low humidity, high duty cycle

Tab. 36 Oil change intervals

10.2.4 Regular service work

Only authorised KAESER service agents should carry out service work.

When operating conditions are unfavourable (e.g. dusty atmosphere) or when the equipment is heavily utilised, service work must be carried out more frequently (shorter intervals).

Interval	Maintenance tasks
Up to 12000 h	Check valves.
Up to 12000 h, at the latest every 3 years	Change the fan motor bearings or the motor complete.
Up to 36000 h, at the latest every 8 years	Change the drive motor bearings.
	Change the coupling.
	Change the hose lines.

Tab. 37 Regular service work

10.3 Cooler Maintenance

10.3.1 Air cooling (option K1)

Material: brush
vacuum cleaner

Pre – condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Check the cooler regularly for contamination. Frequency is mainly dependant on local operating conditions.

Contamination causes overheating and machine damage.

Avoid dust disturbance. Wear breathing apparatus if necessary.

Do not use sharp objects to clean the cooler. The cooler could be damaged.

A severely contaminated cooler should be cleaned by a KAESER service agent.

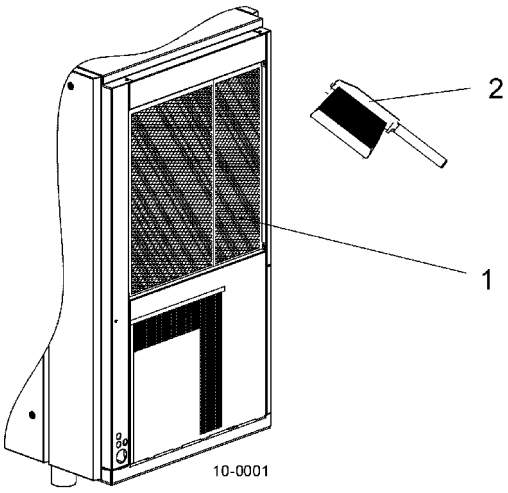


Fig. 17 Cleaning the cooler

1 Cooler
2 Brush

☞ Dry brush the cooler (1) and use a vacuum cleaner to suck up the dirt.

10.3.2 Filter mat maintenance (option K3)

Material: Warm water and household detergent
Spare parts (as required)

Pre – condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

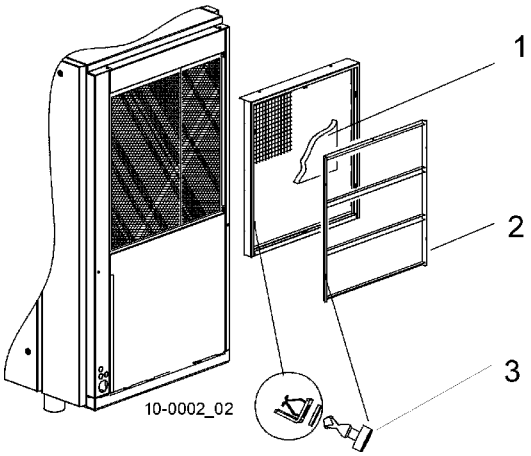


Fig. 18 Cooler filter mats

1 Filter mat
2 Retaining frame
3 Fixing

Removal

☞ Unlock the fixings (3).
Use a screwdriver to turn the fixing 90° anti–clockwise.

☞ Remove the frame (2).

Cleaning

☞ Beat the mat (1) or use a vacuum cleaner to remove loose dirt. If necessary, wash the mat in lukewarm water and household detergent then rinse thoroughly.

Renew the mat if cleaning is not possible of has already been carried out five times.

Replacing

☞ Replace the frame and close the fixings.
Press and turn the fixings 90° clockwise until they latch.

10.3.3 Water cooling maintenance (option K2)

Pre–condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Check the cooler regularly for leaks and contamination. Frequency of checking is dependant on the characteristics of the cooling water.

Contamination causes overheating and machine damage.

☞ Observe the airend discharge temperature to detect any tendency to rise.

Cleaning:

☞ An authorised KAESER service agent should clean the cooler when the airend discharge temperature is 10 °C above the annual average.

Leakage

Pressure in the cooling oil circuit is generally higher than that in the cooling water system. If a leak occurs, oil will run into the cooling water.

☞ Check the cooler visually for leaks.

☞ Have an authorised KAESER service agent check the cooler for internal leaks at least once a year.

10.4 Internal Heat Recovery Maintenance (option W2 / W3)

Pre – condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Deposits in the heat exchanger in machines with heat recovery systems can adversely affect heat transfer.

Check the heat exchanger regularly for leaks and contamination. Frequency of checking is dependant on the characteristics of the heat transfer medium.

Contamination

☞ Have an authorised KAESER service agent clean the heat exchanger as soon as a pressure drop in the heat transfer medium is detected.

Leakage

If a leak occurs, cooling oil can flow into the heat transfer medium as pressure the cooling oil circuit is generally higher.

☞ Check the heat exchanger visually for leaks.

☞ Have an authorised KAESER service agent check the heat exchanger for internal leaks at least once a year.

10.5 Air Filter Maintenance.

Material: Compressed air
Spare parts (as required)

Pre – condition: Machine switched off
Mains isolator locked off
Machine cooled down.

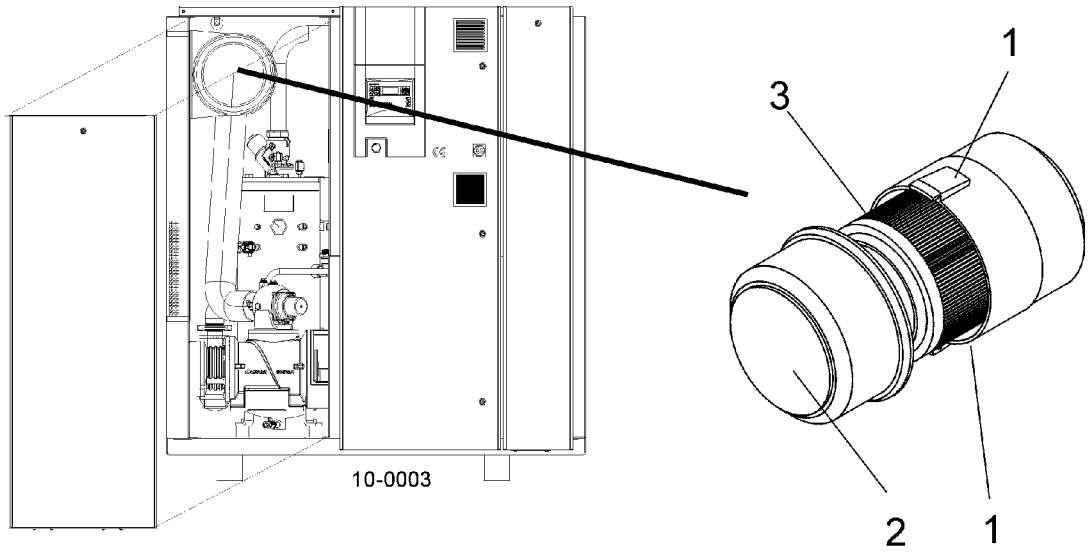


Fig. 19 Air filter maintenance.

1 Retaining clip
2 Cover
3 Air filter cartridge

Open the air filter housing:

☞ Pull the retaining clips (1) outwards and remove the cap (2).

☞ Pull out the air filter cartridge (3) by turning lightly.

☞ Clean the sealing surfaces and the air filter housing.

Do not wet – clean the air filter element.

Clean the air filter cartridge by tapping

Renew the cartridge after two years or after it has been cleaned five times.

☞ Tap the cartridge on the end a number of times with the palm of the hand.

☞ Clean the sealing faces.

Cleaning the air filter cartridge with compressed air

☞ Use dry compressed air at not more than 5 bar to blow dirt from the air filter cartridge from inside to outside.

Close the air filter housing

☞ Insert the filter cartridge.

☞ Push on the housing and close the retaining clips.

☞ Close all access doors and replace all cover panels.

☞ Switch on the power supply and reset the maintenance interval counter.

10.6 Filter mat maintenance (control cabinet ventilator)

Material: Warm water and household detergent
Spare parts (as required)

Pre – condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

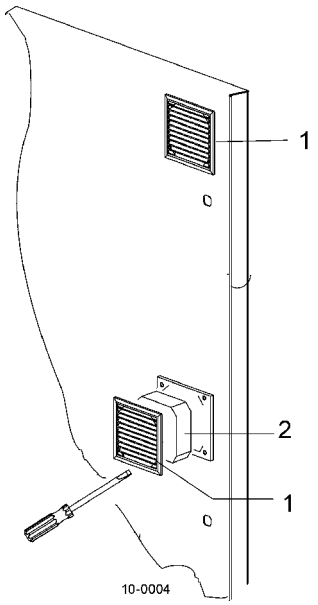


Fig. 20 Control cabinet ventilator

1 Ventilator grill
2 Filter mat

Removal

☞ Remove the ventilator grill (1) and the filter mat (2).

Cleaning

☞ Beat the mat or use a vacuum cleaner to remove loose dirt. If necessary, wash the mat in lukewarm water and household detergent then rinse thoroughly.
Renew the mat if cleaning is not possible of has already been carried out five times.

Replacing

☞ Lay the filter mat in the frame and push on the grill to latch.

10.7 Electric motor maintenance

Material: Bearing grease
Cleaning rags

Pre–condition: Machine running.

CAUTION

Hot components – danger of burning

☞ Wear long–arm clothing and gloves.

☞ Work carefully.

Compressor motor

The motor bearings are fitted with grease nipples.

High–temperature grease ESSO UNIREX N3 should be used for re–greasing the motor bearings. Bearing damages caused by the use of other brands of grease are excluded from the warranty.

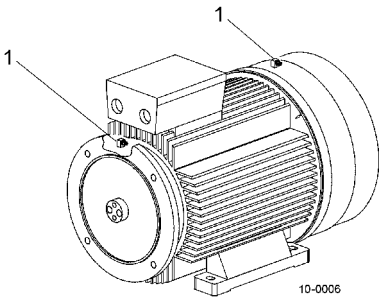


Fig. 21 Compressor motor maintenance

1 Grease nipple

☞ Clean the grease nipple (1) with a rag.

Apply the quantity of grease as given on the motor nameplate.

☞ Grease both bearings.

☞ Close all access doors; replace and secure all removable panels.

☞ Switch on the machine and reset the maintenance interval counter.

Fan motor

Fan motor bearings are permanently greased and need no further greasing.

10.8 Checking the Coupling

WARNING

Danger of injury from rotating coupling!

Severe injury could result from touching the coupling while it is rotating.

☞ Never switch the machine on without the guard in place over the coupling.

The coupling must be carefully inspected at regular intervals.

A defective coupling is recognisable by:

- noisy running,
- surface cracks,
- colour change.

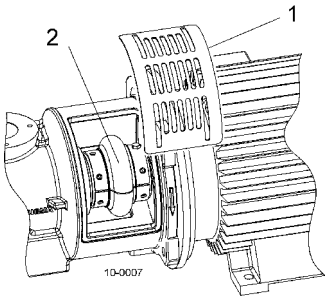


Fig. 22 Checking the Coupling

1 Safety screen
2 Coupling

Check for uneven or noisy running

☞ Switch the machine on.

☞ Check the coupling (2) for noisy or uneven running.

Check for damage

Pre – condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

☞ Remove the fixing screws from the safety screen (1).

☞ Turn the coupling my hand and look for damage or colour change.

☞ Have a damaged coupling changed by an authorised KAESER Service agent.

☞ Refit the safety screen.

☞ Close all access doors and replace all cover panels.

10.9 Venting the Machine Manually

Pre–condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

WARNING

Compressed air can cause injury or death.

Compressed air and devices under pressure can injure or cause death if the contained energy of the air is released suddenly or uncontrolled.

After shutting down the compressor and venting the oil separator tank there is still pressure on the check valve from the air main.

☞ Close the shut–off valve provided by the user to isolate the machine from the air main.

☞ Vent the oil separator tank.

☞ Vent the air aftercooler to completely depressurise the system between the user's shut–off valve and the minimum pressure/check valve.

CAUTION

Escaping oil mist is damaging to health.

☞ Do not direct the maintenance hose at a person while venting.

☞ Do not inhale oil mist or vapour.

☞ Avoid contact with skin and eyes.

Before undertaking any maintenance or service work on the pressure system the machine must be isolated from the air system and completely vented.

The machine is vented in three stages:

- the oil circuit vents automatically when the machine is switched off,
- air is vented manually from the oil separator tank,
- air is vented manually from the air cooler.

Venting

☞ Close the user's shut–off valve between the machine and the air main.

If no shut–off valve is provided, the complete air system must be vented.

The hose coupling, shut–off valve and maintenance hose lie beneath the oil separator tank.

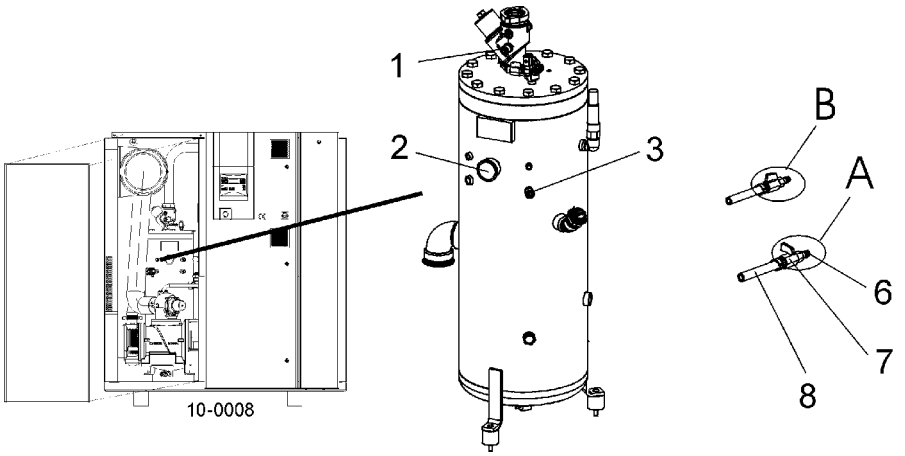


Fig. 23 Ventilate the machine.

1	*Hose coupling (air cooler venting)*	*6*	*Male hose coupling/fitting*
2	*Pressure gauge*	*7*	*Shut–off valve* *A: closed* *B: open*
3	*Hose coupling (oil separator tank venting)*	*8*	*Maintenance hose*

☞ Check that the oil separator tank pressure gauge reads zero.

After automatic venting the pressure gauge does not read zero?

☞ Make sure that the shut–off valve is closed.

☞ If manual venting does **not** bring the oil separator tank pressure gauge to zero, call KAESER service.

Manually venting the oil separator tank

☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (3).

☞ Open the shut–off valve (7) slowly to release pressure.

☞ Withdraw the male hose fitting and close the shut–off valve.

Manually venting the compressed air cooler

☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (1).

☞ Open the shut–off valve (7) slowly to release pressure.

☞ Withdraw the male hose fitting and close the shut–off valve.

10.10 Checking and Topping up the Cooling Oil

10.10.1 Check cooling oil level.

Pre–condition: Machine has been running at least five minutes under load. (minimum 50 Hz for machines under frequency control).

Danger of burning from hot surfaces!

CAUTION Skin burns are possible.

☞ Wear long–arm garments and protective gloves.

☞ Work carefully.

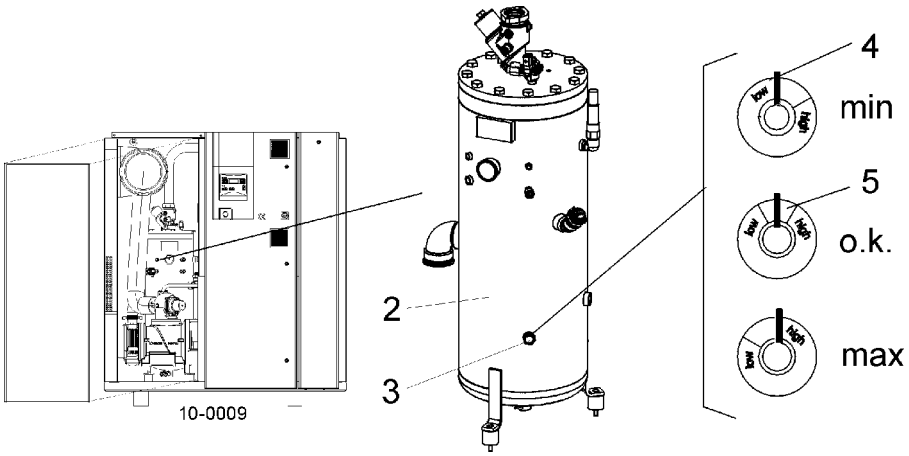


Fig. 24 Check cooling oil level.

2	*Oil separator tank*	*min*	*Minimum oil level*
3	*Oil level indicator*	*OK*	*Oil level optimum*
4	*Indicator markings*	*max*	*Oil level maximum*
5	*Green zone*		

☞ Readout oil level.

When the indicator shows minimum level, top up the oil.

10.10.2 Topping up the cooling oil

Material: Cooling oil

Pre–condition: Machine switched off
Mains isolator locked off
Machine cooled down.

WARNING

Danger of explosion from oils and lubricants!

Danger of explosion from oil mist and vapours.

☞ Fire, naked flame and smoking are forbidden!

CAUTION

Damage to the machine from unsuitable oil

☞ Never mix different types of oil.

☞ Top up only with the same type of oil as already in the machine.

Venting

☞ Close the user's shut–off valve between the machine and the air main.

If no shut–off valve is provided, the complete air system must be vented.

The hose coupling, shut–off valve and maintenance hose lie beneath the oil separator tank.

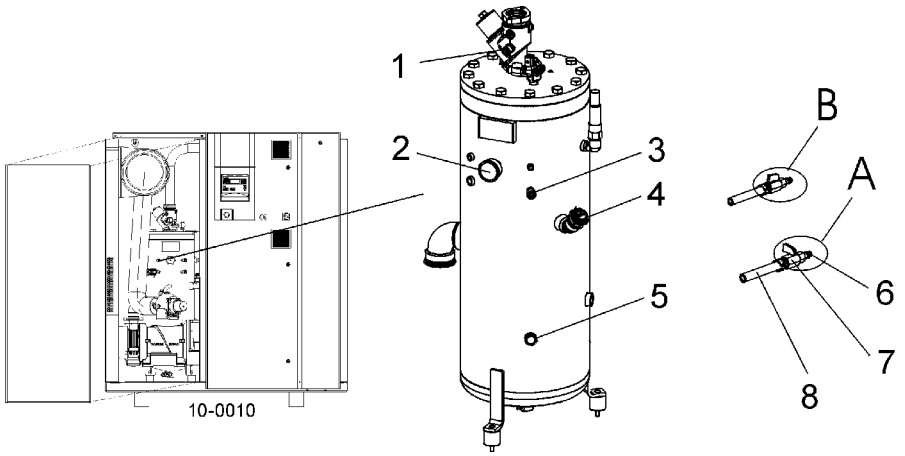


Fig. 25 Topping up the cooling oil

1	*Hose coupling (air cooler venting)*	*5*	*Oil level indicator*
2	*Pressure gauge*	*6*	*Male hose coupling/fitting*
3	*Hose coupling (oil separator tank venting)*	*7*	*Shut–off valve* *A: closed* *B: open*
4	*Oil filling port with plug*	*8*	*Maintenance hose*

☞ Check that the oil separator tank pressure gauge (2) reads zero.

After automatic venting the pressure gauge does not read zero?

☞ Make sure that the shut–off valve is closed.

☞ If manual venting does **not** bring the oil separator tank pressure gauge to zero, call KAESER service.

Manually venting the oil separator tank

☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (3).

☞ Open the shut–off valve (7) slowly to release pressure.

☞ Withdraw the male hose fitting and close the shut–off valve.

Manually venting the compressed air cooler

☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (1).

☞ Open the shut–off valve (7) slowly to release pressure.

☞ Withdraw the male hose fitting and close the shut–off valve.

Topping up the cooling oil

☞ Open the filler plug (4) slowly.

☞ Top up the cooling oil.

☞ Replace the plug gasket if necessary and re–insert the plug.

Start the machine and carry out a test run

☞ Close all access doors; replace and secure all removable panels.

☞ Open the user's shut–off valve between the machine and the air main.

☞ Start the machine and allow it to idle for at least one minute. Then switch to LOAD.

☞ After about five minutes, check the oil level and top up if necessary.

☞ Carry out a visual check for leaks.

10.11 Changing the Cooling Oil

Material: Cooling oil
Have the oil container ready.

Thoroughly drain the oil from the separator tank, the cooler and the heat recovery system if fitted.

Dispose of the old oil in accordance with local environment protection regulations.

CAUTION

Danger of burning from hot components and oil.

- ☞ Wear long–arm clothing and gloves.
- ☞ Work carefully.

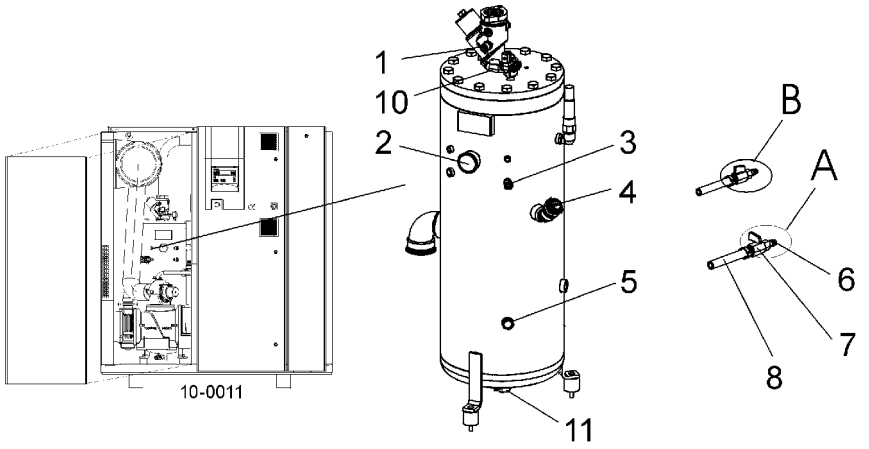


Fig. 26 Changing the Cooling Oil, Oil Separator Tank

1	*Hose coupling (air cooler venting)*	*6*	*Male hose coupling/fitting*
2	*Pressure gauge*	*7*	*Shut–off valve* *A: closed* *B: open*
3	*Hose coupling (oil separator tank venting)*	*8*	*Maintenance hose*
4	*Oil filling port with plug*	*9*	*Hose coupling (oil drain)*
5	*Oil level indicator*	*10*	*Shut–off valve (venting line)*
		11	*Shut–off valve (oil drain)*

Compressed air helps to expel the oil.

This pressure can be generated by the machine itself.

Alternatively, an external source of compressed can be used.

External air is necessary when:

- the machine is not operational
- the machine is to be restarted after a long standstill period.

Oil changing with help from internal pressure

Pre–condition: Machine has been running at least five minutes under LOAD.
Machine is switched off.
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.

- ☞ Close the shut–off valve (10) in the venting line.
- ☞ Start the machine in idle and watch the oil separator tank pressure gauge (2) until it reads 3–5 bar.
- ☞ Switch the machine off.
- ☞ Switch off and lock out the main supply isolator.
- ☞ Wait at least two minutes for oil to flow back to the separator tank.

Alternative: Oil changing with help from an external pressure source

Pre–condition: Machine switched off.
Mains isolator locked off
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.
External source of compressed air available.

- ☞ Close the shut–off valve (10) in the venting line.
- ☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (3).
- ☞ Connect the maintenance hose to an external air supply.
- ☞ Open the shut–off valve (7) until the pressure gauge on the oil separator tank reads 3–5 bar.
- ☞ Close the shut–off valve (7) and withdraw the hose fitting from the coupling.

Draining the oil from the separator tank

Contact KAESER service if condensate is detected in the oil.
It is necessary to adjust the airend discharge temperature to suit operating conditions.

- ☞ Have the oil container ready.
- ☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (9).
- ☞ Place the end of the maintenance hose in the oil container and secure it in place.
- ☞ Open the shut–off valve (11).
- ☞ Open the shut off valve (7) in the maintenance hose slowly and close when air escapes.
- ☞ Close the shut–off valve (11) and unplug the hose.

Draining the oil from the cooler

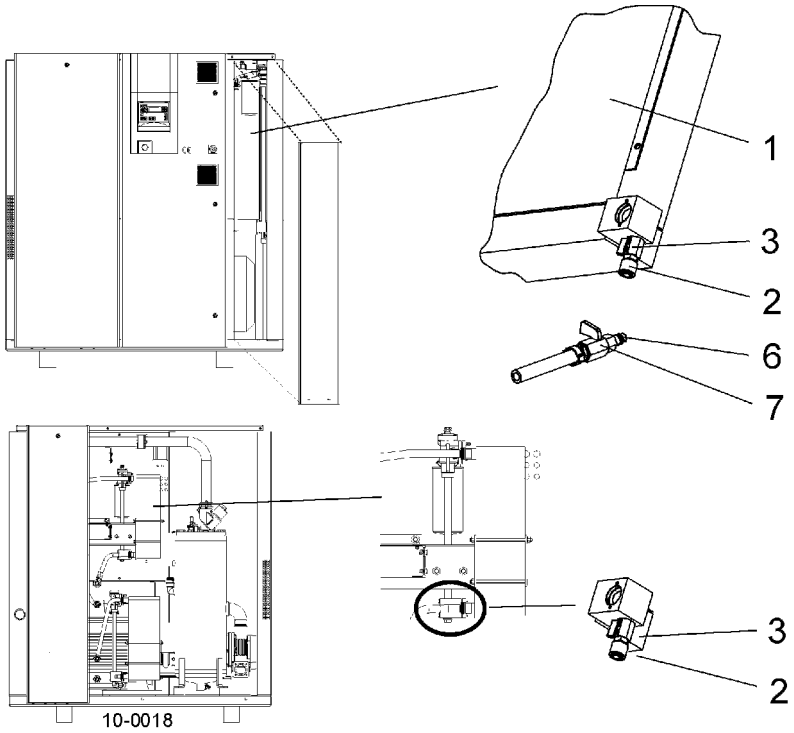


Fig. 27 Changing the Cooling Oil

1	*Oil cooler*	*6*	*Male hose coupling/fitting*
2	*Hose coupling (oil drain)*	*7*	*Shut–off valve*
3	*Shut–off valve*		

☞ Have the oil container ready.

☞ With the shut–off valve closed, insert the male hose fitting (6) into the hose coupling (2).

☞ Place the end of the maintenance hose in the oil container and secure it in place.

☞ Open the shut–off valve (3).

☞ Open the shut–off valve (7) slowly and allow oil and air to drain completely.

☞ Check that the oil separator tank pressure gauge reads zero.

☞ Close the shut–off valve (2) and unplug the hose.

Filling with cooling oil

☞ Open filler plug (4, Fig. 26) slowly.

☞ Fill with oil.

Machines with heat recovery systems need correspondingly more oil.

☞ Check the plug and gasket for damage and re–insert the plug.

Start the machine and carry out a test run

☞ Close all access doors; replace and secure all removable panels.

☞ Open the user's shut–off valve between the machine and the air main.

☞ Switch on the power supply and reset the maintenance interval counter.

☞ Allow the machine to idle for at least one minute. Then switch to LOAD.

☞ After about five minutes, check the oil level and top up if necessary.

☞ Carry out a visual check for leaks.

10.12 Oil filter maintenance

Material: Spare parts
Have the oil container ready.

Pre–condition: Machine switched off
Mains isolator locked off
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.

CAUTION

Danger of burning from hot components and oil.

☞ Wear long–arm clothing and gloves.

☞ Work carefully.

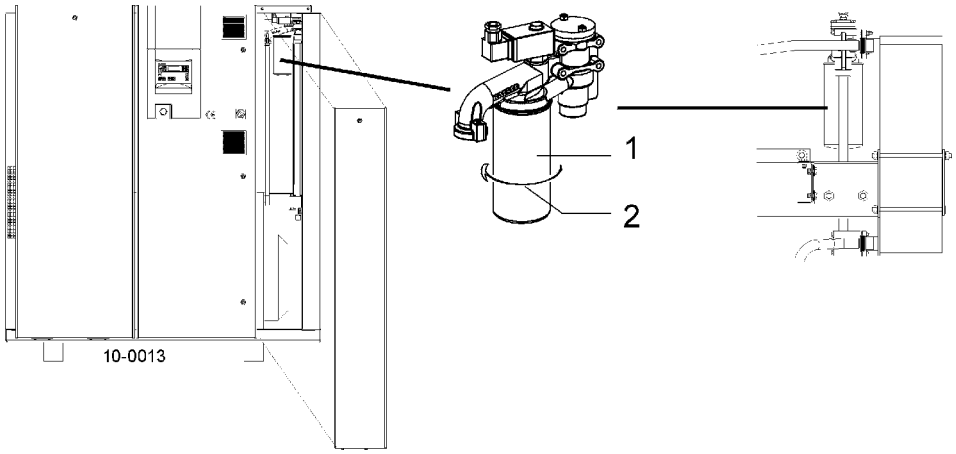


Fig. 28 Changing the Oil Filter

1 Oil filter
2 Direction to unscrew

Dispose of parts and materials contaminated with oil in accordance with local environment protection regulations.

☞ Unscrew the oil filter anti–clockwise, catch oil spillage and dispose of correctly.

☞ Lightly oil the new oil filter gasket.

Screw on the new filter using hand pressure only. Do not use any tool.

☞ The oil filter is turned clockwise to tighten.

Start the machine and carry out a test run

- ☞ Close all access doors; replace and secure all removable panels.
- ☞ Open the user's shut–off valve between the machine and the air main.
- ☞ Switch on the power supply and reset the maintenance interval counter.
- ☞ Allow the machine to idle for at least one minute. Then switch to LOAD.
- ☞ After about five minutes, check the oil level and top up if necessary.
- ☞ Carry out a visual check for leaks.

10.13 Checking the Pressure Relief Valve.

Pre–condition: Machine switched off.
Activate password level 4.

In order to check the pressure relief valve, the machine's working pressure is raised above the blowoff pressure of the valve.

WARNING

There is danger of bursting if the permissible working pressure is exceeded.

Noise from the pressure relief valve blowing off. Danger of scalding from hot oil. Danger of injury from bursting components or the release of compressed air.

- ☞ Close all access doors; replace and secure all removable panels.
- ☞ Wear ear and eye protection.
- ☞ Work carefully.
- ☞ Abort the test if the working pressure reaches 10% above the blowoff pressure of the valve.

Carry out the test exactly as described in the SIGMA CONTROL manual.

Blowoff protection and system pressure monitoring are switched off during the test.
The machine may only be operated with a correctly functioning pressure relief valve.

- ☞ Close the user's shut–off valve between the machine and the air main.
- ☞ Observe the pressure indicator on the SIGMA controller and call up the test function.
- ☞ Stop the test as soon as the pressure relief valve blows off or working pressure reaches 10% above the blowoff set point.
- ☞ Replace a defective pressure relief valve.
- ☞ Deactivate the test function.
- ☞ Open the user's shut–off valve between the machine and the air main.

10.14 Changing the Oil Separator Cartridge

Material: Spare parts
Precision pressure gauge
Cleaning rags

Pre – condition: Machine switched off.
Mains isolator locked off
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.
Machine cooled down.

The life of the oil separator cartridge is influenced by:

- contamination in the air drawn into the compressor,
- adherence to the schedule of oil and air filter changes,

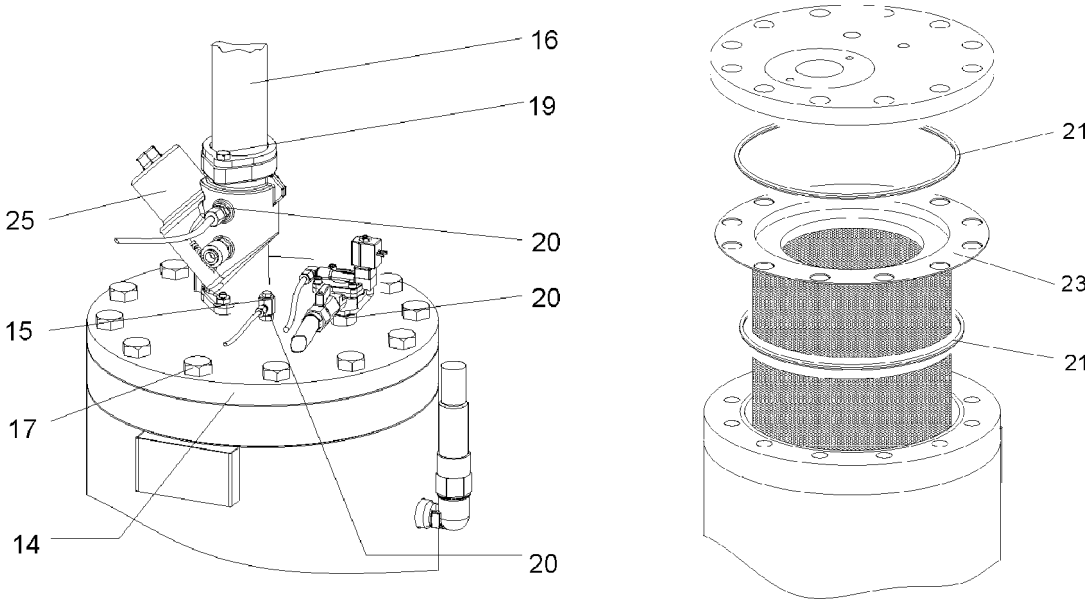


Fig. 29 Changing the Oil Separator Cartridge

14	*Cover*	*19*	*Pipe fitting*
15	*Dirt trap*	*20*	*Fitting*
16	*Air pipe*	*21*	*Gasket*
17	*Retaining screw*	*23*	*Oil separator cartridge*
		25	*Minimum pressure/check valve*

☞ Unscrew the fitting (20) and carefully put the parts to one side; pull out the copper pipe at item (15).

☞ Unscrew the fittings (19) from the ends of the air pipe (16).

☞ Withdraw the air pipe from the minimum pressure/check valve (25) and push carefully to one side.

☞ Remove the cover retaining screws (17) and carefully lift the cover (14).

The oil separator element cannot be cleaned.

Dispose of parts and materials contaminated with oil in accordance with local environment protection regulations.

- ☞ Take out the old oil separator element (23) together with the gaskets (21) and dispose of according to environmental regulations.
- ☞ Wipe all sealing faces with a cleaning rag.
- ☞ Insert the new oil separator cartridge with gaskets and re–fix the cover.
- ☞ Renew the dirt trap (15) strainer and O–ring.
- ☞ Connect the air pipe to the minimum pressure/check valve.
- ☞ Replace and tighten all fittings.

Start the machine and carry out a test run

- ☞ Close all access doors; replace and secure all removable panels.
- ☞ Open the user's shut–off valve between the machine and the air main.
- ☞ Switch on the power supply and reset the maintenance interval counter.
- ☞ Allow the machine to idle for at least one minute. Then switch to LOAD.
- ☞ Carry out a visual check for leaks.

10.15 Logging Maintenance Work

Machine number:

Date	Maintenance task carried out	Operating hours	Signature

Tab. 38 Maintenance log

11 Spares, Operating Materials, Service

11.1 Note the nameplate

Take data from the nameplate for all enquiries and spare parts orders.

11.2 Ordering Maintenance Parts and Operating Materials

CAUTION

Personal injury or machine damage may result from the use of unsuitable spare parts or operating materials.

Unsuitable or poor quality maintenance parts and operating materials may damage the machine or impair its proper function.

Damage to the machine can also result in personal injury.

☞ Use only genuine spare parts and authorised operating materials.

☞ Have an authorised KAESER service agent carry out regular maintenance.

KAESER maintenance parts and operating materials correspond to the original. These are correct for use in our machines.

Compressor

Name	Quantity	material number
Air filter cartridge	1	1250
Filter mat, control cabinet fan	2	1100
Filter mat (cooler)	1	1050
Oil filter	1	1200
Oil separator cartridge	1	1450
Cooling oil	1	1600
Bearing grease [g]	100	9.0915.0
	400	6.3234.0

Tab. 39 Machine maintenance parts

11.3 Maintenance Contract

☞ Sign a maintenance contract with an authorised KAESER service agent.

This ensures the utmost reliability and availability of your compressed air supply system.

11.4 Service Addresses

Address of KAESER agents are given at the end of this manual.

11.5 Spare Parts for Service and Repair

These spare parts lists are intended for trained personnel.

They contain important information for preventive service.

Service and repair work not described in the this manual should only be carried out by a KAESER service workshop or one authorised by KAESER.

KAESER
http://www.kaeser.com
Dok.Nr. **SEL-1059_01E**

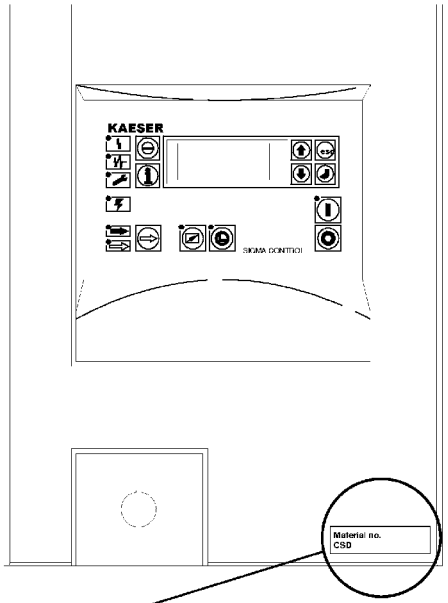
Spare Parts List

Rotary Screw Compressor

without refrigeration dryer
without frequency converter

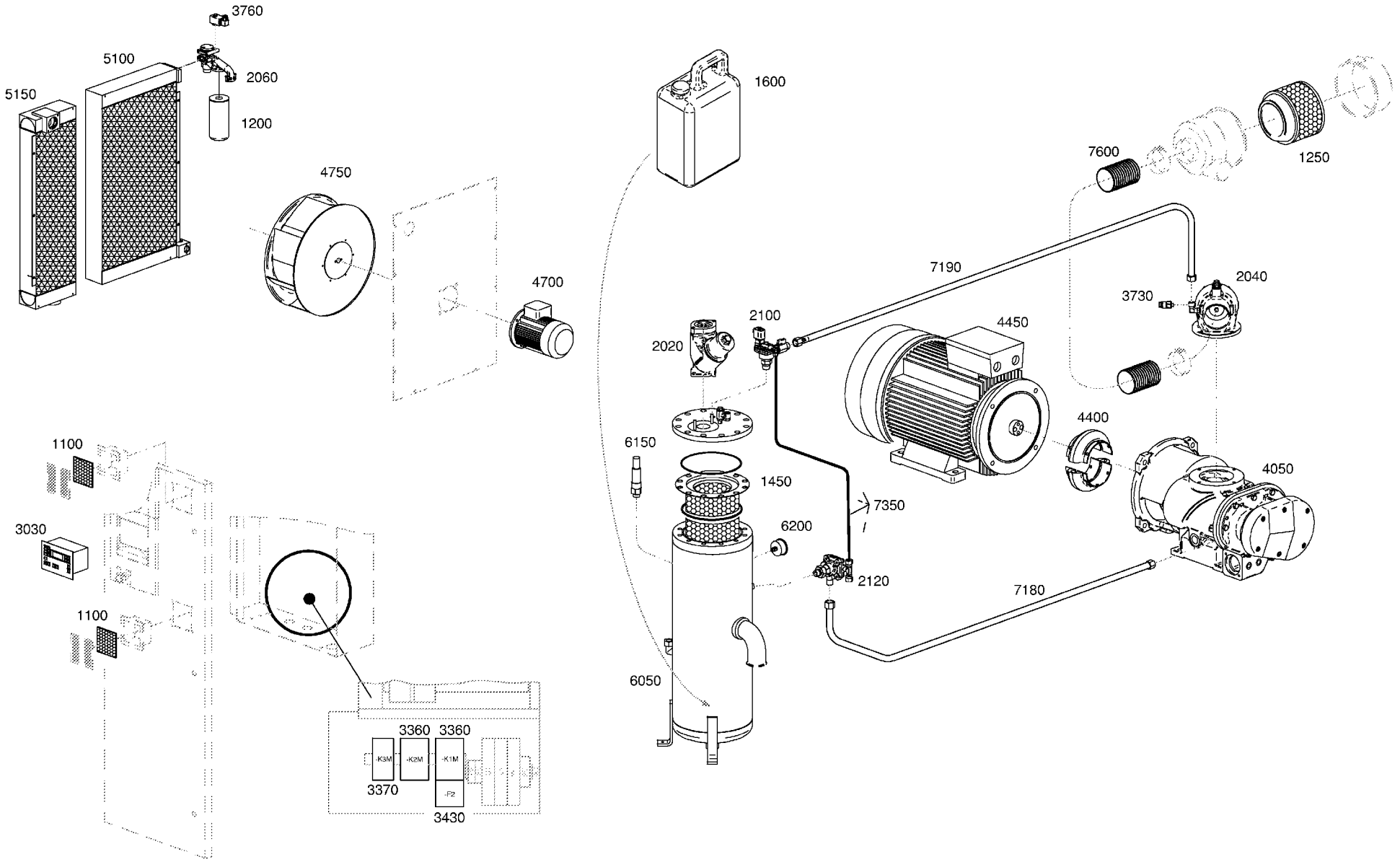
- K1 - air-cooled
- K2 - water-cooled

Model	**CSD**
Material number	
Serial Number	

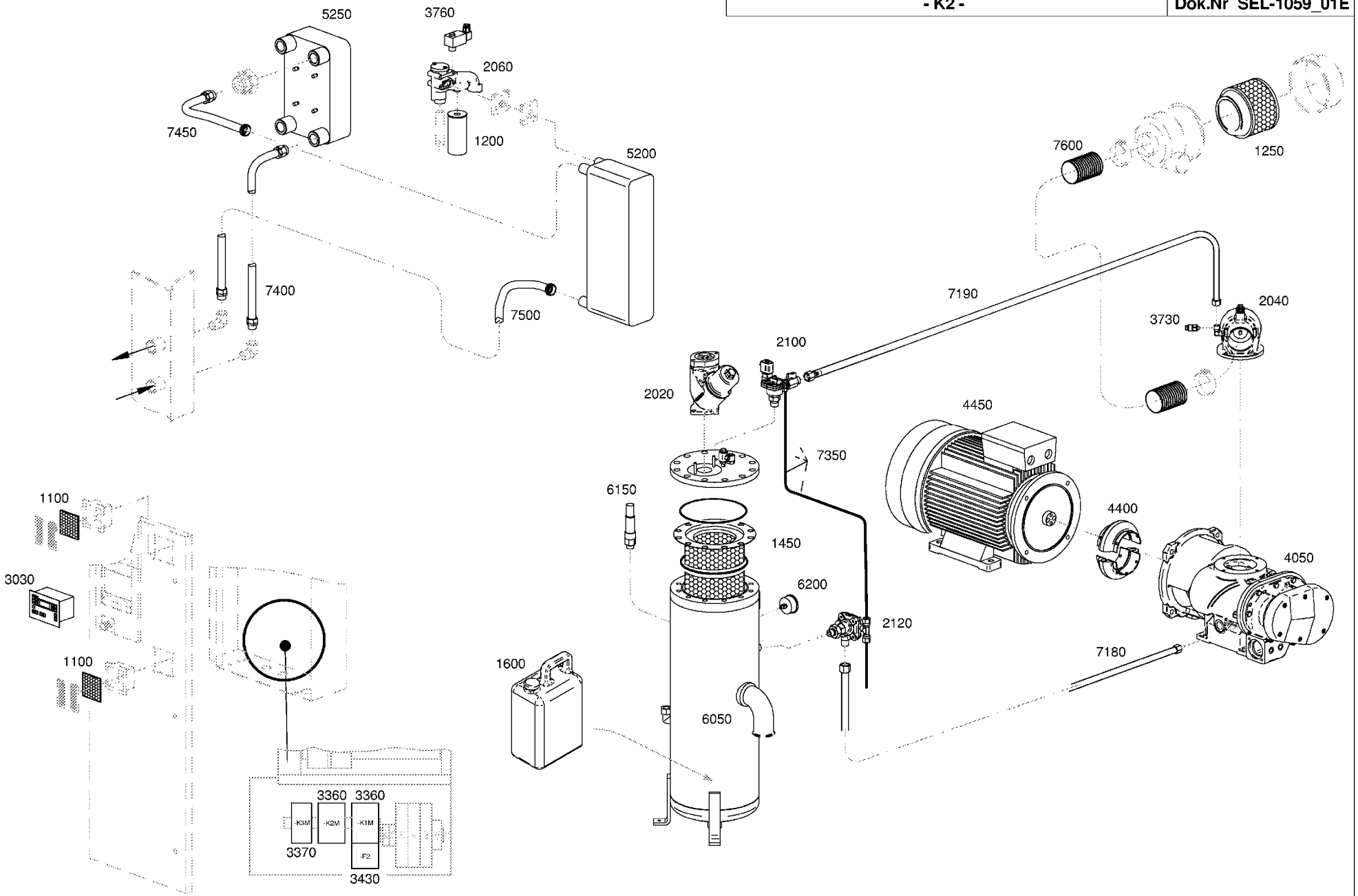


ATTENTION!
Please quote the material number and serial number of the machine (see controller below right) when ordering spare parts together with the item number and the description of the spare part.

CSD	KAESER
- K1 -	Dok.Nr SEL-1059_01E



CSD	KAESER
- K2 -	Dok.Nr SEL-1059_01E



Legend	KAESER
	Dok.Nr. SEL-1059_01E

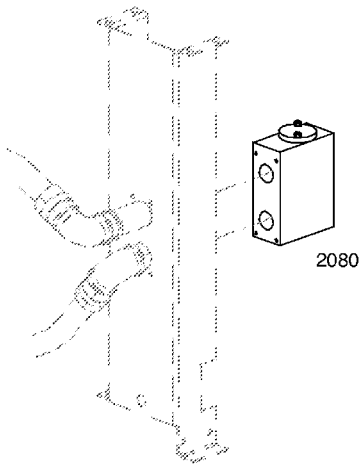
Rotary Screw Compressor CSD

Item	Quantity	Description	
1100	2	Control cabinet filter mat	
1200	1	Oil filter	
1250	1	Air filter cartridge	
1450	1	Oil separator cartridge cpl.	
1600	1	Coolant	
2020	1	Minimum pressure / check valve cpl.	
2022	1	Maintenance kit	Minimum pressure/check valve
2024	1	Repair kit	Minimum pressure/check valve
2040	1	Inlet valve cpl.	
2042	1	Maintenance kit	Inlet valve
2044	1	Repair kit	Inlet valve
2060	1	Combination valve cpl.	
2062	1	Maintenance kit	Combination valve
2064	1	Repair kit	Combination valve
2100	1	Combined venting / auxiliary valve cpl.	
2102	1	Maintenance kit	Combined venting and auxiliary valve
2104	1	Repair kit	Combined venting and auxiliary valve
2120	1	Venting valve cpl.	
2122	1	Maintenance kit	Venting valve
3030	1	Sigma Control internal compressor controller	
3360	2	Contactor (-K1M, -K2M)	
3370	1	Contactor (-K3M)	
3430	1	Drive motor overload protection cutout	
3730	1	Safety pressure switch cpl.	
3732	1	Protective cap	
3760	1	Differential pressure switch	
4050	1	Exchange airend cpl.	
4052	1	Sliding ring seal cpl.	
4100	1	Exchange airend installation kit	
4400	1	Coupling	
4450	1	Drive motor	
447	1	Motor bearings D-end	
448	1	Motor bearings N-end	
4400	1	Coupling	
4450	1	Drive motor	
447	1	Motor bearings D-end	
448	1	Motor bearings N-end	
4700	1	Fan Motor	
472	1	Motor bearings D-end	
473	1	Motor bearings N-end	
4750	1	Fan wheel	
5100	1	Oil cooler cpl.	
5150	1	Air cooler cpl.	
5200	1	Oil cooler (water-cooled)	
5250	1	Luftkühler wassergekühlt kpl.	
6050	1	Oil separator tank cpl.	

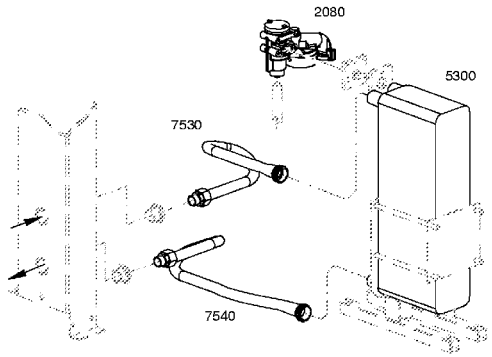
Item	Quantity	Description	
6150	1	Pressure relief valve	
6200	1	Pressure gauge	
7180	1	Hose line	Venting valve - airend
7190	1	Hose line	Combined venting and auxiliary valve – inlet valve
7350	1	Control air line kit	
7400	1	Hose line	Cooling water inlet
7450	1	Hose line	Air cooler – oil cooler
7500	1	Hose line	Cooling water outlet
7600	1	Air inlet hose	

Options	KAESER
(see nameplate)	Dok.Nr. SEL-1059_01E

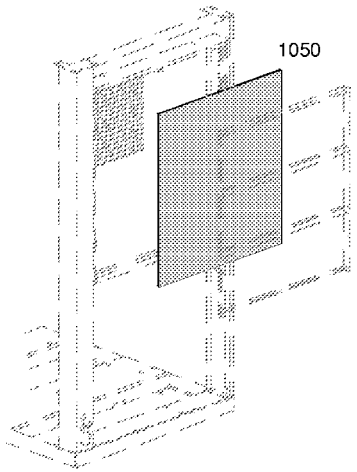
W1 - External heat recovery



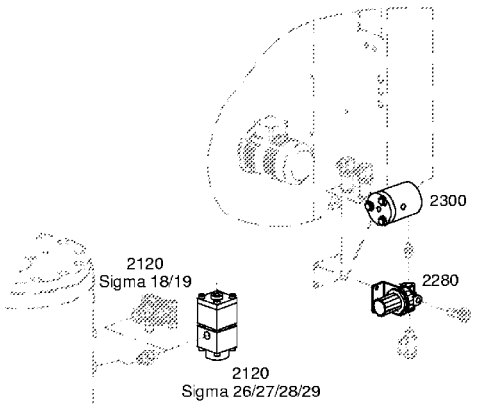
W2, W3 - integrated heat recovery



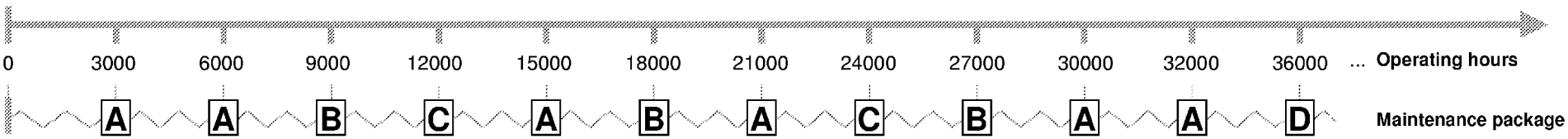
K3 - Inlet filter mat



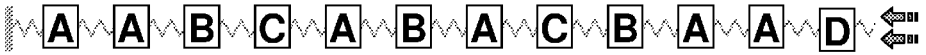
C1 - Modulating control



Item	Quantity	Description	
1050	1	Inlet filter mat	
2080	1	Thermostatic valve cpl.	
2082	1	Maintenance kit	Thermostatic valve
2084	1	Repair kit	Thermostatic valve
2280	1	Proportional controller	
2282	1	Maintenance kit	Proportional controller
2300	1	Pneumatic valve	
5300	1	Plate Heat Exchanger	
7530	1	Hose line	Heat recovery - inlet
7540	1	Hose line	Heat recovery - outlet



Maintenance intervals under good ambient and operating conditions, such as low to moderate ambient temperature and dry, clean inlet air.



Maintenance intervals may decrease due to ambient and operating conditions.

Maintenance package	**A**
Pos. Nr.	Quantity
1100	2
1250	1
1600*)	1
1050 (Option K3)	1

Maintenance package	**B**
Pos Nr.	Quantity
1100	2
1200	1
1250	1
1450	1
1600*)	1
1050 (Option K3)	1

Maintenance package	**C**
Pos Nr.	Quantity
1100	2
1250	1
1600*)	1
2022	1
2042	1
2062	1
2102	1
2122	1
472	1
473	1
1050 (Option K3)	1
2082 (Option W1, W2, W3)	1
2282 (Option C1)	1

Maintenance package	**D**
Pos Nr.	Quantity
1100	2
1200	1
1250	1
1450	1
1600*)	1
2024	1
2044	1
2064	1
2104	1
2122	1
4400	1
447	1
448	1
472	1
473	1
7180	1
7190	1
7360	1
7400	1
7450	1
7500	1
7600	1
1050 (Option K3)	1
2084 (Option W1, W2, W3)	1
2282 (Option C1)	1
7530 (Option W2, W3)	1
7540 (Option W2, W3)	1

*) see cooling fluid recommendations

Before and during all work, be sure to read and follow the safety and service instructions in the machine's service manual.

For maximum safety and availability of the machine, we recommend that an authorised technician, regardless of the machine's operating hours, carry out a safety and function inspection annually.

12 De – commissioning, Storage and Transport

12.1 De – commissioning

De – commissioning is necessary when:

- the machine will not be needed for some time,
- the machine is to be moved to another location,
- the machine is no longer needed,
- the machine is to be scrapped.

Temporarily out of service

Pre – condition: The machine can be started at regular intervals.

☞ Run the machine once a week under load for at least 30 minutes to ensure corrosion protection.

Out of service for a considerable period

Pre – condition: When running for the last time before taking out of service the machine should have run under load for at least 30 minutes.
Machine switched off and fully vented.
Main supply isolator switched off and locked.

☞ Allow the machine to cool down completely.

☞ In water – cooled machines, disconnect the water supply and drain all water from the machine.

☞ Disconnect all air and electrical connections.

12.2 Packing

Material: Desiccant
Plastic sheeting
Wooden transport crate

Pre – condition: Machine is de – commissioned.
Machine dry and cool.

☞ Place desiccant inside the machine cabinet.

☞ Wrap the machine in plastic sheeting.

Transport packing

A wooden crate is required for overland transport to protect the machine from mechanical damage.

Consult an authorised KAESER service agent for advice on packing for sea or air transport.

12.3 Storage

Pre – condition: The machine is adequately packed.

☞ Store the machine in a dry, frost – free room.

☞ Prevent entry of moisture and condensation.

12.4 Transporting

Use only a fork truck or lifting cradle.

Take weight and centre of gravity into consideration. The centre of gravity is shown in the drawing in chapter 13.2.3.

The water cooling system of water – cooled machines must be drained completely if there is danger of frost.

Fork truck

Pre – condition: The whole machine is over the forks.

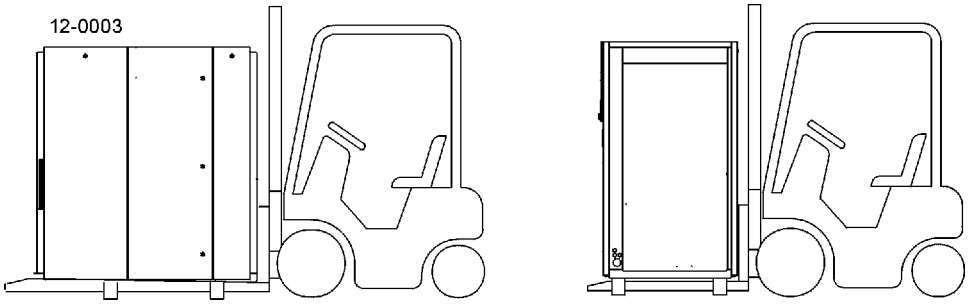


Fig. 30 Transport by fork truck

Lifting cradle

Pre – condition: No pressure on the sides of the machine cabinet.

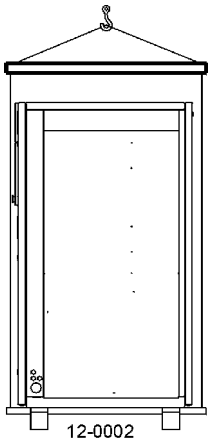


Fig. 31 Transport by lifting cradle

12.5 Disposal

Pre – condition: Machine is de – commissioned.

When disposing of a machine, drain out all liquids and remove dirty filters.

Parts contaminated with cooling oil must be disposed of in accordance with local environment protection regulations.

- ☞ Completely drain the cooling oil from the machine.
- ☞ Remove used ail filter and separator cartridge.
- ☞ Hand the machine over to an authorised disposal expert.

13 Annex

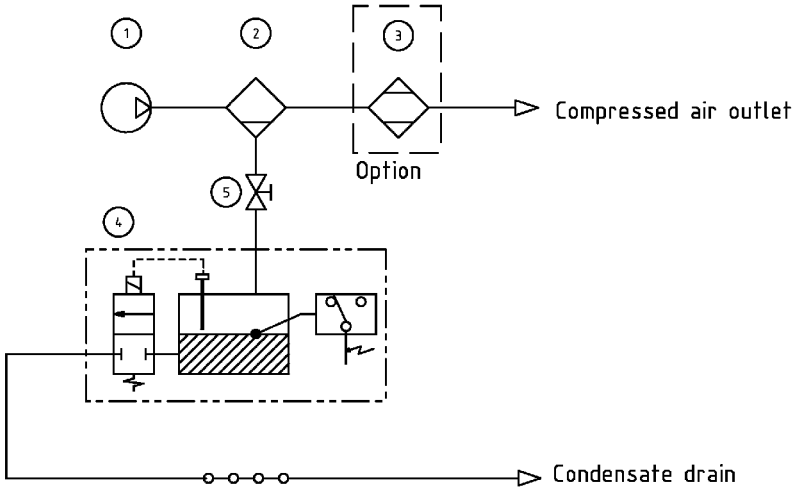
13.1 Conformity

Machines with CE mark conform to European directives and may be operated in the EU.

A Declaration of Conformity is provided with the machine.

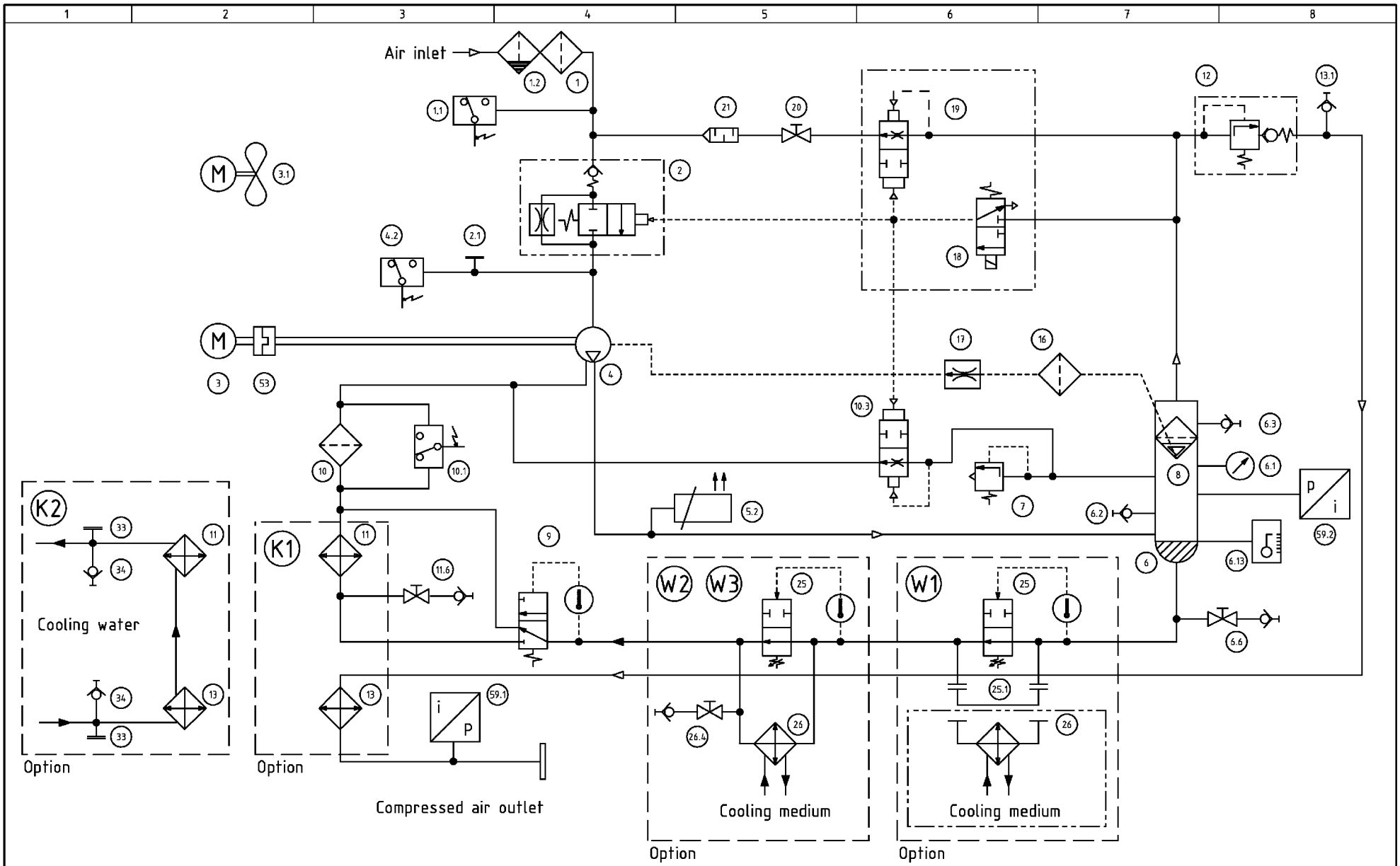
13.2 Diagrams and Drawings

13.2.1 Pipeline and instrument flow diagram (P&I diagrams)



1	Compressor
2	Centrifugal separator
4	Electronically controlled condensate drain ECO-DRAIN
5	Shut-off valve
Option	
3	Refrigeration dryer

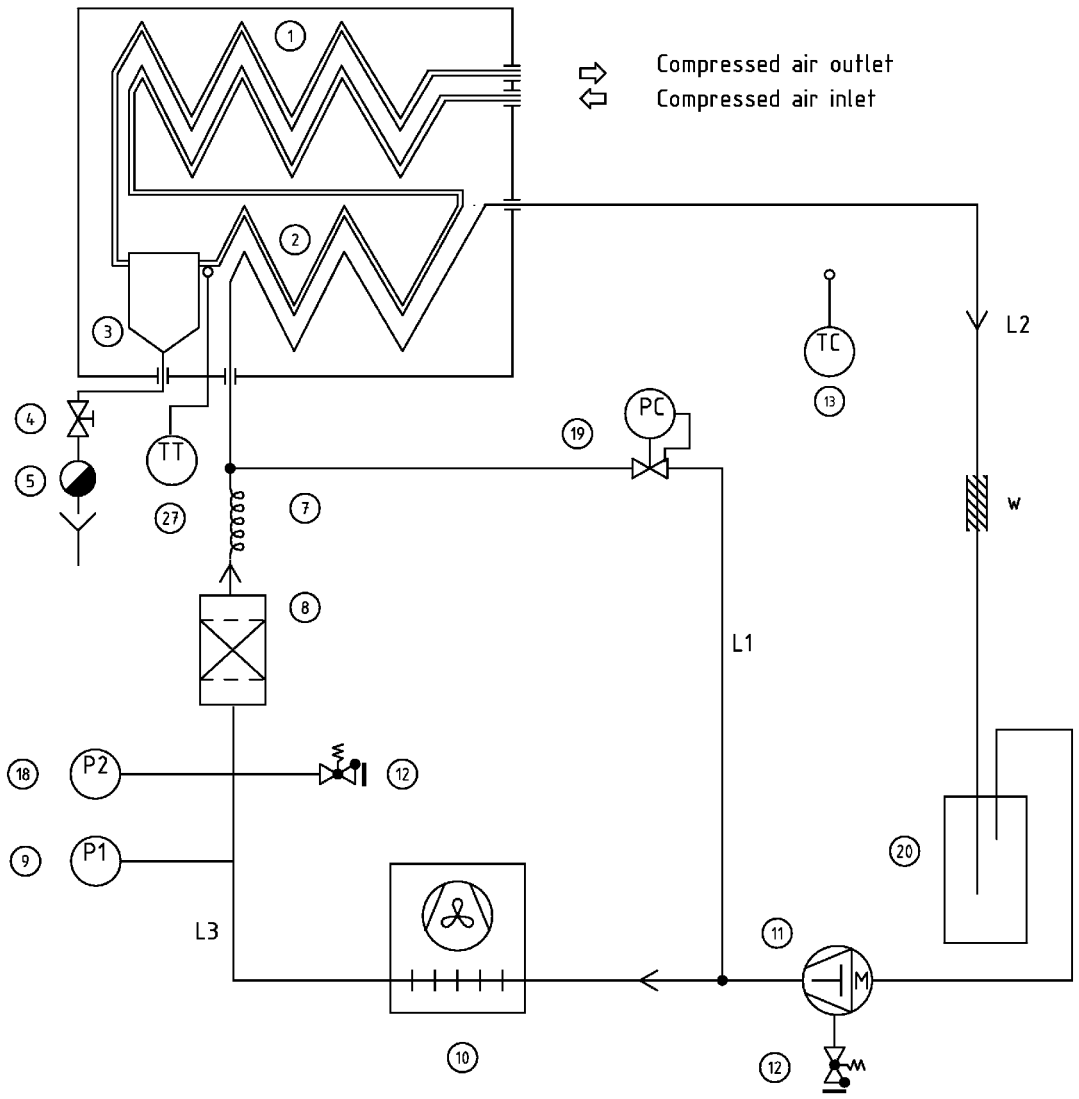
c				Datum	02.06.2003		KAESER KOMPRESSOREN	P&I Diagram / P&I Diagram legend Compressor Package	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	FCSDST-0020.01	Blatt 1 E



c				Datum	02.06.2003		KAESER KOMPRESSOREN	P&I Diagram CSD	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	FCSDST-0020.01	Blatt 2 E

1	Air filter
1.1	Vacuum switch - Air filter
1.2	Dust collector
2	Inlet valve
2.1	Oil filler with screw plug
3	Drive motor
3.1	Fan motor
4	Airend
4.2	Pressure switch - Wrong direction of rotation
5.2	PT100-sensor
6	Oil separator tank
6.1	Pressure gauge
6.2	Hose coupling (oil end)
6.3	Hose coupling (air end)
6.6	Shut-off valve with hose coupling - Oil drain
6.13	Oil level indicator
7	Pressure relief valve
8	Oil separator cartridge
9	Oil temperature controller
10	Oil filter
10.1	Differential pressure switch - Oil filter
10.3	Oil flow reduction valve
11	Oil cooler
11.6	Shut-off valve with hose coupling - Oil drain
12	Minimum pressure check valve
13	Air cooler
13.1	Hose coupling
16	Dirt trap
17	Nozzle
18/19	Combined control/venting valve
18	Control valve
19	Venting valve
20	Shut-off valve - Venting line
21	Silencer
25	Oil temperature thermostat for heat recovery system
25.1	Hose line
26	Heat recovery system
26.4	Shut-off valve with hose coupling - Oil drain
33	Measuring point connection
34	Hose coupling
53	Coupling
59.1	Pressure transducer - System pressure
59.2	Pressure transducer - Internal pressure
Option	
K1	air-cooled
K2	water-cooled
W1	Heat recovery system, external
W2/W3	Heat recovery system, internal

c				Datum	02.06.2003		KAESER KOMPRESSOREN	P&I Diagram legend CSD	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	FCSDST-0020.01	Blatt 3 / E



c				Datum	02.06.2003		KAESER KOMPRESSOREN	P&I Diagram	
b				Bearb.	Plau			Option	
a				Gepr.	Hildenstein			Refrigeration dryer	
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	FCSDST-0020.01	Blatt 4 / E

1	2	3	4	5	6	7	8

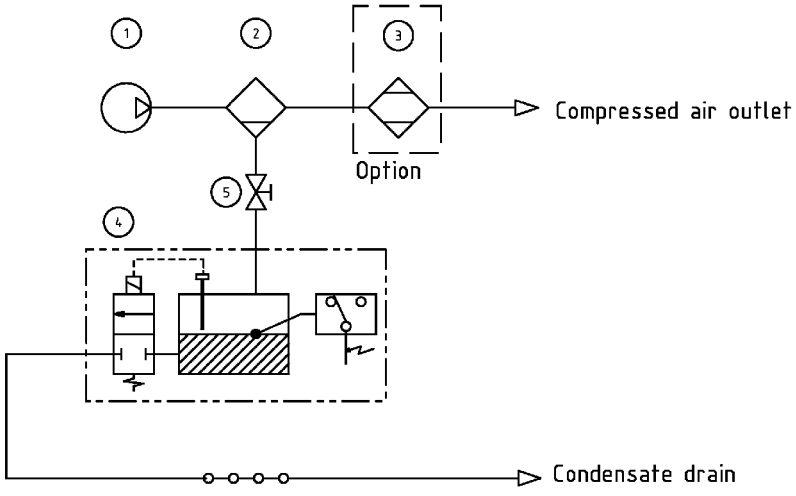
1	Air to air heat exchanger	heat insulated
2	Air to refrigerant heat exchanger (Vapouriser)	
3	Condensate separator	
4	Shut-off valve	
5	Condensate drain	
7	Capillary tube (Refrigerant injection)	
8	Filter dryer	
9	Safety pressure switch	
10	Refrigerant condenser (air cooled condenser)	
11	Refrigerant compressor (hermetic)	
12	Service connection (Schrader valve)	
13	Thermostat	
18	Pressure switch - Refrigerant condenser	
19	Hot gas bypass valve	
20	Refrigerant separator	
27	PT100-sensor	

Piping:

L1	Bypass line 10 x 1,0 DIN 1708
L2	CU-Pipe 10 x 1,0 DIN 1708
L3	CU-Pipe 6 x 1,0 DIN 1708
w	heat insulated

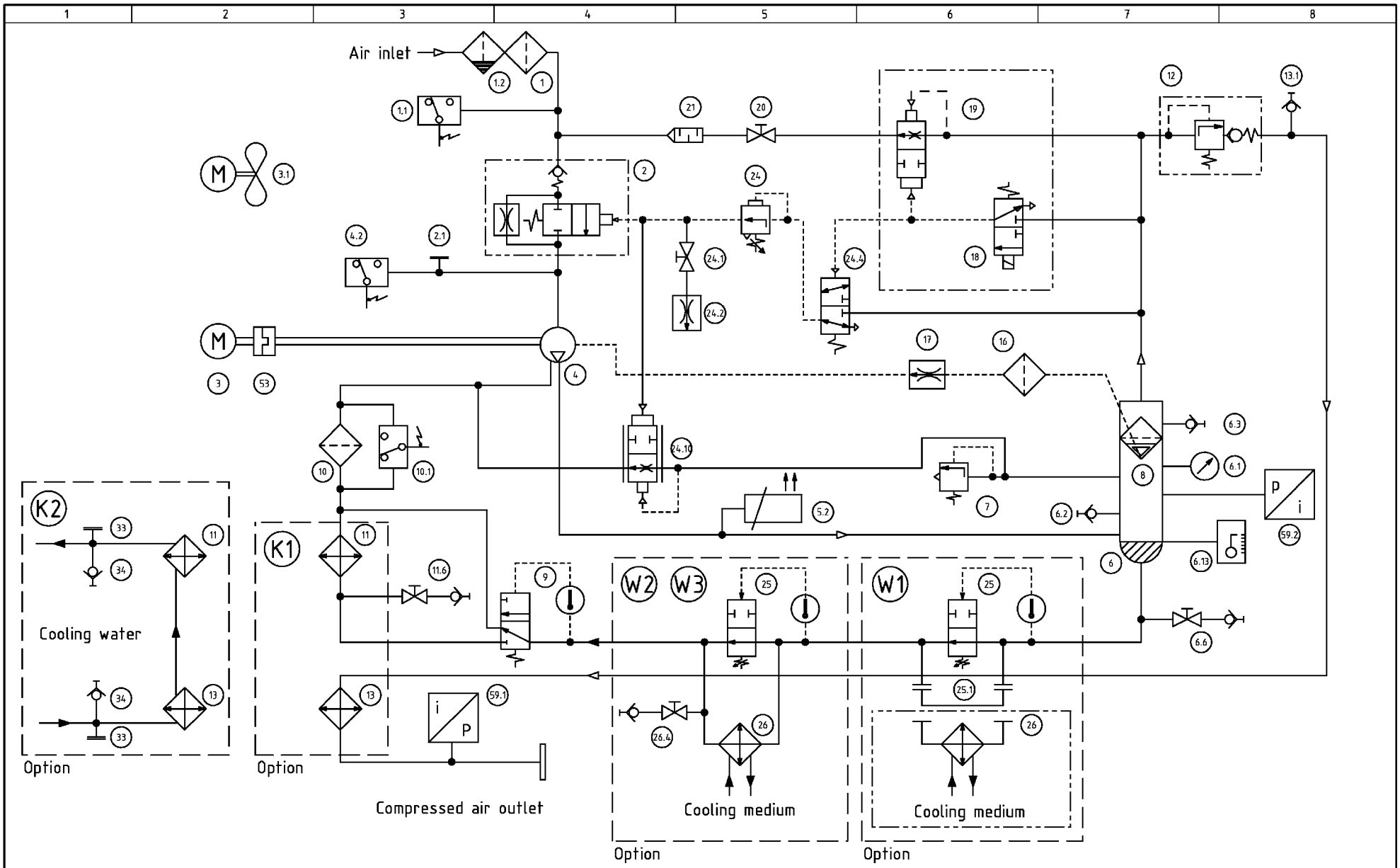
c				Datum	02.06.2003		KAESER KOMPRESSOREN	P&I Diagram legend Option Refrigeration dryer	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	FCSDST-0020.01	Blatt 5 E

13.2.2 Pipeline and instrument flow diagram (option C1)



1	Compressor
2	Centrifugal separator
4	Electronically controlled condensate drain ECO-DRAIN
5	Shut-off valve
Option	
3	Refrigeration dryer

c				Datum	06.05.2003		KAESER KOMPRESSOREN	P&I Diagram / P&I Diagram legend Compressor Package	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FCSDST-0020.00	FCSDTL-0022.01	Blatt 1 E

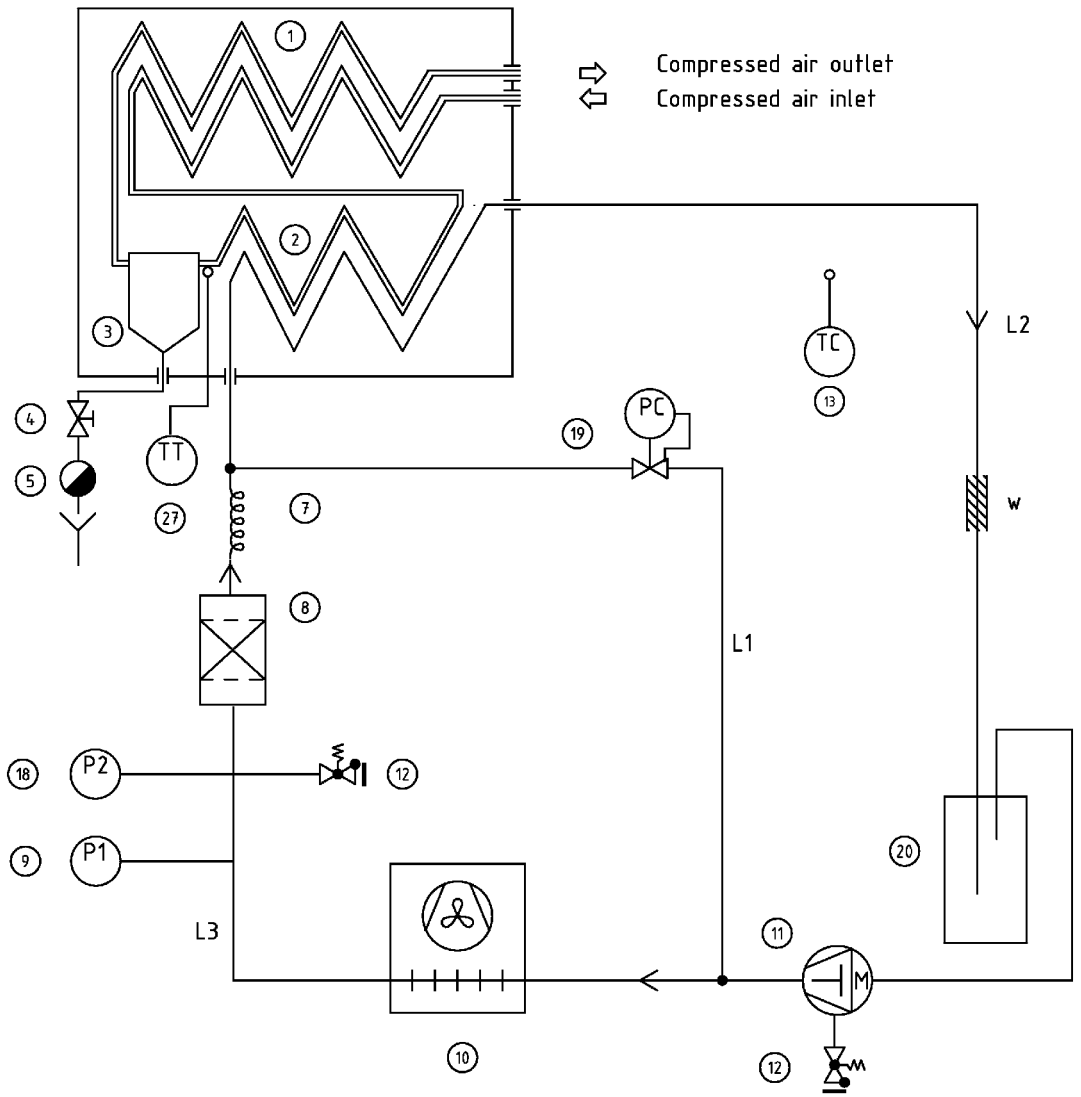


c				Datum	06.05.2003		KAESER KOMPRESSOREN	P&I Diagram CSD		
b				Bearb.	Plau					
a				Gepr.	Hildenstein					
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FCSDST-0020.00	FCSDTL-0022.01	Blatt 2 E

1	Air filter
1.1	Vacuum switch - Air filter
1.2	Dust collector
2	Inlet valve
2.1	Oil filler with screw plug
3	Drive motor
3.1	Fan motor
4	Airend
4.2	Pressure switch - Wrong direction of rotation
5.2	PT100-sensor
6	Oil separator tank
6.1	Pressure gauge
6.2	Hose coupling (oil end)
6.3	Hose coupling (air end)
6.6	Shut-off valve with hose coupling - Oil drain
6.13	Oil level indicator
7	Pressure relief valve
8	Oil separator cartridge
9	Oil temperature controller
10	Oil filter
10.1	Differential pressure switch - Oil filter
11	Oil cooler
11.6	Shut-off valve with hose coupling - Oil drain
12	Minimum pressure check valve
13	Air cooler
13.1	Hose coupling
16	Dirt trap
17	Nozzle
18/19	Combined control/venting valve
	18 Control valve
	19 Venting valve
20	Shut-off valve - Venting line
21	Silencer
24	Proportional controller
24.1	Shut-off valve open: machine in modulating control
	Shut-off valve closed: package running in DUAL-/QUADRO or VARIO mode
24.2	Nozzle
24.4	3/2-Directional control valve
	(amplifies volume of control air for the inlet valve)
24.10	Oil flow regulating valve (proportionally controlled)
25	Oil temperature thermostat for heat recovery system
25.1	Hose line
26	Heat recovery system
26.4	Shut-off valve with hose coupling - Oil drain
33	Measuring point connection
34	Hose coupling
53	Coupling
59.1	Pressure transducer - System pressure

Option	
K1	air-cooled
K2	water-cooled
W1	Heat recovery system, external
W2/W3	Heat recovery system, internal

c				Datum	06.05.2003		KAESER KOMPRESSOREN	P&I Diagram legend CSD	
b				Bearb.	Plau				
a				Gepr.	Hildenstein				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FCSDST-0020.00	FCSDTL-0022.01	Blatt 3 E



c				Datum	06.05.2003		KAESER KOMPRESSOREN	P&I Diagram		
b				Bearb.	Plau			Option		
a				Gepr.	Hildenstein			Refrigeration dryer		
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FCSDST-0020.00	FCSDTL-0022.01	Blatt 4 E

1	2	3	4	5	6	7	8

1	Air to air heat exchanger	heat insulated	13 Thermostat
2	Air to refrigerant heat exchanger (Vapouriser)		18 Pressure switch - Refrigerant condenser
3	Condensate separator		19 Hot gas bypass valve
4	Shut-off valve		20 Refrigerant separator
5	Condensate drain		27 PT100-sensor
7	Capillary tube (Refrigerant injection)		
8	Filter dryer		
9	Safety pressure switch		
10	Refrigerant condenser (air cooled condenser)		
11	Refrigerant compressor (hermetic)		
12	Service connection (Schrader valve)		

Piping:

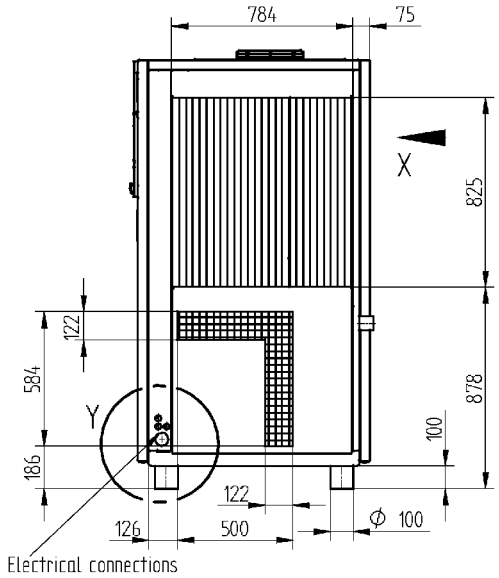
L1	Bypass line 10 x 1,0 DIN 1708
L2	CU-Pipe 10 x 1,0 DIN 1708
L3	CU-Pipe 6 x 1,0 DIN 1708
w	heat insulated

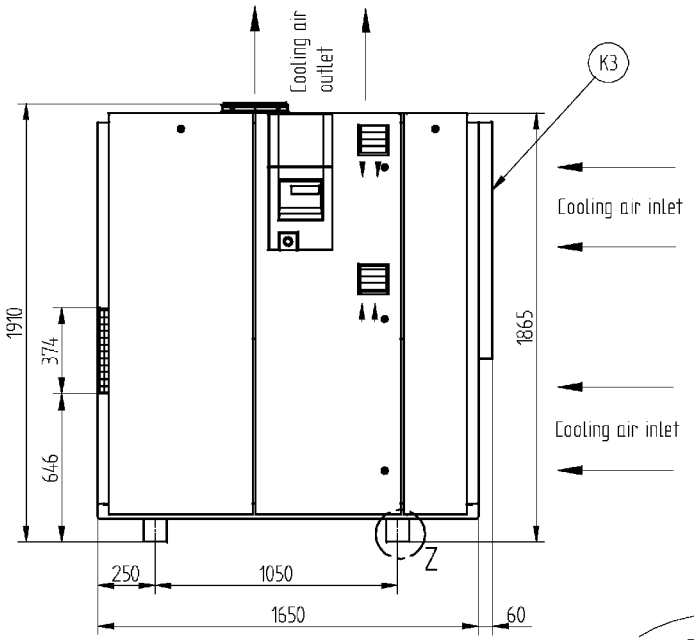
c				Datum	06.05.2003		KAESER KOMPRESSOREN	P&I Diagram legend			
b				Bearb.	Plau			Option			
a				Gepr.	Hildenstein			Refrigeration dryer			
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FCSDST-0020.00		FCSDTL-0022.01	Blatt 5 / E

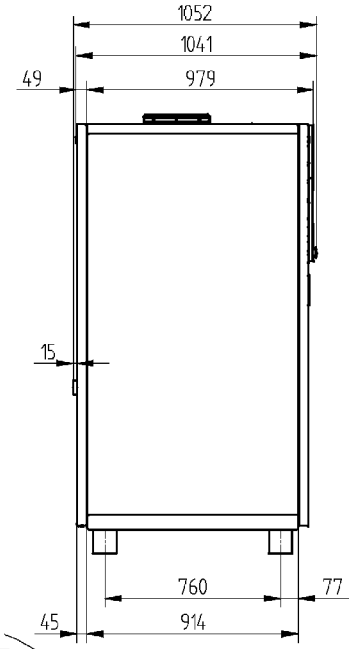
13.2.3 Dimensional drawing

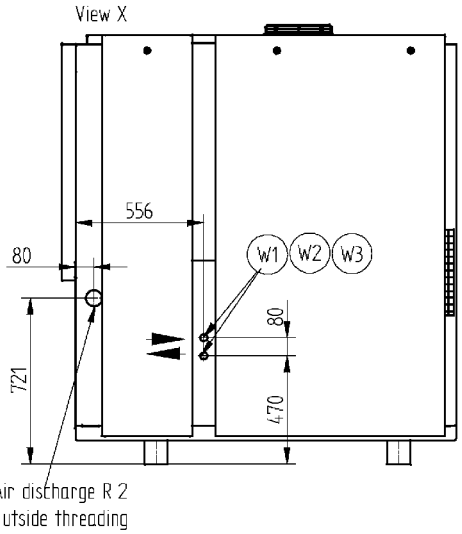
13.2.3.1 Air cooling (option K1)

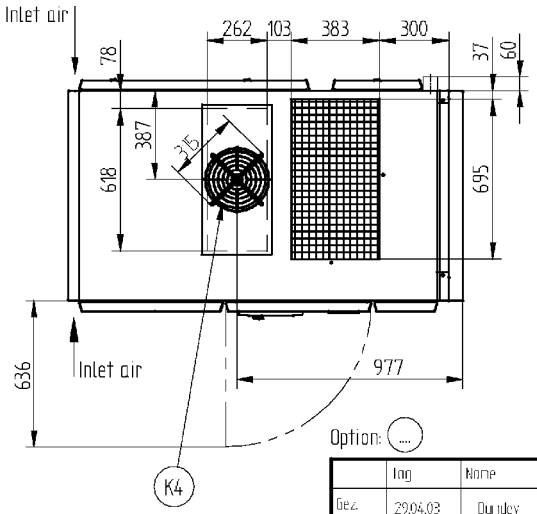
Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über CAD geändert werden.

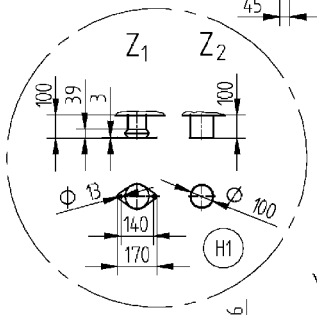


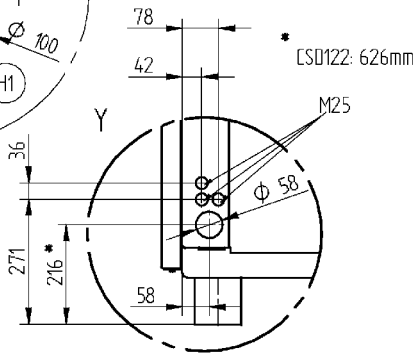












Option: (...)

ATTENTION!
Minimum width of door is total width of unit + 100 mm

	Tag	Name
Gez.	29.04.03	Dunkley
Gepr.		
Freigeg.		
Maßstab		Ersatz für

CSD (K1)

KAESER KOMPRESSOREN

T10276.00 e

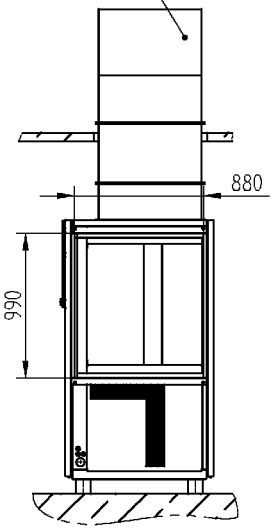
A-Index 00

Diese Zeichnung ist unser Eigentum und darf gemäss Urheberrecht ohne unsere vorherige schriftliche Genehmigung nicht vervielfältigt oder Dritten zugänglich gemacht werden.

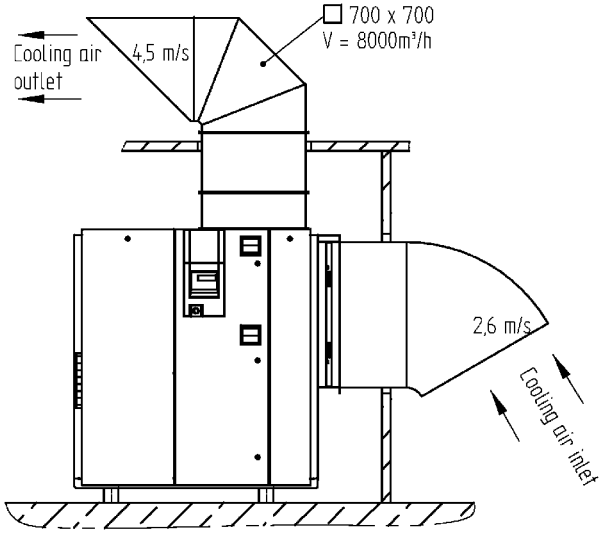
Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über EAD geändert werden.

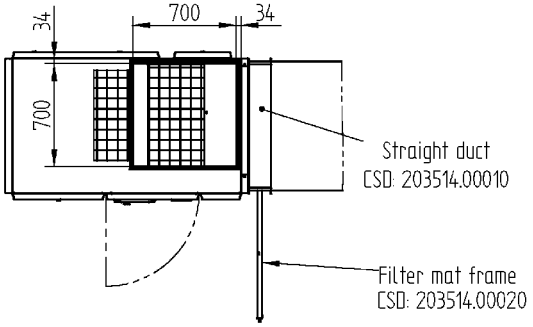
Die Zeichnung bleibt unser ausschließliches Eigentum. Sie wird nur zu dem vereinbarten Zweck anvertraut und darf zu keinem anderen Zweck verwendet werden. Kopien oder sonstige Vervielfältigungen einschließlich Speicherung, Verarbeitung oder Verbreitung unter Verwendung elektronischer Systeme dürfen nur zu dem vereinbarten Zweck angefertigt werden. Weder Original noch Vervielfältigungen dürfen Dritten ausgehändigt oder in sonstiger Weise zugänglich gemacht werden.

Discharge cooling
air duct 700 x 700

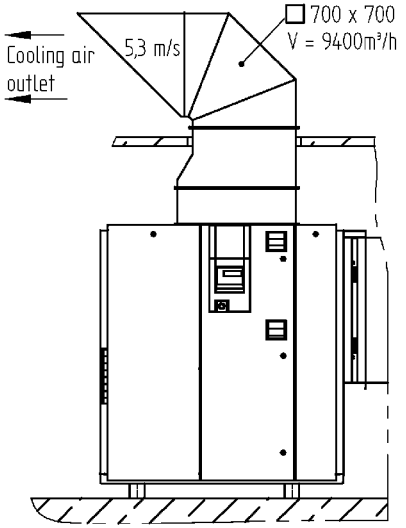


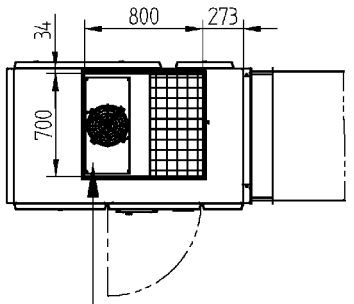
Air ducting over
cooling air outlet cooler only





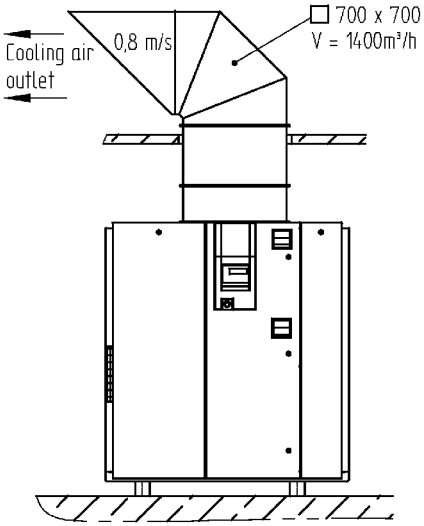
Air ducting over
cooling air outlet unit / cooler
(only with auxiliary fan No. 207749.0)

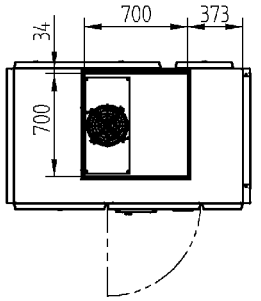




Fit the auxiliary fan 207749.0
below the left-hand grid in the package

water-cooled





Total permissible pressure loss for installed ducting

		without filter	with filtermats
CSD 82/102 aircooled	$\Delta p_{tot.=}$	80 Pa (8 mmWS)	40 Pa (4 mm/wc)
CSD 82/102 watercooled	$\Delta p_{tot.=}$	80 Pa (8 mmWS)	——
CSD 122 aircooled	$\Delta p_{tot.=}$	60 Pa (6 mmWS)	30 Pa (3 mm/wc)
CSD 122 watercooled	$\Delta p_{tot.=}$	60 Pa (6 mmWS)	——

	Tag	Name	
Gez.	20.06.02	Dumdey	CSD Total permissible pressure loss for installed ducting
Gepr.			
Freigeg.	25.06.2002	Hackler	
Maßstab			Ersatz für

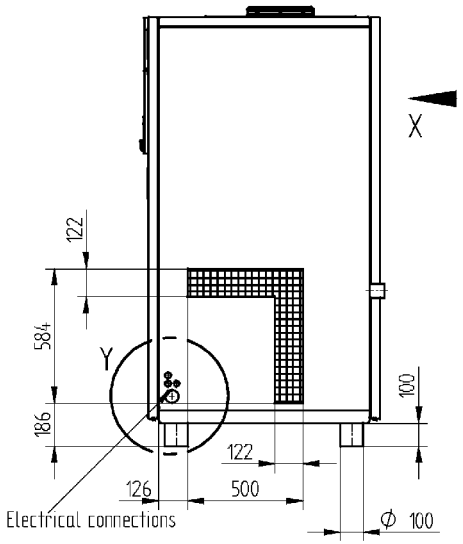
KAESER KOMPRESSOREN

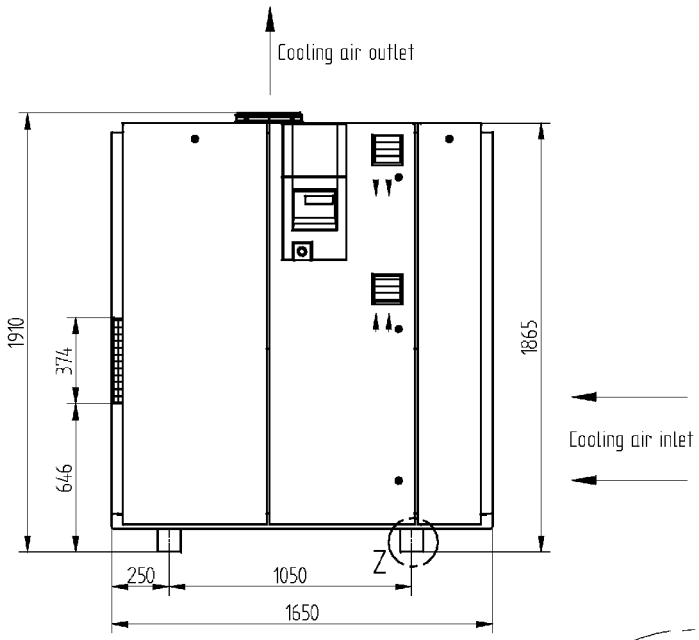
T9997.1 e

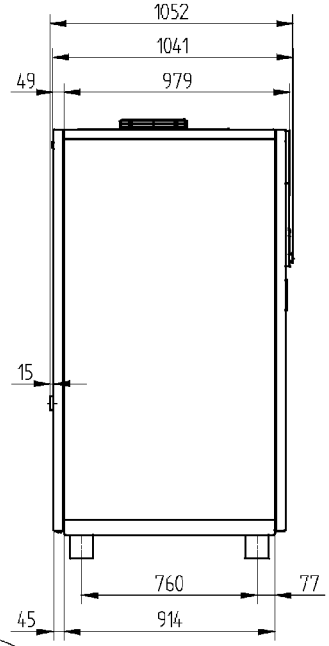
A- Index 01

13.2.3.2 Water cooling (option K2)

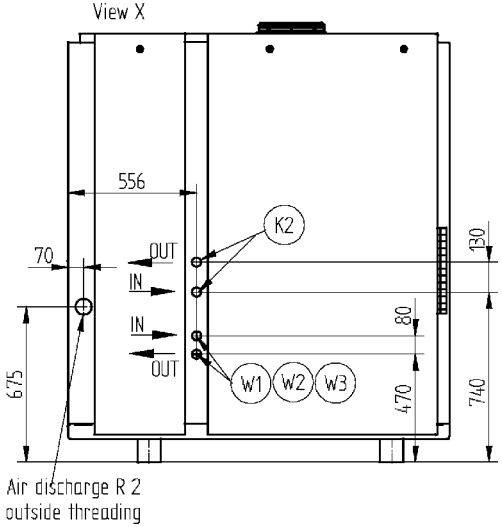
Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über CAD geändert werden.

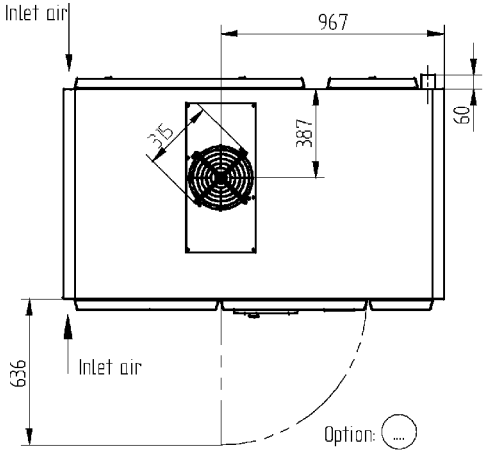


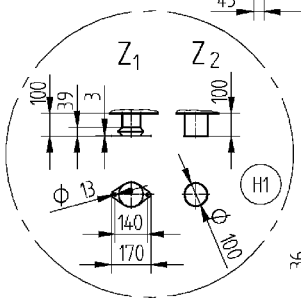


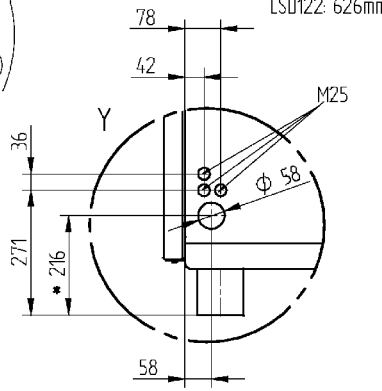


View X









* CSD122: 626mm

Option: (....)

ATTENTION!
Minimum width of door is total width of unit + 100 mm

	Tag	Name
Gez.	2504.03	Hundley
Gepr.		
Freigeg.		
Maßstab		Ersatz für

CSD (K2)

KAESER KOMPRESSOREN

T10277.00 e

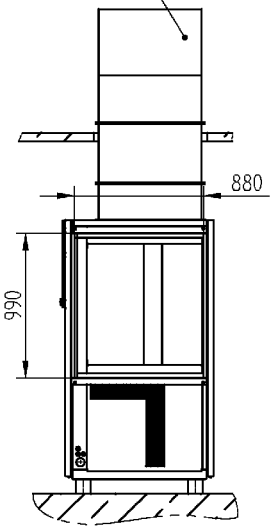
A-Index 00

Diese Zeichnung ist unser Eigentum und darf gemäss Urheberrecht ohne unsere vorherige schriftliche Genehmigung nicht vervielfältigt oder Dritten zugänglich gemacht werden.

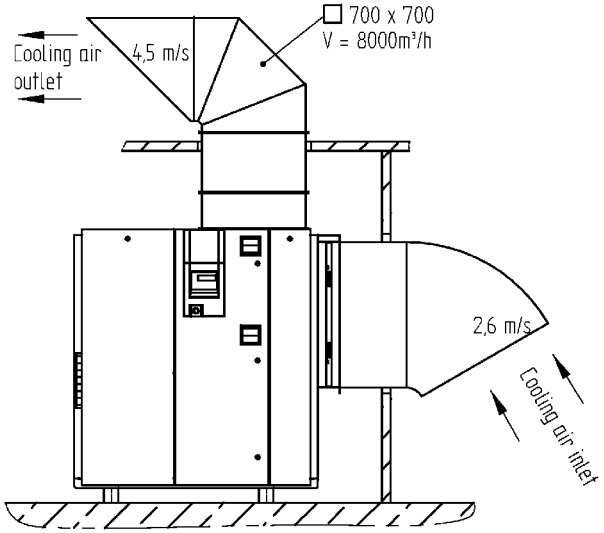
Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über EAD geändert werden.

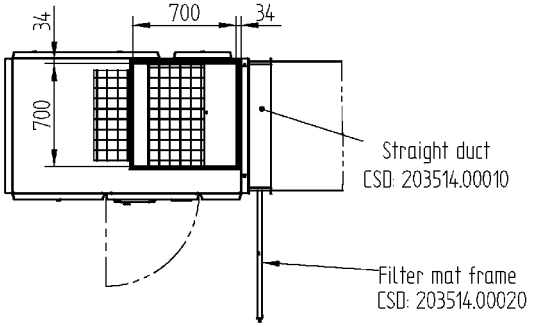
Die Zeichnung bleibt unser ausschließliches Eigentum. Sie wird nur zu dem vereinbarten Zweck anvertraut und darf zu keinem anderen Zweck verwendet werden. Kopien oder sonstige Vervielfältigungen einschließlich Speicherung, Verarbeitung oder Verbreitung unter Verwendung elektronischer Systeme dürfen nur zu dem vereinbarten Zweck angefertigt werden. Weder Original noch Vervielfältigungen dürfen Dritten ausgehändigt oder in sonstiger Weise zugänglich gemacht werden.

Discharge cooling
air duct 700 x 700

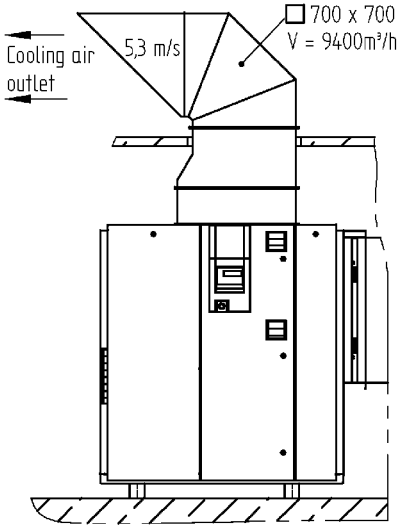


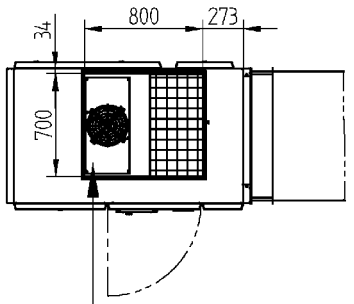
Air ducting over
cooling air outlet cooler only





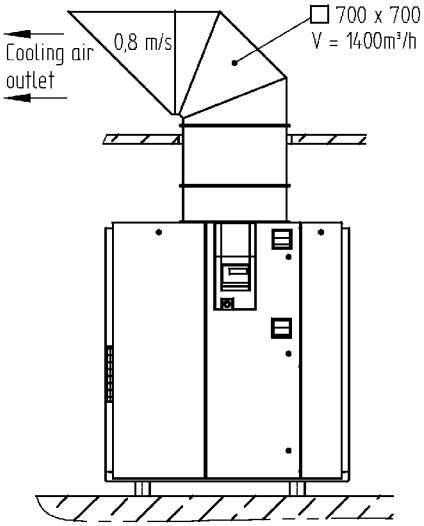
Air ducting over
cooling air outlet unit / cooler
(only with auxiliary fan No. 207749.0)

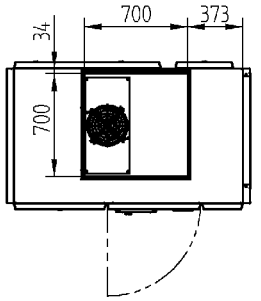




Fit the auxiliary fan 207749.0
below the left-hand grid in the package

water-cooled





Total permissible pressure loss for installed ducting

		without filter	with filtermats
CSD 82/102 aircooled	$\Delta p_{tot.=}$	80 Pa (8 mmWS)	40 Pa (4 mm/wc)
CSD 82/102 watercooled	$\Delta p_{tot.=}$	80 Pa (8 mmWS)	——
CSD 122 aircooled	$\Delta p_{tot.=}$	60 Pa (6 mmWS)	30 Pa (3 mm/wc)
CSD 122 watercooled	$\Delta p_{tot.=}$	60 Pa (6 mmWS)	——

	Tag	Name	
Gez.	20.06.02	Dumdey	CSD Total permissible pressure loss for installed ducting
Gepr.			
Freigeg.	25.06.2002	Hackler	
Maßstab			Ersatz für

KAESER KOMPRESSOREN

T9997.1 e

A- Index 01

13.2.4 Electrical diagram

Electrical diagrams

Compressor series CSD

Air cooled or Water cooled

230V±10% 50/60Hz
400V±10% 50Hz
380V±10% 60Hz
440V±10% 60Hz
460V±10% 60Hz

TT/TN power supply with common point grounding

Manufacturer: KAESER KOMPRESSOREN GmbH
96450 Coburg
GERMANY

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.

The drawings remain our exclusive property. The 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.

c				Datum	23.04.2003 E		KAESER KOMPRESSOREN	Cover page Compressor series CSD		=
b				Bearb.	Sitter					+
a				Gepr.	Büchner				SIGMA CONTROL	DCSD-02000.00 Blatt 1
A	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00			Bl.

Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	Cover page			DCSD-02000.00	1	
2	List of contents			ZCSD-02000.00	1	
3	Block diagram			UCSD-02000.00	1	
4	Block diagram			UCSD-02000.00	2	
5	Block diagram	performance-related components		UCSD-02000.00	3	
6	Block diagram	performance-related components		UCSD-02000.00	4	
7	Block diagram	performance-related components		UCSD-02000.00	5	
8	Block diagram			UCSD-02000.00	6	
9	Circuit diagram	Power switching		SCSD-02000.00	1	
10	Circuit diagram	Condensate drain/Fan		SCSD-02000.00	2	
11	Circuit diagram	Power supply unit		SCSD-02000.00	3	
12	Circuit diagram	mother board/inputs		SCSD-02000.00	4	
13	Circuit diagram	mother board/inputs		SCSD-02000.00	5	
14	Circuit diagram	mother board/inputs		SCSD-02000.00	6	
15	Circuit diagram	mother board/outputs		SCSD-02000.00	7	
16	Circuit diagram	mother board/outputs		SCSD-02000.00	8	
17	Circuit diagram	Volt-free contacts		SCSD-02000.00	9	
18	Circuit diagram	transformer diagrams		SCSD-02000.00	10	
19	Equipment parts list	Control cabinet		GCSD-02000.00	1	
20	Terminal schedule	Terminal strip -X0		KCSD-02000.00	1	
21	Terminal schedule	Terminal strip -X2,-X11		KCSD-02000.00	2	
22	Terminal schedule	Terminal strip -X14,-X15		KCSD-02000.00	3	
23	Component layout	Mounting plate		ACSD-02000.00	1	

c				Datum	23.04.2003		KAESER KOMPRESSOREN	List of contents Compressor series CSD	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
B	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:	ZCSD-02000.00	Blatt 1 Bl.

general instructions

ATTENTION !!!
Install supplies, grounding and shock protection
to local safety regulations.
Control circuits are single-end-earthed;
operate with insulation monitoring only.
Do not make or break
live plug-in connectors.

control cabinet wiring for non-designated conductors

primary circuits:	black
Control voltage AC:	red 1mm^2 H05V-K
Control voltage DC:	blue 1mm^2 H05V-K
external voltage:	orange 1,5mm^2 H07V-K
measuring circuits:	violet 1mm^2 H05V-K
earth conductor:	green/yellow

option K1 = air cooling

option K2 = water cooling

option K4 = additional fan for fitted ducting

c				Datum	23.04.2003		KAESER KOMPRESSOREN	Block diagram Compressor series CSD	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
C	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:	UCSD-02000.00	Blatt 1 Bl.

electrical equipment identification

general components

-A10	SIGMA CONTROL
-A10.1...-A10.5	mother board, inputs/outputs
-G1	Power unit
-K1M	Mains contactor
-K2M	Delta contactor
-K3M	Star contactor
-M1	Compressor motor
-M2	Fan motor
-M5	Control cabinet ventilator
-Q0	Overload protection switch, Control transformer
-T1	Control transformer
-Y1	Control valve

terminal strips/plug-in connections

	SIGMA CONTROL
-1X1...-1X3	connector strip, mother board
-1X7...-1X9	connector strip interface
-1X01...-1X03	Connector plug
	Adapter
-2X1,-2X3	connector strip, internal
-2X16	connector strip, internal
-2X01,-2X03	Connector plug, internal
-2X016	Connector plug, internal
-2X31...-2X44	connector strip, external
-2X031...-2X044	Connector plug, external
	Transfer module
-X14,-X15	Terminal strip, digital inputs
-X16	connector strip digital inputs
-X016	Connector plug
-X0	Terminal strip, Power supply
-X11	Terminal strip, Control
-X2	Terminal strip, outputs, Volt-free contacts
-X02	Connector plug, outputs/Volt-free contacts

Fault indicator

Shutdown function and Indicating function:

-B2	Direction of rotation pressure switch
-B11	Temperature probe Airend discharge temperature
-F2	Overload protection Compressor motor
-M6	Compressor unit fan- Overload protection
-Q4	Overload protection switch Fan motor
-S3	EMERGENCY STOP pushbutton

Indicating function:

-B1	Pressure transducer, Air main pressure
-B3	Oil filter differential pressure switch
-B4	Pressure transducer, package internal pressure
-B5	Air filter vacuum switch

c				Datum	23.04.2003		KAESER KOMPRESSOREN	Block diagram Compressor series CSD	=	
b				Bearb.	Sitter				+	
a				Gepr.	Büchner					Blatt 2
C	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	UCSD-02000.00	Bl.

performance-related components
CSD 82

model

machine power supply		230V±10% 50Hz 230V±10% 60Hz	380V±10% 60Hz	400V±10% 50Hz	440V±10% 60Hz 460V±10% 60Hz	
motors	-M1	45kW	45kW	45kW	45kW	
	-M2	1,1kW	1,1kW	1,1kW	1,1kW	
Component layout Mounting plate		ACSD-02000... page 1, fig. 2	ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1	
Terminal strip	-X0	1x 7.3227.00010 L27/2 Wieland	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland	
contactors	-K1M/-K2M	2x 7.4831.0 A110-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.5757.0 A63-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.5757.0 A63-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.5757.0 A63-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	
	-K3M	1x 7.5284.0 A75-30-22-80 ABB + 1x 7.3946.00050	1x 7.5755.0 A40-30-10-80 ABB + 1x 7.3946.00060 + 1x 7.4835.0	1x 7.5755.0 A40-30-10-80 ABB + 1x 7.3946.00060 + 1x 7.4835.0	1x 7.5755.0 A40-30-10-80 ABB + 1x 7.3946.00060 + 1x 7.4835.0	
Overload protection	-F2	1x 7.4833.0 TA110-DU110 ABB 80-110A	1x 7.5760.0 TA75-DU63 ABB 45-63A	1x 7.5760.0 TA75-DU63 ABB 45-63A	1x 7.5760.0 TA75-DU63 ABB 45-63A	
Overload protection switch	-Q0	1x 7.4528.00010 MS225-2,5 ABB 1,6-2,5A setting 1,7A	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4528.00010 MS225-2,5 ABB 1,6-2,5A setting 1,7A	
	-Q4	1x 7.4530.00010 MS225-6,3 ABB 4-6,3A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	
Transformer	-T1	1x 7.2239.20070 USTE400 Block 400VA 230V/230V diagram 2 Bl. 10	1x 7.6349.0 STE320/X Block 320VA 380V/230V diagram 1 Bl.10	1x 7.6349.0 STE320/X Block 320VA 400V/230V diagram 1 Bl.10	1x 7.2239.20070 USTE400 Block 400VA diagram 2 Bl.10	
Cable	-W11/-W13	Silflex-SIF 6x1x35mm² black	Silflex-SIF 6x1x16mm² black	Silflex-SIF 6x1x16mm² black	Silflex-SIF 6x1x16mm² black	
	-W14	Silflex-SIF 3x1x35mm² black	Silflex-SIF 3x1x16mm² black	Silflex-SIF 3x1x16mm² black	Silflex-SIF 3x1x16mm² black	
	-W19.1/.2	H07RN-F 7x1x35mm² black	NYSLYÖ-J 2x4x16mm²	NYSLYÖ-J 2x4x16mm²	NYSLYÖ-J 2x4x16mm²	

Block diagram
Compressor series CSD

KAESER KOMPRESSOREN

UCSD-02000.00

Blatt 3 Bl.

Ursprung:
Ersatz für:
Ersatz durch:

		Datum	Name	Norm
c				
b		Bearb.	Sifter	
a		Gepr.	Büchner	
C	Änderung	Datum	Name	Norm

23.04.2003

performance-related components
CSD 102

model

machine power supply		**230V±10% 50Hz** **230V±10% 60Hz**	**380V±10% 60Hz**	**400V±10% 50Hz**	**440V±10% 60Hz** **460V±10% 60Hz**	
motors	**-M1**	55kW	55kW	55kW	55kW	
	-M2	1,1kW	1,1kW	1,1kW	1,1kW	
Component layout äMounting plate		ACSD-02000... page 1, fig. 2	ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1	
Terminal strip	**-X0**	3x 7.3600.0 RFK1/185 Wieland	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland	
contactors	**-K1M/-K2M**	2x 7.6250.0 A145-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.6270.0	2x 7.4830.0 A95-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.5284.0 A75-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.5284.0 A75-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	
	-K3M	1x 7.4831.0 A110-30-22-80 ABB + 1x 7.3946.00050	1x 7.5757.0 A63-30-22-80 ABB + 1x 7.3946.00050	1x 7.5756.0 A50-30-22-80 ABB + 1x 7.3946.00050	1x 7.5756.0 A50-30-22-80 ABB + 1x 7.3946.00050	
Overload protection	**-F2**	1x 7.6260.0 TA200-DU135 ABB 100-135A	1x 7.4866.0 TA80-DU80 ABB 60-80A	1x 7.5761.0 TA75-DU80 ABB 60-80A	1x 7.5760.0 TA75-DU63 ABB 45-63A	
Overload protection switch	**-Q0**	1x 7.4528.00010 MS225-2,5 ABB 1,6-2,5A setting 1,7A	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4528.00010 MS225-2,5 ABB 1,6-2,5A setting 1,7A	
	-Q4	1x 7.4530.00010 MS225-6,3 ABB 4-6,3A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	
Transformer	**-T1**	1x 7.2239.20070 USTE400 Block 400VA 230V/230V diagram 2 Bl.10	1x 7.6349.0 STE320/X Block 320VA 380V/230V diagram 1 Bl.10	1x 7.6349.0 STE320/X Block 320VA 400V/230V diagram 1 Bl.10	1x 7.2239.20070 USTE400 Block 400VA diagram 2 Bl.10	
Cable	**-W11/-W13**	Silflex-SIF 6x1x50mm² black	Silflex-SIF 6x1x25mm² black	Silflex-SIF 6x1x25mm² black	Silflex-SIF 6x1x25mm² black	
	-W14	Silflex-SIF 3x1x50mm² black	Silflex-SIF 3x1x25mm² black	Silflex-SIF 3x1x25mm² black	Silflex-SIF 3x1x25mm² black	
	-W19.1/.2	H07RN-F 7x1x35mm² black	NYSLYÖ-J 2x4x25mm²	NYSLYÖ-J 2x4x25mm²	NYSLYÖ-J 2x4x25mm²	

UCSD-02000.00

Blatt 4 Bl.

Block diagram
Compressor series CSD

KAESER KOMPRESSOREN

Ursprung:
Ersatz für:
Ersatz durch:

		Datum	Name
c	Änderung	23.04.2003	
b		Bearb. Sifter	
a		Gepr. Büchner	
		Norm	
C	Änderung	Datum	Name

performance-related components
CSD 122

model						
machine power supply		**380V±10% 60Hz**	**400V±10% 50Hz**	**440V±10% 60Hz** **460V±10% 60Hz**		
motors	**-M1**	75kW	75kW	75kW		
	-M2	1,1kW	1,1kW	1,1kW		
Component layout Mounting plate		ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1	ACSD-02000... page 1, fig. 1		
Terminal strip	**-X0**	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland	1x 7.3227.0 L27 Wieland		
contactors	**-K1M/-K2M**	2x 7.4830.0 A95-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.4830.0 A95-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0	2x 7.4830.0 A95-30-22-80 ABB + 2x 7.3946.00050 + 1x 7.4834.0		
	-K3M	1x 7.5284.0 A75-30-22-80 ABB + 1x 7.3946.00050	1x 7.5284.0 A75-30-22-80 ABB + 1x 7.3946.00050	1x 7.5284.0 A75-30-22-80 ABB + 1x 7.3946.00050		
Overload protection	**-F2**	1x 7.4833.0 TA110-DU110 ABB 80-110A	1x 7.4832.0 TA110-DU90 ABB 65-90A	1x 7.4832.0 TA110-DU90 ABB 65-90A		
Overload protection switch	**-Q0**	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4527.00010 MS225-1,6 ABB 1-1,6A setting 1,5A	1x 7.4528.00010 MS225-2,5 ABB 1,6-2,5A setting 1,7A		
	-Q4	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0	1x 7.4529.00010 MS225-4 ABB 2,5-4A + 1x 7.4536.0		
Transformer	**-T1**	1x 7.6349.0 STE320/X Block 320VA 380V/230V diagram 1 Bl.10	1x 7.6349.0 STE320/X Block 320VA 400V/230V diagram 1 Bl.10	1x 7.2239.20070 USTE400 Block 400VA diagram 2 Bl.10		
Cable	**-W11/-W13**	Silflex-SIF 6x1x35mm² black	Silflex-SIF 6x1x35mm² black	Silflex-SIF 6x1x35mm² black		
	-W14	Silflex-SIF 3x1x35mm² black	Silflex-SIF 3x1x35mm² black	Silflex-SIF 3x1x35mm² black		
	-W19.1/.2	H07RN-F 7x1x35mm² black	H07RN-F 7x1x35mm² black	H07RN-F 7x1x35mm² black		

c					
b					
a					
C	Änderung	Datum	Name	Datum	23.04.2003
				Bearb.	Sifter
				Gepr.	Büchner
				Norm	

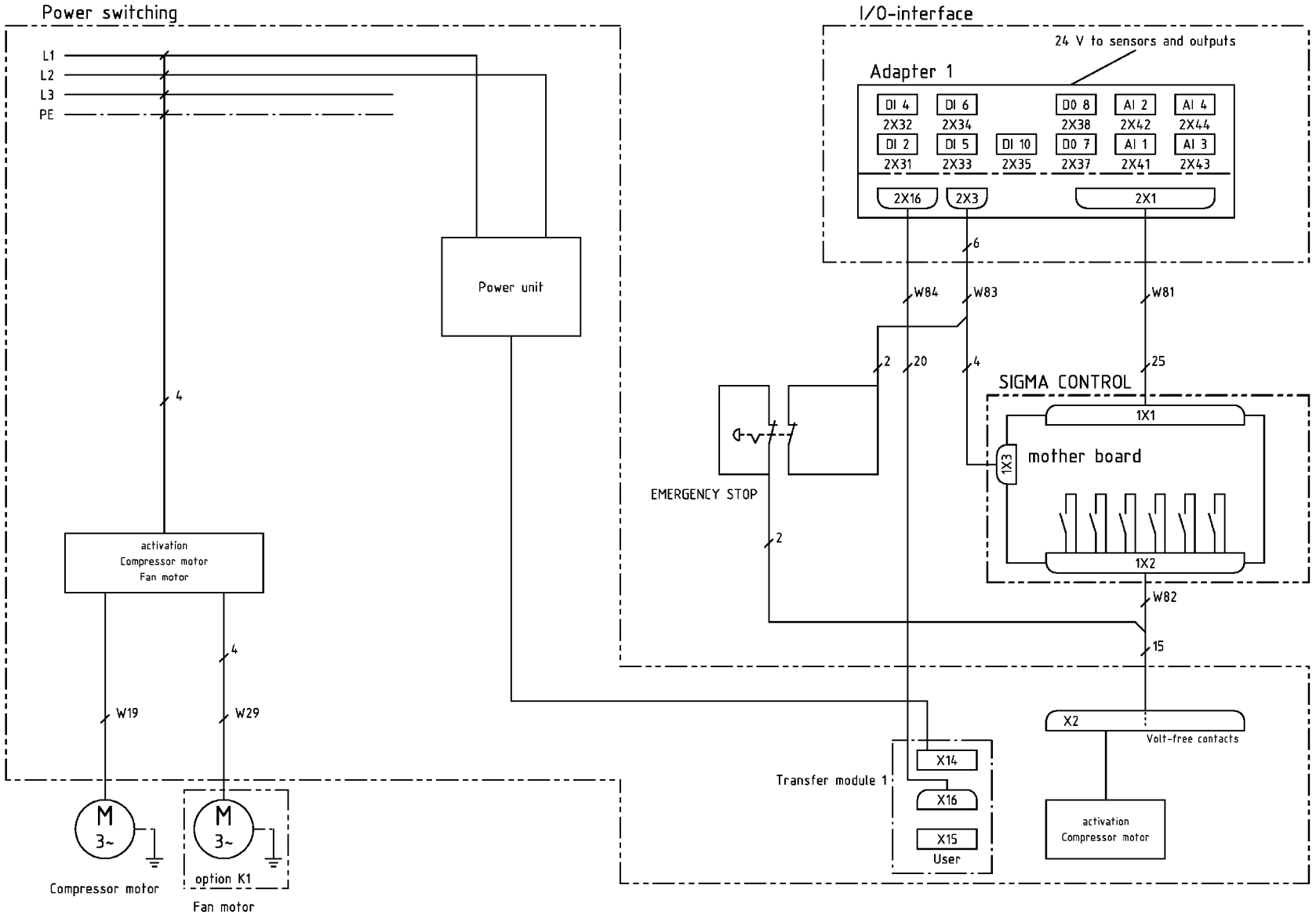
Ersatz durch: | Ersatz für: | Ursprung:

KAESER KOMPRESSOREN

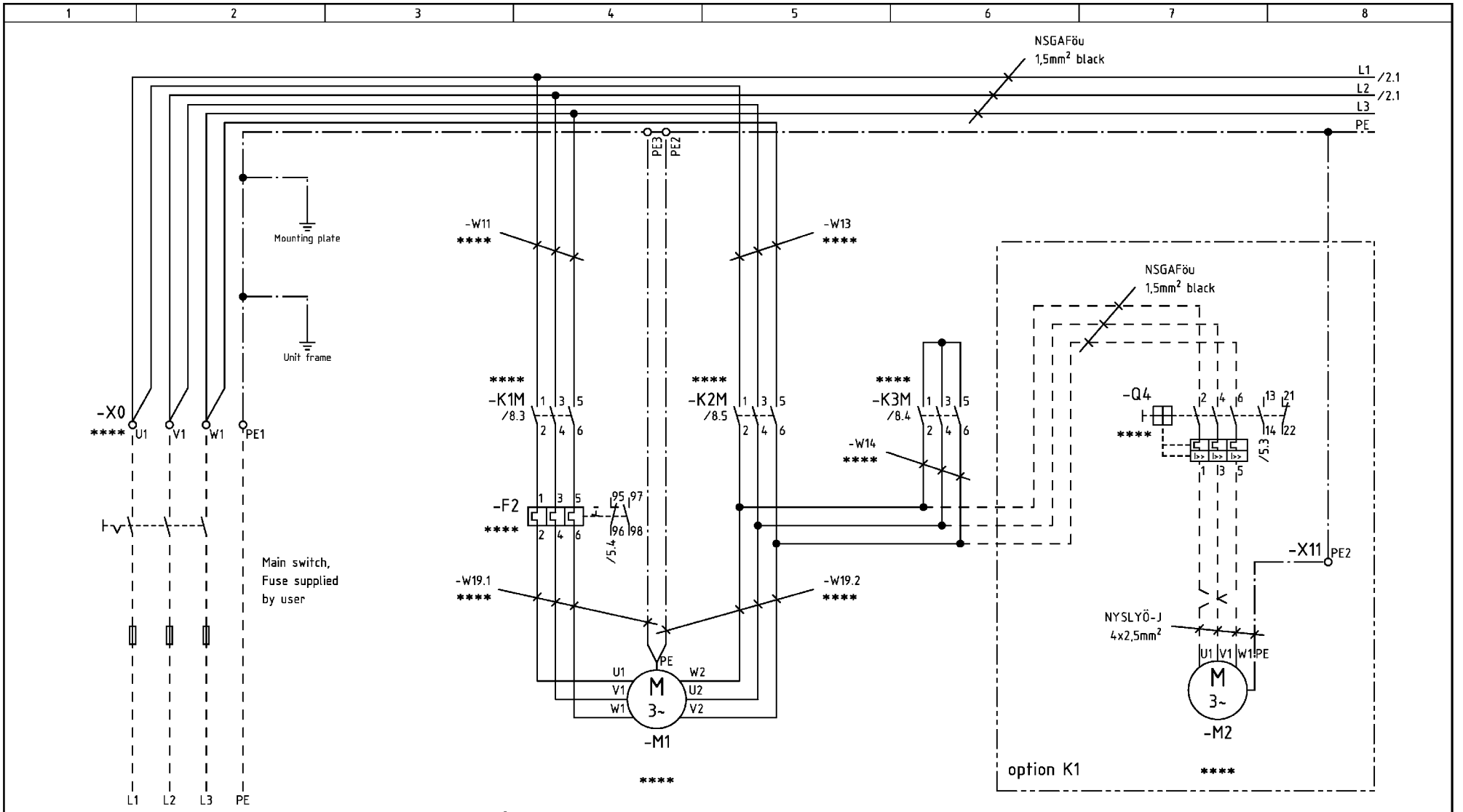
Block diagram
Compressor series CSD

UCSD-02000.00

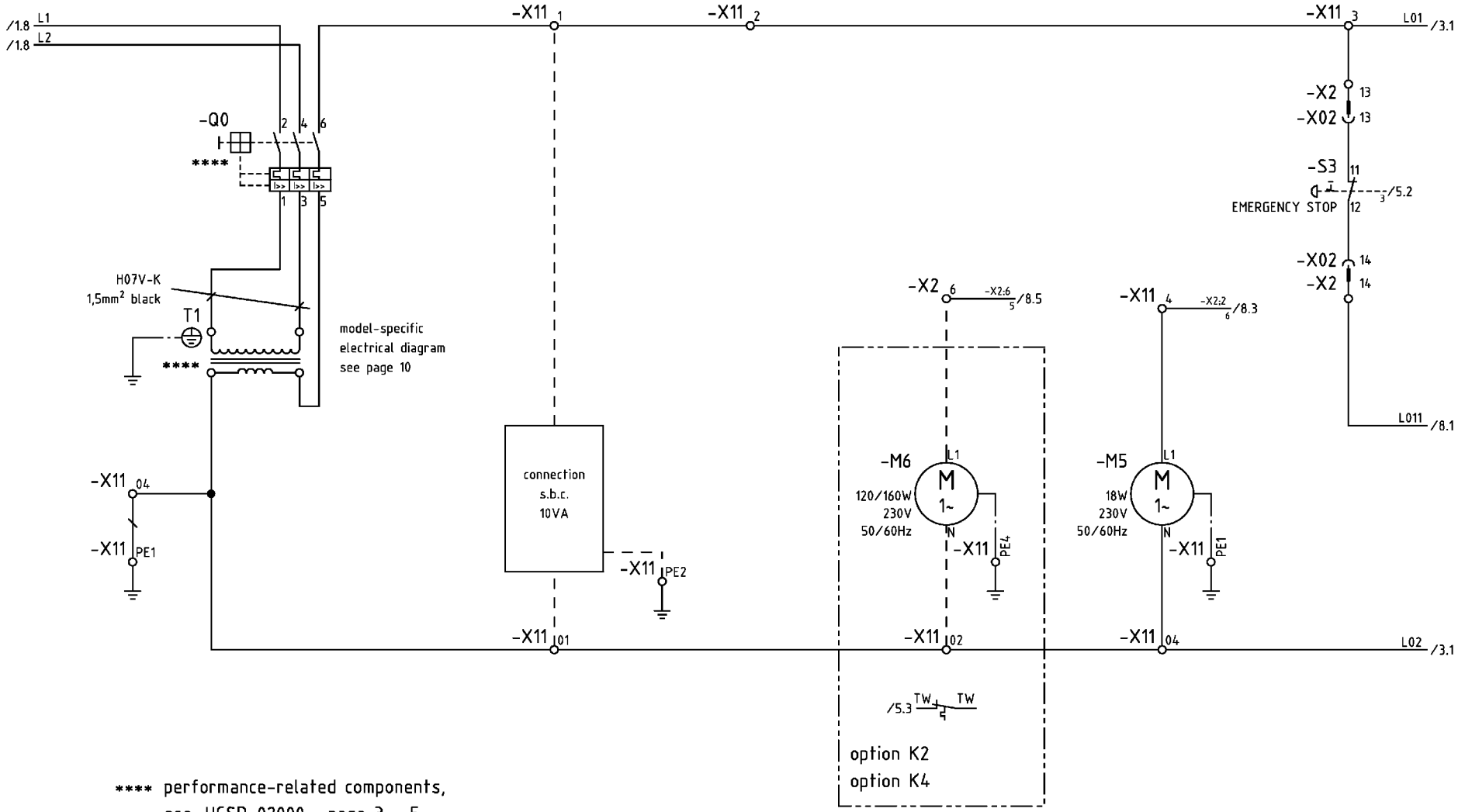
Blatt 5 Bl.



c				Datum	23.04.2003		KAESER KOMPRESSOREN	Block diagram Compressor series CSD	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
C	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00	UCSD-02000.00	Blatt 6 Bl.

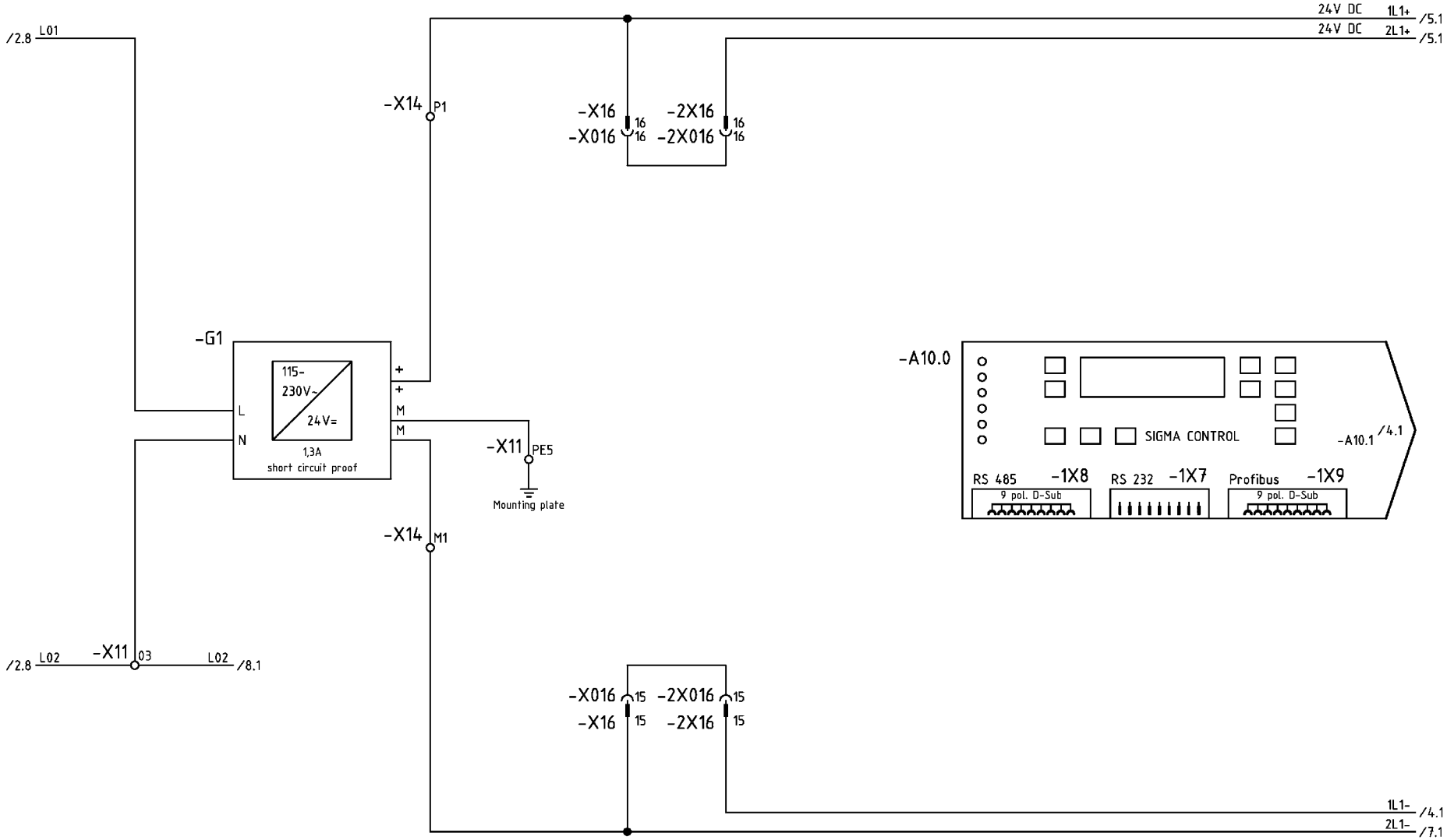


Function:						Compressor motor			Fan motor		
Group of functions:				Main power supply		Power switching					
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram		=	
b				Bearb.	Sitter			Compressor series CSD		+	
a				Gepr.	Büchner			Power switching			
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:		SCSD-02000.00	Blatt 1 Bl.

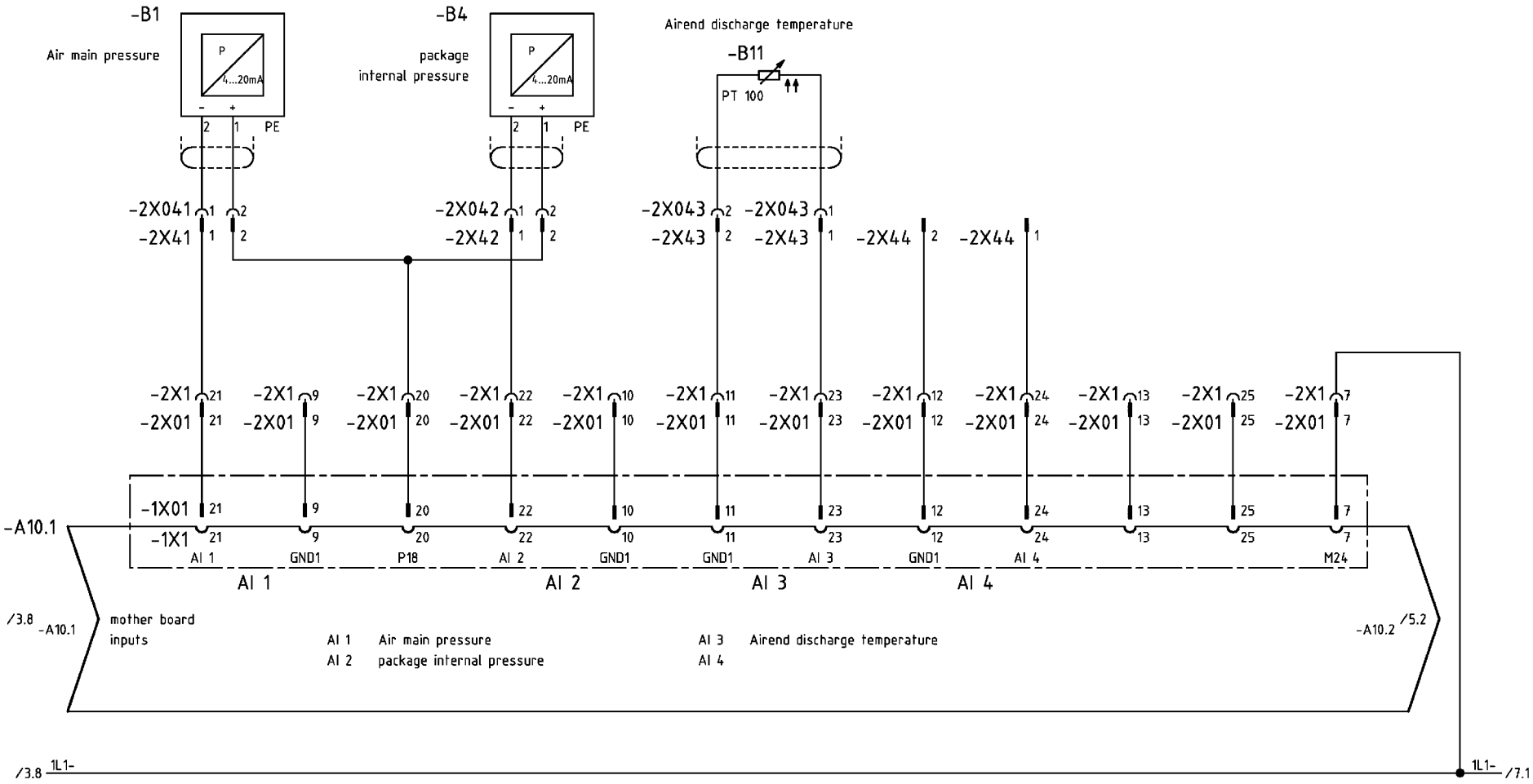


Function:	230V/1~/50/60Hz						EMERGENCY STOP
Group of functions:	Control voltage tapping				Compressor unit fan	Control cabinet ventilator	Safety chain

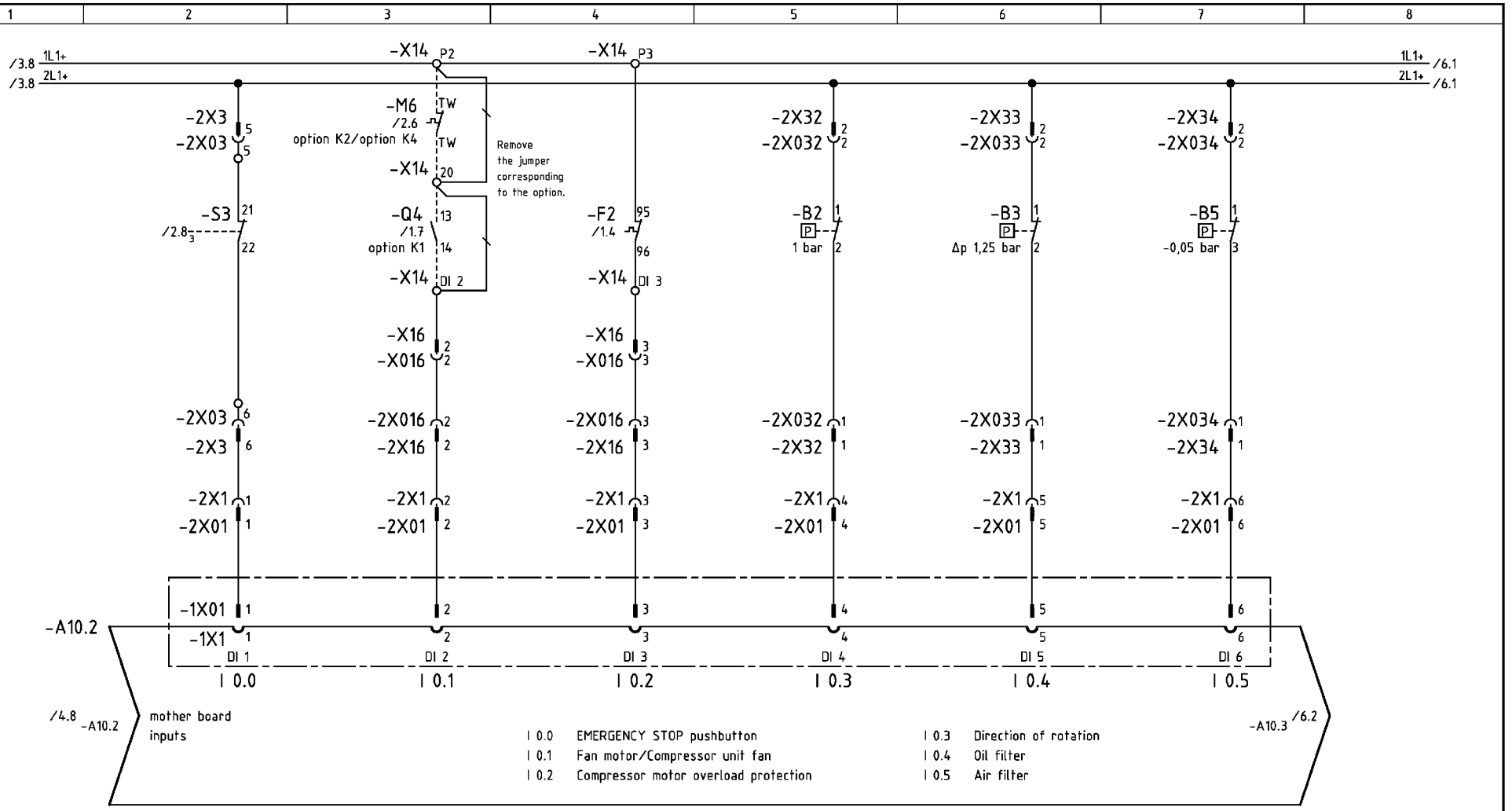
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram	=
b				Bearb.	Sitter			Compressor series CSD	+
a				Gepr.	Büchner			Condensate drain/Fan	
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 2 Bl.



Function:					24V DC				
Group of functions:					Control voltage tapping		Transfer module	Adapter 1	
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD Power supply unit	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 3 Bl.



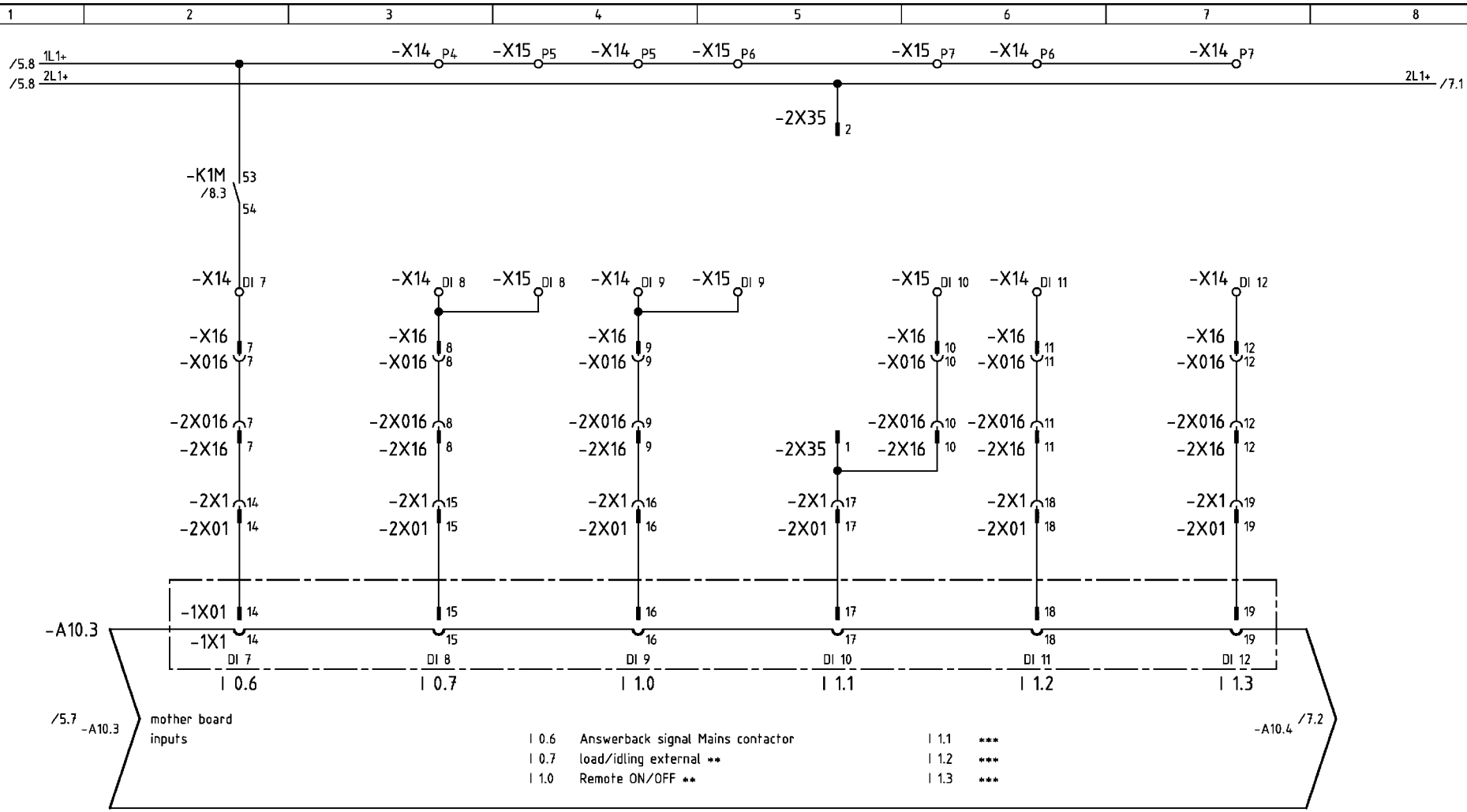
Function:										
Group of functions:					Pressure control					
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram		=
b				Bearb.	Sitter			Compressor series CSD		+
a				Gepr.	Büchner			mother board/inputs		
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 4 Bl.



Function:

Group of functions: Alarm/maintenance indications

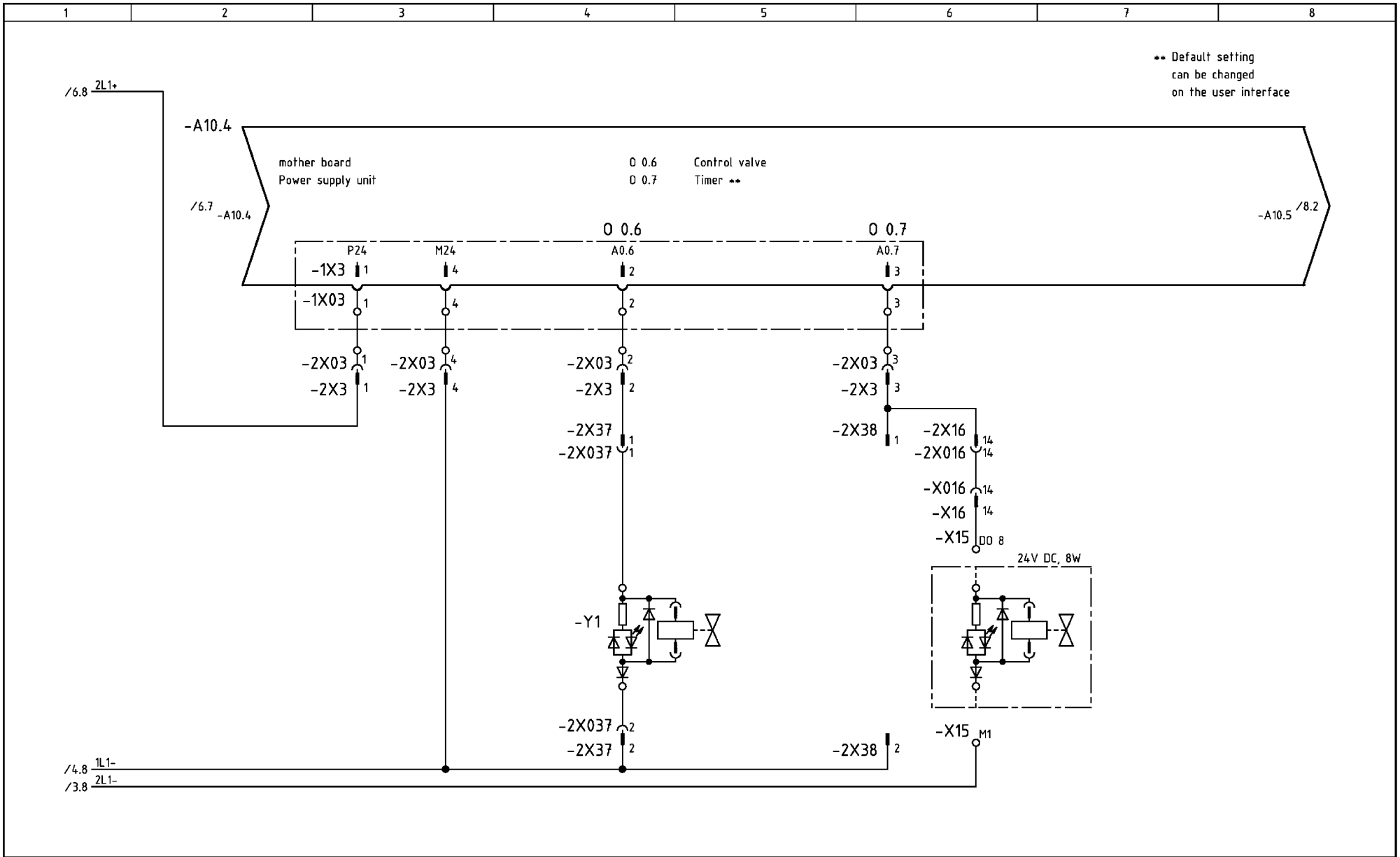
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD mother board/inputs	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 5 Bl.



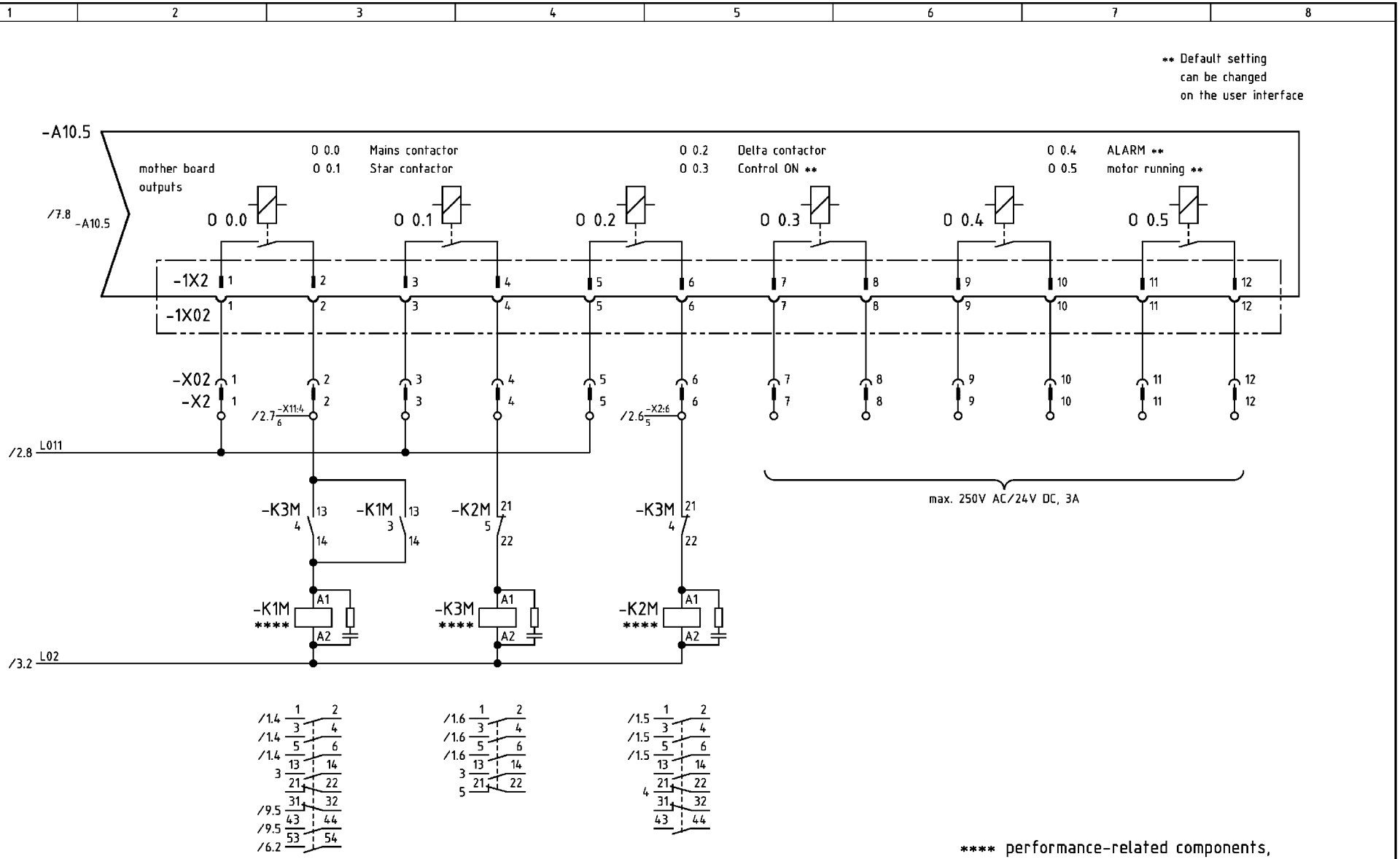
** Default setting
can be changed
on the user interface

*** The setting
can be set on
the user interface

Function:									
Group of functions:					Alarm/maintenance indications				
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD mother board/inputs	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 6 Bl.



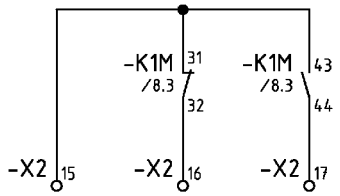
Function:					Inlet/ Venting		Condensate drain, User's connection		
Group of functions:					mother board				
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD mother board/outputs	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00	SCSD-02000.00	Blatt 7 Bl.



Function:									
Group of functions:					Star-delta changeover			Volt-free contacts, User's connection	
c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD mother board/outputs	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	SCSD-02000.00	Blatt 8 Bl.

1	2	3	4	5	6	7	8

Volt-free contacts
User's connection

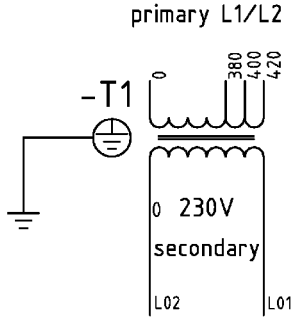


max. 250V AC/24V DC, 3A

All non-designated conductors,
1,5mm^2 orange H07V-K

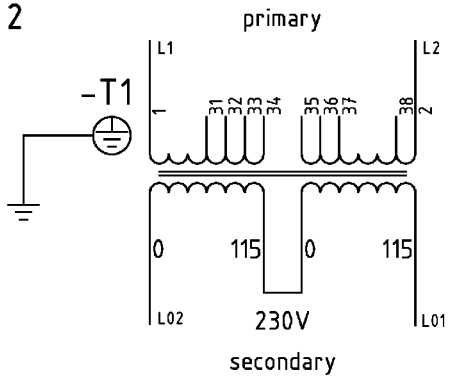
Function:								motor running					
Group of functions:								Volt-free contacts					
c				Datum	23.04.2003			KAESER KOMPRESSOREN	Circuit diagram			=	
b				Bearb.	Sitter				Compressor series CSD			+	
a				Gepr.	Büchner				Volt-free contacts				
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:			SCSD-02000.00		Blatt 9 Bl.

diagram 1



primary	Power connection	
	L1	L2
420V	0	420
400V	0	400
380V	0	380

diagram 2



Power connection 1-2	
primary	Jumper between:
460V	32-36
440V	32-37
230V	1-36/2-32

c				Datum	23.04.2003		KAESER KOMPRESSOREN	Circuit diagram Compressor series CSD transformer diagrams	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:	SCSD-02000.00	Blatt 10 Bl.

1	2	3	4	5	6	7	8					
A Stück-zahl Qty.	B Benennung und Verwendung Description and function	C Fabrikatsbezeichnung Typ; notwendige techn. Daten (z.B. Steuerspannung, Frequenz, Einstellbereich); Bestell-Nr.; Hersteller — Identification data Type; basic technical data (e.g. control voltage, frequency, adjustable range); order No.; manufacturer			D Lfd. Nr. Item	E Betriebsmittel-Kennz. nach DIN 40719, Teil 2 Identifying symbol of device	F Stromlaufplan Planabschnitt Circuit diagram sheet No.; section No.	G Einbauort Location	Concerns only the manufacturer Wst.-Nr. H Schabl. Nr.	I BZ-Pos.	J VA Kz. *)	K Eingangs-vermerk
1	Control cabinet		7.7277.0	CKC								
1	Mounting plate	812x610x2,5	206472.0	CKC								
3	Motor contactor	****		****		-K1M,-K2M,-K3M						
1	Overload protection	****		****		-F2						
2	Overload protection switch	****		****		-Q0,-Q4						
1	Control transformer	****		****		-T1						
1	Power supply	115-230V AC/24V DC	7.7025.0	Siemens		-G1						
1	Terminal strip	****		****		-X0						
1	Terminal strip		7.7113.00040	Wieland		-X2,-X11						
1	Transfer module	FLB20/8158 TOP 36 pole	7.7012.1	Wieland		-X14,-X15,-X16						
1	Adapter	A11	7.7010.0	Wieland		-2X...						
1	Compressor control "Sigma Control"	Typ 1	7.7000.0	Siemens		-A10						
1	EMERGENCY STOP pushbutton	KPMT2-10R	7.3629.0	ABB		-S3						
1	Switching element	KCBH-02 2 OE	7.3169.00080	ABB		-S3						
1	Control cabinet ventilator	LV 200 230V	7.2751.00140	Rübsamen&Herr		-M5						
2	Sealing frame	D 200	7.3350.00020	Rübsamen&Herr								
1	Outlet filter	GV 200	7.2752.00060	Rübsamen&Herr								
****	**performance-related components,**											
	see: UCSD-02000... page 3 - 5											

Bei Nachbestellung von Geräten und Maschinen sind alle in den stark umrandeten Spalten B und C angegebenen Daten aufzuführen. Die Daten in den Spalten D bis G sind zusätzlich unter Nennung dieser Gerätestücklisten-Nummer anzugeben, soweit sie die Beantwortung technischer Rückfragen erleichtern. Für Ersatzteilbestellung ist zusätzlich die Angabe der Serialnummer erforderlich, falls diese auf dem Typenschild des Erzeugnisses genannt ist.

In Zweifelsfällen gilt die deutsche Fassung.

When reordering the equipment, all data enclosed by the heavy lines of columns B and C should be stated. In addition, the data in columns D to G should be given together with the No. of this list of equipment, insofar as they ar helpful in answering technical enquiries. When ordering spare parts, also quote the serial No. of the product if stated on the rating plate.

The German version applies in cases of doubt.

*) Versandanschrift - Kennzeichen

c				Datum	23.04.2003		KAESER KOMPRESSOREN	Equipment parts list Compressor series CSD Control cabinet	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
F	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	GCSD-02000.00 Blatt 1 Bl.

Terminal strip: -X0
total 6 Terminals

Terminal strip	Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5	Terminal 6
Destination internal – Connection number						
Destination internal – Component identification		Mounting plate	-K1M/-K2M 1	-K1M/-K2M 3	-K1M/-K2M 5	Unit frame
Location	/1.4	/1.4	/1.1	/1.2	/1.2	/1.2
Wire link						
Terminal legend / Link / Terminal number	PE2	PE3	U1	V1	W1	PE1
Destination external – Connection number	PE	PE				
Destination external – Component identification	-M1	-M1	supply	supply	supply	supply
Cable identification: -s.b.c. **			X	X	X	X

** See service manual for supply cable cross-section

s.b.c. = supplied by customer

c				Datum	03.06.2003
b				Bearb.	Sitter
a				Gepr.	Büchner
H	Änderung	Datum	Name	Norm	

Ersatz durch: | Ersatz für: | Ursprung:

KAESER KOMPRESSOREN

Terminal schedule
Compressor series CSD
Terminal strip -X0

=
+

KCSD-02000.00

Blatt 1
Bl.

Volt-free contacts, User's connection

1) motor running

2) Control ON **
3) ALARM **
4) motor running **

** Default setting can be changed on the user interface

5) option K2/K4

Terminal strip: -X2 (total 24 Terminals)

Terminal number	Location	Destination external: Component identification	Destination external: Connection number	Note	Destination internal: Component identification	Destination internal: Connection number	-W46 NYSLYÖ-J 5x1 mm²	-W29 NYSLYÖ-J 4x2,5 mm²	-W70 NYSLYÖ-J 3x1 mm²	-Connector plug -X02
1	/8.2				-1X2	1				X
2	/8.3	-X11	4		-K1M	13				
2	/8.3	(hatched)			-1X2	2				X
3	/8.3				-1X2	3				X
4	/8.4				-K2M	21				
4	/8.4	(hatched)			-1X2	4				X
5	/8.4				-1X2	5				X
6	/8.5	-M6	L1	5)	-K3M	21	X			
6	/8.5	(hatched)			-1X2	6				X
7	/8.5			2)	-1X2	7				X
8	/8.6			2)						
8	/8.6	(hatched)			-1X2	8				X
9	/8.6			3)	-1X2	9				X
10	/8.7			3)						
10	/8.7	(hatched)			-1X2	10				X
11	/8.7			4)	-1X2	11				X
12	/8.8			4)						
12	/8.8	(hatched)			-1X2	12				X
13	/2.8	-X11	3		-S3	11				X
14	/2.8									
14	/2.8	(hatched)			-S3	12				X
15	/9.4			1)	-K1M	31				
16	/9.5			1)	-K1M	32				
17	/9.5			1)	-K1M	44				

Terminal strip: -X11 (total 13 Terminals)

Terminal number	Location	Destination external: Component identification	Destination external: Connection number	Note	Destination internal: Component identification	Destination internal: Connection number	-W46 NYSLYÖ-J 5x1 mm²	-W29 NYSLYÖ-J 4x2,5 mm²	-W70 NYSLYÖ-J 3x1 mm²	-Connector plug -X02
1	/2.4				-Q0	9				
01	/2.4				-T1	0				
2	/2.5									
02	/2.6	-M6	N	5)	-K1M	A2	X			
3	/2.8	-G1	L		-X2	13				
03	/3.2	-G1	N							
4	/2.7	-X2	2		-M5	L1			X	
04	/2.2				-M5	N			X	
PE1	/2.2				-M5	PE			X	
PE2	/1.8				-M2	PE		X		
PE3										
PE4	/2.6	-M6	PE	5)			X			
PE5	/3.4	-G1	M		Mounting plate					

H	Änderung	Datum	Name		
c				Datum	03.06.2003
b				Bearb.	Sitter
a				Gepr.	Büchner
				Norm	

Ersatz durch: | Ersatz für: | Ursprung:

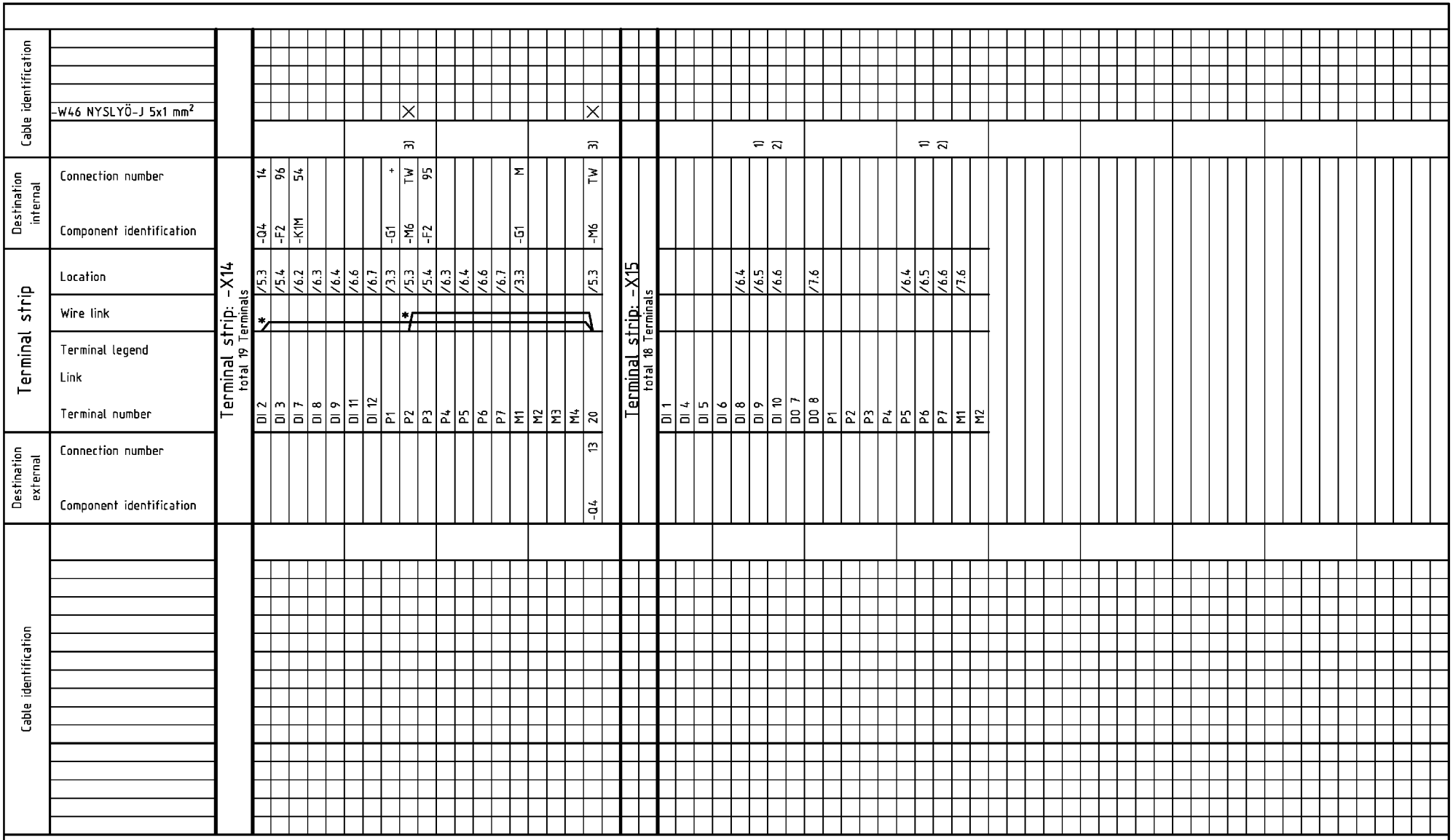
KAESER
KOMPRESSOREN

Terminal schedule
Compressor series CSD
Terminal strip -X2,-X11

=
+

KCSD-02000.00

Blatt 2
Bl.



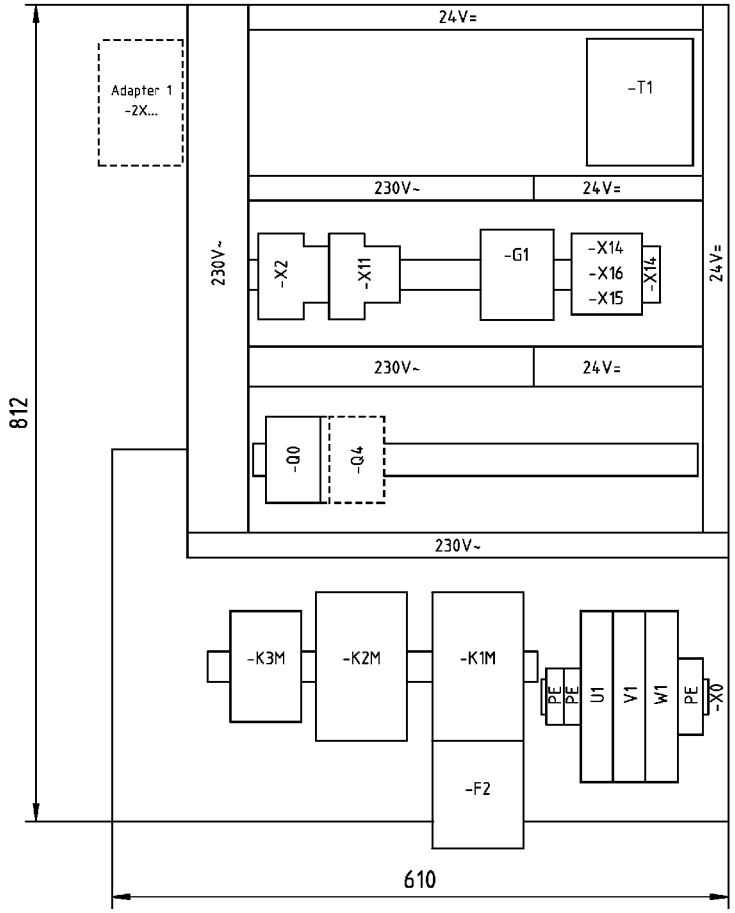
1) load/idling external **
2) Remote ON/OFF **
3) option K2/K4

* Remove the jumper corresponding to the option.

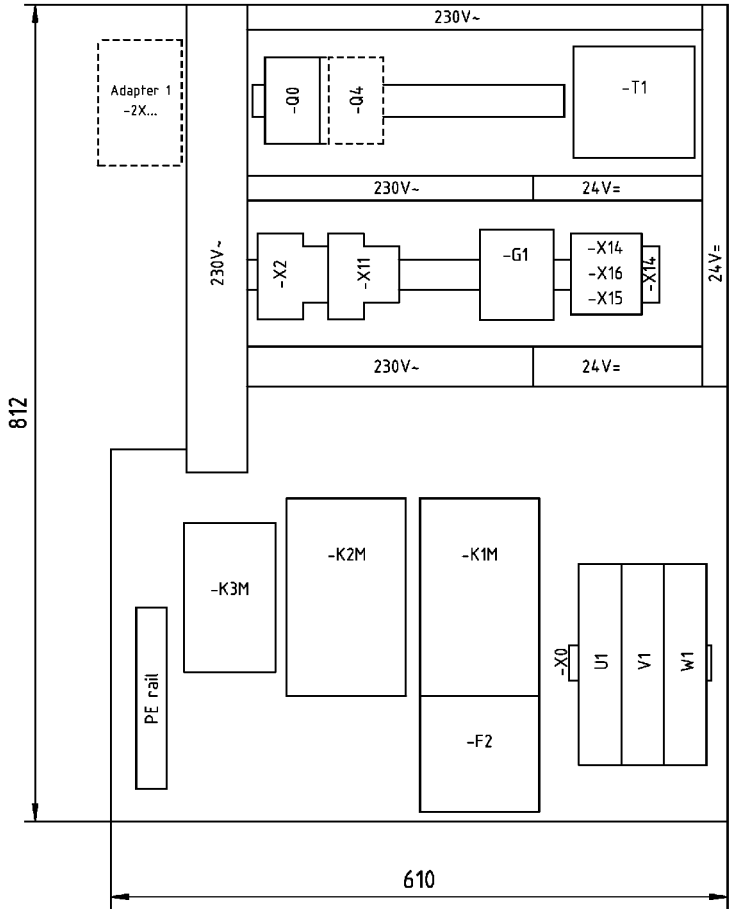
** Default setting can be changed on the user interface

c				Datum	03.06.2003		KAESER KOMPRESSOREN	Terminal schedule Compressor series CSD Terminal strip -X14,-X15	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
H	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	KCSD-02000.00 Blatt 3 Bl.

Mounting plate 1



Mounting plate 2



The components are performance-related
and not shown to scale.

c				Datum	23.04.2003		KAESER KOMPRESSOREN	Component layout Compressor series CSD Mounting plate	=
b				Bearb.	Sitter				+
a				Gepr.	Büchner				
l	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: acs02001_00	ACSD-02000.00	Blatt 1 Bl.