Technician's handbook

SIGMA CONTROL 2

No.: SIP-30002079_00 E

Manufacturer:

KAESER KOMPRESSOREN

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

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Quick user guide

Controller

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KAESER KOMPRESSOREN

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1 Important settings

In this chapter, important or often used settings are explained in brief. Detailed information on function, configuration, fault removal and important instructions concerning safe operation are found in subsequent chapters.

Setting and other work on the machine may only be carried out by the following persons:

- persons trained on the machine/controller and persons instructed by and under the supervision of a specialist,
- trained technicians,
- authorised Service personnel.

2 Setting the display language

Precondition The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Press the «UP» or «DOWN» keys until the current language is shown as active line.

Active line with current language
Submenu
Submenu
Submenu
Submenu
Submenu
Submenu

3. Use the «Enter» key to switch to setting mode.
   The currently set language flashes.
4. Move to the required language with «UP »or «DOWN».
5. Confirm the setting with «Enter».
6. Press «Escape» repeatedly to return to the main menu.

Result The display texts are now in the selected language.

3 Entering a password

Use a supplied Equipment Card to log on at the controller.

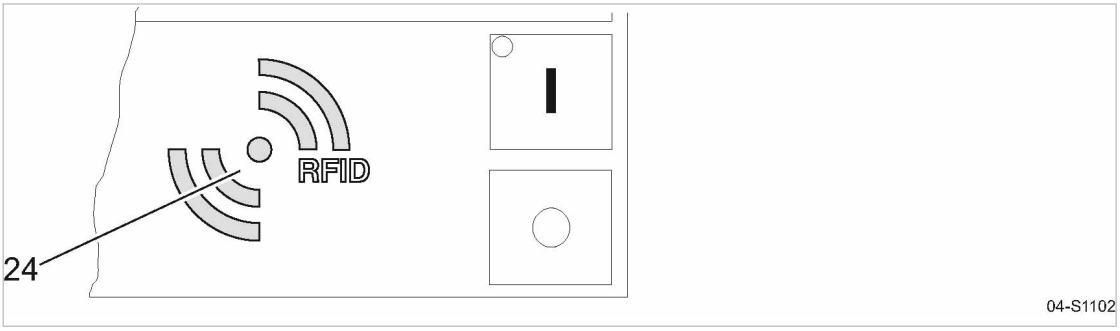


Fig. 1 RFID reader

1. Hold the Equipment Card for a short time in front of the RFID reader.
   The system reads the data and displays your access level.
2. Press «Enter» to confirm the logon.

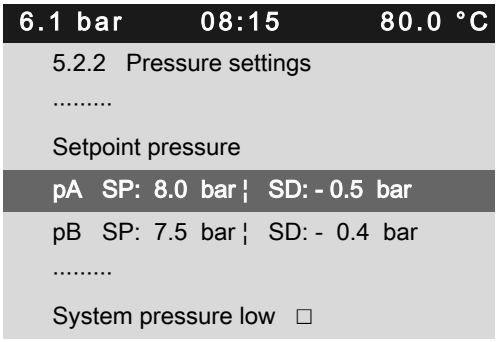
Result The operating mode is displayed. You are logged on.

Further information See chapter 7.2.4 for a manual logon to the controller.

4 Adjusting the system set-point pressure

Precondition Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the *< Configuration → Pressure control → Pressure settings >* menu.
3. Press «UP» or «DOWN» repeatedly until the switching point *pA* is displayed as active line:



4. Press «Enter» to switch into setting mode.
   The current value flashes.
5. Use «UP» or «DOWN» to adjust the setting for the switching point *pA* .
6. Press «Enter» to accept the setting.
7. Press the «Right» key once.
8. Press «Enter» to switch into the setting mode for the switching differential.
   The current value flashes.
9. Use «UP» or «DOWN» to adjust the setting for the switching differential.
10. Press «Enter» to accept the setting.
11. If necessary, adjust the value for pB in the same way.
12. Press «Escape» repeatedly to return to the main menu.

Further information See chapter 7.3 for the adjustment of the machine's pressure parameters.

5 Activating the «Timer» key

Activating/deactivating the check box

Check box	Check box for Reset	Status
☑	☒	activated
☐	☐	deactivated

Tab. 1 Check box status

Precondition Password level 2 is activated.
The display shows the operating mode.

Selecting the Compressor clock menu

1. Press «Enter».
   The main menu is displayed.
2. Select *< Compressor clock >*.
   The display for setting the Compressor clock timing program appears.

6.1 bar 08:15 80.0 °C	
6 Compressor clock	Current menu
Key clock : ☐	
Reset: ☐	
.....	
01 n.a. 00 : 00 off	Enter switching point 01 (active line)
02 n.a. 00 : 00 off	Enter switching point 02
03 n.a. 00 : 00 off	Enter switching point 03

Entering switching points

1. Press «Enter» to switch into setting mode.
   The *n.a.* column flashes in the active line.
2. Use «UP» to specify the settings for the weekdays.
3. Press «Enter» to accept the setting.
4. Press the «Right» key once.
5. Press «Enter» to switch into setting mode.
   Time column, hours display, *00 : 00* flashes in the active line.
6. Use «UP» to specify the settings for the hours.
7. Press the «Right» key once.
   Time column, minutes display, *00 : 00* flashes in the active line.
8. Use «UP» to specify the settings for the minutes.

9. Press «Enter» to accept the settings.
   The display stops flashing and the time (hours/minutes) is set.

6.1 bar 08:15 80.0 °C	
6 Compressor clock	Current menu
Key clock : ☐	
Reset: ☐	
.....	
01 Mon-Fri 06 : 30 on	Example for weekdays
02 Mon-Fri 12 : 00 off	Example for time
03 Mon-Fri 13 : 00 on	Example for the action Compressor ON

10. Press the «Right» key once.
11. Press «Enter» to switch into setting mode.
    The action *off / on* column flashes.
12. Use «UP» to specify the settings for the Compressor ON action.
13. Press «Enter» to accept the setting.
    The Compressor ON action is set for the first switching point.
14. Specify further switching points in the same manner.

Result Weekdays, time and the Compressor ON / Compressor OFF actions are set for all switching points.

Activating the «Timer» key

1. Use «UP» to move to line *Key clock* .
2. Press «Enter» to switch into setting mode.
   The check box flashes in the active line.

6.1 bar 08:15 80.0 °C	
6 Compressor clock	Menu
Key clock : ☑	Active line with check box
Reset: ☐	Resetting all current switching points
.....	
01 Mon-Fri 06 : 30 on	
02 Mon-Fri 12 : 00 off	
03 Mon-Fri 13 : 00 on	

3. Use the «UP» key to activate the check box.
4. Press «Enter» to accept the setting.
   The «Timer» key is activated.
5. Press «Escape» repeatedly to return to the main menu.
6. Press the «Timer» key.

- Proceed in the same manner to deactivate the «Timer» key.
- All defined switching points will be reset simultaneously if you activate the *Reset* check box.

5 Activating the «Timer» key

Result The machine runs according to the defined switching points of the timing program.

Further information See chapter 7.4 for the Configuration of starting and stopping the machine.
See chapter 7.6.2 for the Configuration of load changeover based on a timing program.

6 Activating the «Remote control» key

Further settings have to be made to allow the machine to be remotely controlled.

➢ Refer to the section "Additional information" in this chapter.

Activating/deactivating the check box

Check box	Status
☑	activated
☐	deactivated

Tab. 2 Check box status

The following menus are used to activate the «Remote control» key:

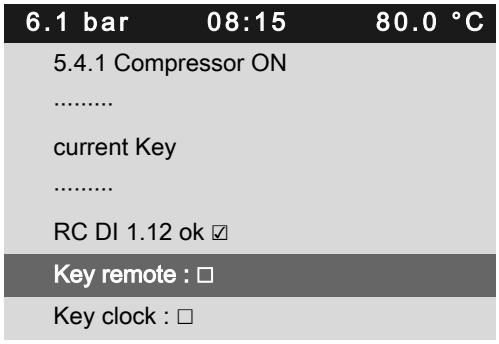
- Menu *< Compressor ON >*
- Menu *< Load control >*

The function will be available as soon as the «Remote control» key in one of the menus has been activated.

Precondition Password level 2 is activated.
The display shows the operating mode.

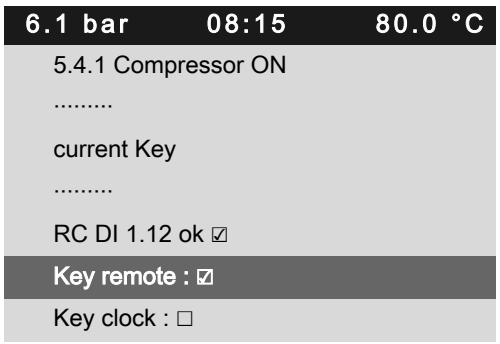
Activating the «Remote control» key in the Compressor ON menu

1. Press «Enter».
   The main menu is displayed.
2. Select *< Configuration → Compressor start → Compressor ON >*.
3. Press «DOWN» repeatedly until *Key remote* is displayed as active line.
4. Press «Enter» to switch into setting mode.
   The check box for Key remote will flash.



5. Press «UP».
   The activated check box is displayed.

6. Press «Enter» to save the setting.
   The «Remote control» key is activated and can be used.



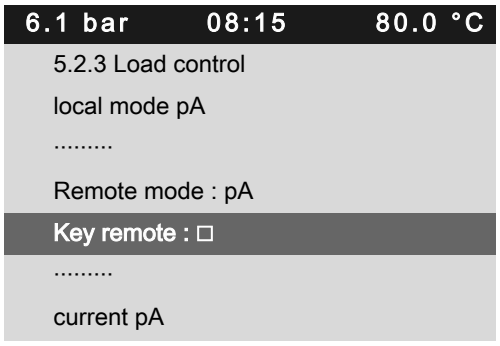
7. Press «Escape» repeatedly to return to the main menu.
8. Press the «Remote control» key to enable Remote mode .

Proceed in the same manner to deactivate the «Remote control» key.

Activating the «Remote control» key in the Load control menu

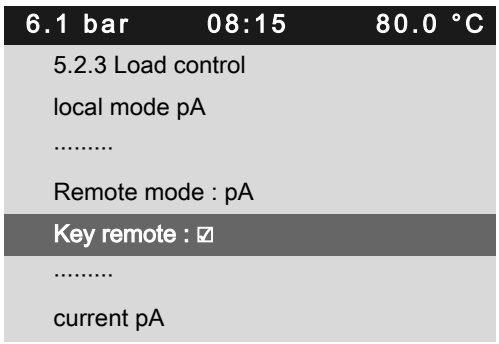
Precondition Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select < *Configuration* ➞ *Pressure control* ➞ *Load control* >.
3. Press «UP» repeatedly until *Key remote* is displayed as active line.
4. Press «Enter» to switch into setting mode.
   The check box for Key remote will flash.



5. Press «UP».
   The activated check box is displayed.

6. Press «Enter» to accept the setting.
   The «Remote control» key is activated and can be used.



7. Press «Escape» repeatedly to return to the main menu.
8. Press the «Remote control» key to enable Remote mode .

Proceed in the same manner to deactivate the «Remote control» key.

Further information

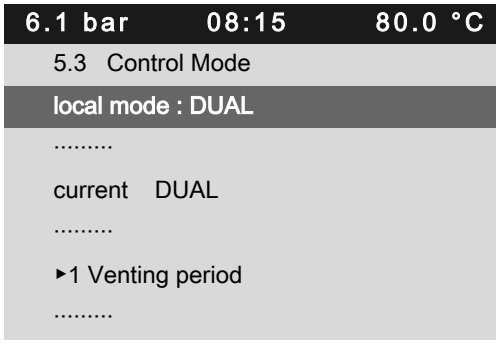
See chapter 7.4 for the Configuration of starting and stopping the machine.
See chapter 7.7 for the Configuration of the load changeover in sequenced mode.

7 Changing the control mode

The standard setting of Control Mode depends on the machine type.

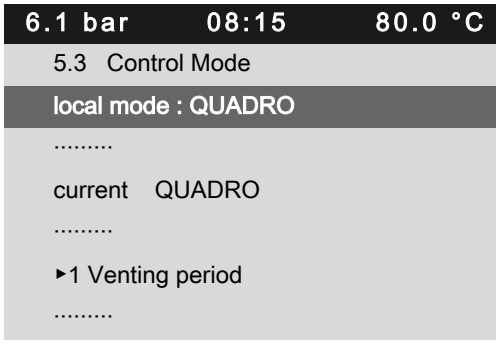
Precondition
Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the < *Configuration* → *Control Mode* > menu.
3. Press «UP» repeatedly until *local mode* is displayed as active line.
   The Control Mode setting is shown in the active line.



Current menu
Active line with Control Mode to be adjusted
Current control mode

4. Press «Enter» to switch into setting mode.
   DUAL flashes.



Current menu
Active line with adjusted Control Mode
Current control mode

5. Use «UP» to change the Control Mode QUADRO .
6. Press «Enter» to accept the setting.
   The new Control Mode *QUADRO* is shown in the *current* line.
7. Press «Escape» repeatedly to return to the main menu.

Result
The Control Mode DUAL has been changed to Control Mode QUADRO .

Further information
See chapter 4.6 for the functions of the control modes.
See chapter 7.5 for the Configuration of the control mode parameters.

8 Outputting important operational states of the machine

Important operational machine states can be assigned via floating relay contacts as a binary signal on the outputs DOR 1.05 – DOR 1.07 . Further outputs are optionally available. You can assign every output only once.

Precondition
Password level 2 is activated.
The display shows the operating mode.

Configuration ➞ I/O periphery ➞ DO functions menu

1. Press «Enter».
   The main menu is displayed.
2. Select the *< Configuration ➞ I/O periphery ➞ DO functions >* menu.
   Controller ON is displayed in the active line.
3. Select the required message with the «UP» or «DOWN» keys.

Menu

Active line with Controller ON message

Assigning a message to an output

1. Press «Enter» to switch into setting mode.
   The display flashes.
2. Select a free output with the «UP» or «DOWN» key.
3. Press «Enter» to accept the setting.
   A message is now sent via the output assigned.
4. Press «Escape» repeatedly to return to the main menu.

Further information
See chapter 7.9 for Configuration and use of the controller's inputs and outputs.

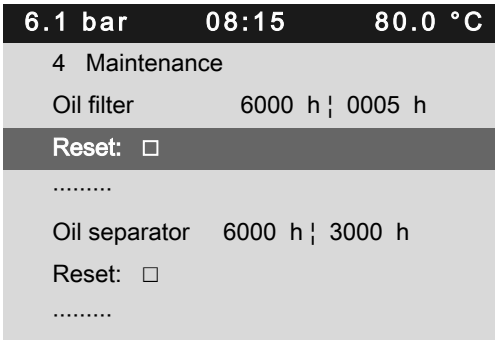
9 Resetting maintenance interval counters

Example: Resetting the maintenance interval counter for Oil filter .

Precondition
Maintenance has been performed.
Warning message has been acknowledged.
Access level 2 is activated.
The display shows the operating mode.

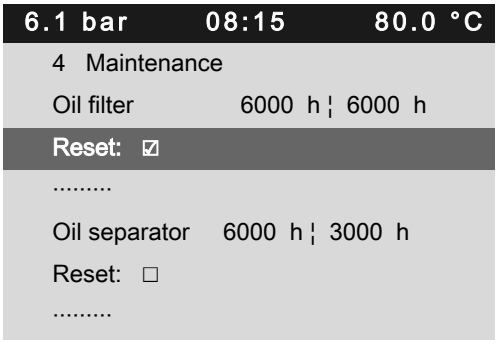
Maintenance menu

1. Press «Enter».
   The main menu is displayed.
2. Select the *< Maintenance >* menu.
   The maintenance counter for *Oil filter* is displayed in the active line.
3. Press «DOWN» once.
   Reset line is displayed as being active.
4. Press «Enter» to switch into setting mode.
   The check box for *Reset* will flash.



Menu
Maintenance interval ¦ remaining time
Active line

5. Use the «DOWN» key to deactivate the check box for *Reset* .



Menu
Maintenance interval ¦ remaining new time
Active line

6. Press «Enter» to accept the setting.
   The check box for *Reset* is deactivated automatically.

Result
The remaining time of the new oil filter complies with the defined maintenance interval of 6000 h.

Further information
See chapter 8.4 for setting the maintenance intervals.
See chapter 1012.12.1 for the maintenance of the controller.

10 Testing the pressure relief valve

Overview

- Preparation for the test
- Carrying out the check
- Correct conclusion of the test
- Performing a Reset

When the check mode is activated, monitoring of internal pressure (blow-off protection - if provided) and regulation of network pressure are deactivated.

The measured value of internal pressure pi is used to describe the following check.

Check box	Status
☑	activated
☐	deactivated

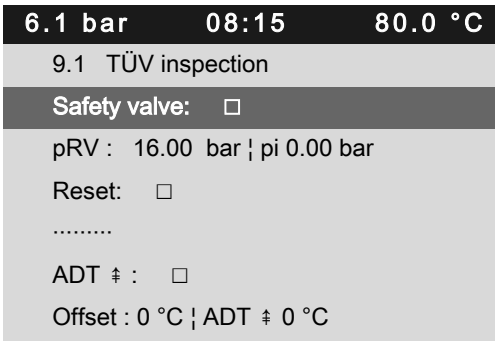
Tab. 3 Check box status

WARNING
Danger of injury from pressurised components

➢ Perform the following actions in the sequence provided.

Preparation for the test

1. Note the activating pressure of the pressure relief valve from the machine's nameplate.
2. Press the «OFF» key to shut down the machine.
3. Close the user's shut-off valve between the machine and the air distribution network.
4. Log on to SIGMA CONTROL 2 with access level 2 (see chapter 7.2.4).
5. In operating mode, switch to the main menu with the «Enter» key.
6. Select the *< Machine test ➞ TÜV inspection >* menu.
   Safety valve line is displayed as being active.



Menu

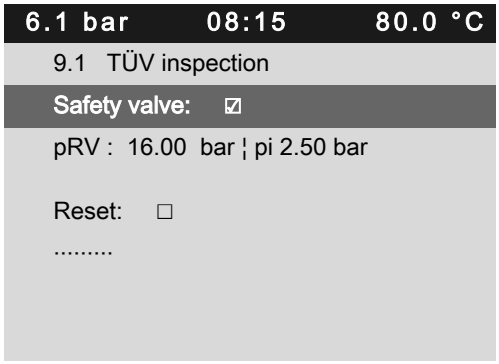
Active line with check box

Safety valve Activating pressure (example)

Carrying out the check

1. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.
2. Use the «UP» key to activate the check box.

3. Press «Enter» to accept the setting.
   The check mode is now activated.
   The monitoring of internal and network set point pressures is deactivated!



Menu

Active line with check box

Activating pressure Safety valve (pRV) ¦ Internal pressure pi (current)

4. **WARNING!**
   Excessive noise is caused when the pressure relief valve blows off!
   - ➢ Close all access doors, replace and secure all removable panels.
   - ➢ Wear hearing protection.

5. **WARNING!**
   Risk of burns due to released cooling oil and compressed air when blowing off the pressure relief valve!
   - ➢ Close all access doors, replace and secure all removable panels.
   - ➢ Wear eye protection.

6. Press and hold the «ON» key.
   The machine switches to load, the machine's internal pressure pi rises.
7. Manually monitor on the display the pressure rise pi during the TÜV inspection .
8. If the internal pressure pi increases to more than 10 % above the correct opening pressure of the pressure relief valve, shut down the machine with the «OFF» key.
9. Have the Safety valve replaced immediately.

If the alarm message *pRV ≠* appears, the Safety valve is defective. The permissible internal pressure was exceeded by 2 bar.

- ➢ Have the Safety valve replaced immediately.

Avoid oil mist:

- ➢ Release the «ON» key immediately when the Safety valve responds, in order to prevent unnecessary oil mist.

Correct conclusion of the test

1. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.
2. Use the «DOWN» key to deactivate the check box.
3. Press «Enter» to accept the setting.
   The " Safety valve " test mode is de-activated and the test is completed.
4. Press «Escape» repeatedly to return to the main menu.
5. Open the shut-off valve from the machine again.

Result The machine is ready for operation.

Resetting

If the test is canceled when opening the pressure relief valve, the internal pressure *pi* will indicate the highest measured value.
Activate the check box for Reset in order to reset the stored value.

➢ Activate the check box for Reset .

Further information See chapter8.5 to test the pressure relief valve.

11 Checking the temperature sensor and overheating shutdown function

The machine should shut down if the airend discharge temperature (ADT) reaches a maximum of 110 °C.
SIGMA CONTROL 2 will simulate a higher temperature for checking this function.

For this purpose, SIGMA CONTROL 2 automatically determines an offset value to be displayed. During the test mode, this Offset is added to the actual airend discharge temperature to cause the machine to shut down prematurely.

In standard operation, SIGMA CONTROL 2 generates the "overtemperature" fault message when the maximum airend discharge temperature is reached. Since the modified test temperature is 2 K below the fault message switching point for overtemperature, the system will not generate a fault message in test mode.

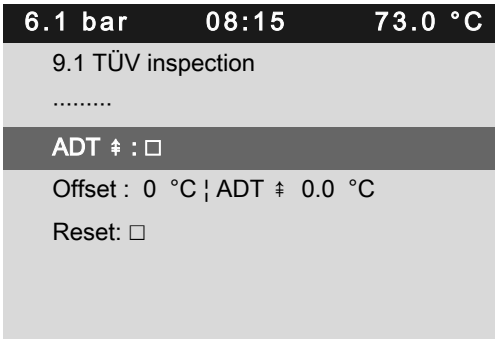
Overview

- Shut down the machine and allow to cool down slightly
- Performing the test
- Correct conclusion of the test
- Performing a Reset

Performing the test

Precondition Machine cooled down by approx. 5 °C

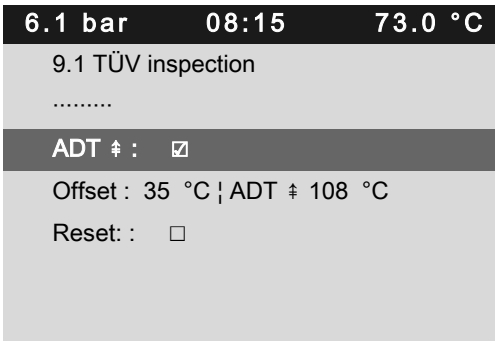
1. Log on to SIGMA CONTROL 2 with access level 2. (see section 7.2.4).
2. In operating mode, switch to the main menu with the «Enter» key.
3. Select the *< Machine test → TÜV inspection >* menu.
   Safety valve is displayed in the active line.
4. Press «DOWN» repeatedly until *ADT* ⇞ is displayed as active line.
5. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.



Fallen airend discharge temperature (73.0 °C)
Menu
Active line

6. Use the «UP» key to activate the check box.

7. Press «Enter» to accept the setting.
   The Offset display changes to *35 °C*.
   The ADT ⇞ display changes to *108 °C*.
   The test mode is now activated.



8. Press the «ON» key to switch the machine to LOAD.
   The machine switches to LOAD and the airend discharge temperature rises again.
   The machine will switch off as soon as *ADT* attains a value of *108 °C*.

The machine does not shut down?

➢ Abort the test and contact KAESER Service as soon as possible.

Correct conclusion of the test

1. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.
2. Use the «DOWN» key to deactivate the check box.
3. Press «Enter» to accept the setting.
   The offset is reset to *0 °C*.
   The test mode is de-activated and the test is completed.
4. Press «Escape» repeatedly to return to the main menu.

Resetting

ADT ⇞ will display the highest measured value if the test for switching off at overtemperature is aborted.
Activate the check box for Reset in order to reset the stored value.

➢ Activate the check box for Reset .

Further information See chapter 8.6 for testing the temperature sensor.

12 Interpreting operation messages

The controller will automatically display operation messages informing you about the current operational state of the machine.

Operating messages are identified with the letter O .

The message numbers are not numbered consecutively.

Messages 0081 to 0095 are customer-specific and undefined. Complete them with your defined message text and interpretation.

Message	Meaning
0001 O load control pA	The machine is regulated by system set point pressure pA .
0002 O load control pB	The machine is regulated by system set point pressure pB .
0003 O load control RC	The machine is regulated via the remote contactor.
0004 O load control RB	The machine is remotely regulated via the bus connection.
0005 O ready	The machine is switched on and in STANDSTILL operating mode.
0006 O IDLE	The machine is switched on and in IDLE operating mode.
0007 O ON LOAD	The machine is switched on and in LOAD operating mode.
0008 O off	The machine is switched off. The power supply is connected.
0009 O Compressor ON	The machine is switched on.
0010 O Controller ON	The power supply is connected. The controller is powered.
0011 O Cold start release	The machine can be switched on although the machine temperature is below the permissible starting temperature. The machine can be switched on only as long as the message is displayed.
0025 O Setpoint pressure pA	The value for pA is output.
0026 O Setpoint pressure pB	The value for pB is output.
0027 O Power OFF → ON	Request: Switch the power supply off and on.
0028 O DYNAMIC motor T↑	Control mode DYNAMIC: The temperature of the compressor motor is too high.
0081 O	

Message	Meaning
0082 O	
0083 O	
0084 O	
0085 O	
0086 O	
0087 O	
0088 O	
0089 O	
0090 O	
0091 O	
0092 O	
0093 O p-Switch pi	
0094 O T-Switch ADT	
0095 O p-Switch pN	

Tab. 4 Operational Messages

13 Interpreting diagnostic messages

Diagnostic messages are identified with the letter D .

They provide information on the status of the controller, the connected input and output modules and support the KAESER service in trouble-shooting.

14 Interpreting fault messages

Fault messages are identified with the letter A .

The message numbers are not numbered consecutively.

Messages 0081 to 0095 are customer-specific and may differ from the suggested values. Complete them with your defined message text, possible causes and remedies.

Message	Possible cause	Remedy
0001 A Direction of rotation	The compressor drive motor is turning in the wrong direction.	Change over phase lines L1 and L2.
0002 A Motor T ⇟	Compressor drive motor overheated.	Clean the motor. Keep ambient conditions within specified limits.
0003 A pRV ⇟	The activating pressure of the pressure relief valve on the oil separator tank has been exceeded.	Change the pressure relief valve.
0004 A EMERGENCY STOP	EMERGENCY STOP control device actuated.	Unlatch the push-button.
0005 A Oil separator T ⇟	Maximum air temperature at the oil separator tank outlet is exceeded.	Check the line to the trip relay.
0007 A Mains monitor	Fault in mains power supply.	Have the mains power supply checked.
0009 A Sigma Control T ⇟	Permissible enclosure temperature for SIGMA CONTROL 2 exceeded.	Keep ambient conditions within specified limits. Control cabinet: Check filter mats and fan.
0010 A Blow-off protection ⇟	The activating 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.
0011 A Fan M4 I ⇟	Overload shut-down of the first fan motor.	Investigate cause of shut-down. Reset the overload relay.
0012 A Access doors	Door open / interlocked panel removed while the machine is running.	Fit and secure all panels and close access doors.
0013 A Motor I ⇟	Overload shut-down of the compressor drive motor.	Investigate cause of shut-down. Change the oil separator cartridge.
0014 A Fan M5 I ⇟	Overload shut-down of the second fan motor.	Investigate cause of shut-down. Reset the overload relay.

Message	Possible cause	Remedy
0015 A ADT ⇟	Maximum permissible airend discharge temperature (ADT) exceeded.	Keep ambient conditions within specified limits. Clean the cooler. Check the cooling oil level.
0016 A Fan M6 I⇟	Overload shut-down of the third fan motor.	Investigate cause of shut-down. Reset the overload relay.
0019 A Internal pressure pi⇟	–	–
0021 A Refrigeration dryer T⇟	Refrigeration dryer: Compressed air temperature too low.	Contact KAESER Service.
0022 A Oil separator dp⇟	Oil separator cartridge clogged.	Change the oil separator cartridge.
0023 A Motor bearings	Drive motor bearings overheated.	Re-grease the motor bearings.
0024 A Water-cooling water shortage	Cooling water pressure is too low.	Check cooling water supply.
0034 A Mains contactor on?	Mains contactor does not close.	Check mains contactor and wiring.
0035 A Fan M7 I⇟	Overload shut-down of the control cabinet fan motor.	Contact KAESER Service.
0038 A PD T⇟	Package discharge (PD) temperature too low.	Contact KAESER Service.
0039 A PD T⇟	Package discharge (PD) temperature too high.	Check the cooling oil level. Clean the radiator. Check the fan motor.
0040 A Mains contactor off?	Mains contactor does not open.	Check mains contactor and wiring.
0041 A Mains voltage ⇟	Second power failure.	Check power supply voltage. Check the door interlock switch.
0042 A Back pressure stop	Back pressure in the oil separator tank caused by defective venting.	Check venting line.
0043 A ADT dT/dt ⇟	The rate of rise of the airend discharge temperature (ADT) is too fast.	Check the cooling oil level.
0044 A No pressure buildup	The machine does not produce compressed air. The working pressure does not rise above 3.5 bar within the preset period.	Check the machine for leaks. Check coupling / V-belt.
0045 A Compressor T⇟	Thermostatic valve defective	Contact KAESER Service.

Message	Possible cause	Remedy
0048 A High-voltage cell	Fault in the high voltage cell.	Contact KAESER Service.
0051 A Aggregate A	Aggregate A failed.	Contact KAESER Service.
0052 A Aggregate B	Aggregate B failed.	Contact KAESER Service.
0056 A RD condensate drain	Refrigeration dryer: The condensate drain is defective.	Refrigeration dryer: Check condensate drain and condensate conduits.
0057 A Model	Compressor model uncertain.	Contact KAESER Service.
0058 A Condensate drain	The condensate drain is defective.	Check condensate drain and condensate conduits.
0059 A Back pressure run	Drive belt or coupling broken.	Drive belt: Replace drive belt. Coupling: Contact KAESER Service.
0060 A Softstart	Fault in the soft start equipment.	Contact KAESER Service.
0061 A Oil separator dT/dt ⇞	The rate of rise of the airend discharge temperature is too fast.	Check the cooling oil level.
0062 A Refrigeration dryer p ⇞	Refrigeration dryer: Pressure too high in the refrigerant circuit. Safety pressure switch tripped.	Clean the refrigerant condenser. Check the fan motor. Maintain operating conditions.
0063 A Refrigeration dryer p ⇟	Refrigeration dryer: Refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	Contact KAESER Service.
0081 A		
0082 A		
0083 A		
0084 A		
0085 A		
0086 A		
0087 A		

Message	Possible cause	Remedy
0088 A		
0089 A		
0090 A		
0091 A		
0092 A		
0093 A p-Switch pi		
0094 A T-Switch ADT		
0095 A p-Switch pN		
0097 A High-voltage cell on?	High-voltage cell does not activate.	Check high-voltage cell and wiring.
0098 A High-voltage cell off?	High-voltage cell does not deactivate.	Check high-voltage cell and wiring.
0099 A Mains contactor on?	Mains contactor does not close.	Check mains contactor and wiring.
0100 A Mains contactor off?	Mains contactor does not open.	Check mains contactor and wiring.
0101 A Motor I⇞	Overload shut-down of the compressor drive motor.	Investigate cause of shut-down. Change the oil separator cartridge.
0102 A Fan M4 I⇞	Overload shut-down of the first fan motor.	Investigate cause of shut-down. Reset the overload relay.
0200 A Compressor motor USS alarm	Frequency converter fault	Contact KAESER Service.
0201 A Compressor motor USS alarm	Frequency converter fault	Contact KAESER Service.
0202 A Compressor motor USS alarm	Frequency converter fault	Contact KAESER Service.
0205 A Compressor motor USS alarm	Communications error	Check connection and line path.
0210 A Compressor motor FC Motor overload alarm	Frequency converter fault	Contact KAESER Service.

Message	Possible cause	Remedy
0211 A Compressor motor FC Group alarm	Frequency converter fault	Contact KAESER Service.

Tab. 5 Fault messages and measures

15 Interpreting warning messages

Warning messages are identified with the letter W .

The message numbers are not numbered consecutively.

Messages 0081 to 0092 are customer-specific and may differ from the suggested values. Complete them with your defined message text, possible causes and remedies.

Message	Possible cause	Remedy
0002 W Motor T↑	Drive motor overheating.	Clean the motor. Keep ambient conditions within specified limits.
0003 W V-belt tension	Belt tension is too low.	Re-tension drive belt.
0004 W Oil separator dp↑	The pressure drop across the oil separator cartridge has risen. Oil separator cartridge clogged.	Change the oil separator cartridge.
0005 W Start inhibit	Too frequent manual on and off switching.	Do not exceed the maximum number of motor switchings per hour when manual on/off switching.
0007 W Motor bearings	Drive motor bearing defective.	Contact KAESER Service.
0008 W ADT↑	Maximum airend discharge temperature will soon be reached.	Clean the radiator. Check the cooling oil level. Replace the oil filter. Ensure adequate ventilation. Keep surrounding temperature within recommended limits.
0010 W Buffer battery	Data retention battery is almost discharged.	Change the battery.
0011 W Oil filter Δp↑	The pressure differential of the oil filter has risen. Oil filter clogged.	Change the oil filter.
0012 W Modem problem	SIGMA CONTROL 2 does not recognize modem.	Check the link between the SIGMA CONTROL 2 and the modem.
0013 W Air filter dp↑	Air filter clogged.	Change the air filter element.
0015 W Bus alarm	The bus link from the Profibus DP interface is interrupted.	Check bus highway and plug.
0016 W Error: RAM	Internal RAM defective.	Contact KAESER Service.
0017 W Refrigeration dryer T↓	Refrigeration dryer: Compressed air temperature too high.	Maintain operating conditions. Clean the refrigerant condenser. Clean the cooler. Install an extractor fan.

Message	Possible cause	Remedy
0018 W Refrigeration dryer p↓	Refrigeration dryer: Refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	Contact KAESER Service.
0025 W Oil separator h⧗	Oil separator cartridge: Maintenance interval has elapsed.	Change the oil separator cartridge.
0026 W Oil change h⧗	Cooling oil: Maintenance interval has elapsed.	Change the cooling oil.
0027 W Oil filter h⧗	Oil filter: Maintenance interval has elapsed.	Change the oil filter.
0028 W Air filter h⧗	Air filter: Maintenance interval has elapsed.	Change the air filter element.
0029 W Valve inspection h⧗	Valves: Maintenance interval has elapsed.	Contact KAESER Service.
0030 W Belt/coupling inspection h⧗	Belt tension/coupling: Maintenance interval has elapsed.	Carry out a visual inspection. Re-tension drive belt.
0031 W Motor bearing h⧗	Motor bearing of compressor motor: Maintenance interval has elapsed.	Contact KAESER Service.
0032 W Electrical equipment h⧗	Electric components and installation: Maintenance interval has elapsed.	Inspect and reset the maintenance interval counter.
0033 W Fan bearing h⧗	Motor bearing of fan motors: Maintenance interval has elapsed.	Contact KAESER Service.
0034 W PD T↓	Package discharge (PD) temperature too low.	Contact KAESER Service.
0035 W PD T↑	Compressed air discharge temperature too high.	Clean the radiator. Check the cooling oil level.
0036 W Motor starts /h⧗	The permissible number of motor starts was exceeded in the last 60 minutes.	Extend the idle period. Increase the capacity of air receiver. Increase the cross-section of piping between compressor and air receiver.
0037 W Motor starts /d⧗	The permissible number of motor starts was exceeded in the last 24 hours.	Extend the idle period. Increase the capacity of air receiver. Increase the cross-section of piping between compressor and air receiver.
0038 W Blow-off protection ↑	The pressure relief valve's activating pressure will soon be reached.	Change the oil separator cartridge. Open the shut-off valve in the venting line.

Message	Possible cause	Remedy
0041 W Mains voltage ↓	1. Power failure: The machine is automatically re-started.	Check power supply. Check the door interlock switch.
0043 W External load signal?	Ambiguous external load signal: Increased cut-out pressure exceeded. The external load control has not switched to idle (off load).	Check settings of the external controller. Take into account pressure drops across filters and dryer.
0044 W Oil T↓	Cooling oil temperature too low.	Check temperature switch, line and connection. Check the oil circulation. Increase room temperature.
0046 W System pressure ↓	Network pressure has fallen below the set 'low' value. Air consumption too high.	Check air demand. Check cable runs and sensor connections. Check the 'sys.press. low' warning setting.
0047 W No pressure buildup	The compressor cannot build-up to working pressure.	Check for air leaks. Check the value for internal pressure given in the *<analog data >*menu against the reading on the oil separator tank pressure gauge.
0048 W Bearing lube h⇟	Re-grease the motor bearings. Maintenance interval has elapsed.	Re-grease the motor bearings.
0049 W Annual maintenance	Last maintenance was 1 year ago.	Carry out the necessary maintenance and reset the corresponding maintenance interval counter.
0059 W Start T↓ ↓	The airend temperature is too low (<–10 °C) for the machine to be operated.	Keep ambient conditions within specified limits.
0060 W Start T↓	The airend temperature is too low (<+2 °C).	Keep ambient conditions within specified limits.
0061 W Compressor T↓	The airend discharge temperature (ADT) did not reach the minimum value within the specified time.	Contact KAESER Service.
0066 W Air filter dp⇡	Initial warning: Air filter clogged.	Change the air filter element soon.
0068 W Condensate drain	The condensate drain is defective.	Check the condensate drain and drain line.
0069 W Refrigeration dryer p↑	Refrigeration dryer: Pressure too high in the refrigerant circuit. Safety pressure switch tripped.	Clean the refrigerant condenser. Check the fan motor. Maintain operating conditions.

Message	Possible cause	Remedy
0070 W Refrigeration dryer T↑	Refrigeration dryer: Compressed air temperature too high.	Maintain operating conditions. Clean the refrigerant condenser. Clean the cooler. Install an extractor fan.
0071 W Oil level ↓	Cooling oil level too low.	Replenish the cooling oil.
0072 W RD condensate drain	Refrigeration dryer: The condensate drain is defective.	Check condensate drainage
0081 W		
0082 W		
0083 W		
0084 W		
0085 W		
0086 W		
0087 W		
0088 W		
0089 W		
0090 W		
0091 W		
0092 W		
0093 W p-Switch pi		
0094 W T-Switch ADT		
0095 W p-Switch pN		

Tab. 6 Warning messages and remedies

16 Interpreting system messages

System messages are identified with the letter Y .

The message numbers are not numbered consecutively.

Message	Possible cause	Remedy
0001 Y Hardware watchdog reset	System error	Contact KAESER Service.
0002 Y Internal software error	System error	Contact KAESER Service.
0003 Y Filesystem Read/Write failure	System error	Contact KAESER Service.
0004 Y CPU load too high	System error	Contact KAESER Service.
0005 Y RAM out of memory	System error	Contact KAESER Service.
1000 Y RFID error: switch SIGMA CONTROL power supply OFF→ON!	System error	Contact KAESER Service.

Tab. 7 System messages and remedies

KAESER KOMPRESSOREN

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1 Regarding this document

1.1 Using this document

- This document is for the exclusive use of KAESER Service personnel or the trained personnel of authorised sales partners.
- This document does not supersede or invalidate any existing Work Instructions.
- The document explains the function of certain products and gives instructions on operating, maintenance and repair.

➢ This document should be made accessible to authorised personnel only.

1.2 Copyright

This operating manual is protected by copyright. Any queries regarding the use or duplication of this documentation should be referred to KAESER. Correct use of information will be fully supported.

1.2.1 Software

The software used in SIGMA CONTROL 2 contains copyright-protected software which is licensed by GNU General Public License in versions 2 and 3.
A copy of these licenses is contained in SIGMA CONTROL 2 .
Display the licenses by pointing your browser to the "COPYING" file in the root directory of SIGMA CONTROL 2 .
URL:
http:// <Hostname>/ SIGMA CONTROL 2 COPYING

The licenses can be also found under this address:
http://www.gnu.org/licenses/gpl-2.0.txt
http://www.gnu.org/licenses/gpl.txt

Within three years from receipt of SIGMA CONTROL 2 , you may obtain the complete source code by sending a corresponding order to the following address:

Technical Office Electrical Design
KAESER KOMPRESSOREN
96450 Coburg, Postfach 2143
Germany

This offer is valid for anybody having this information.

1.3 Symbols and labels

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

1.3.1 Warnings

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

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

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

Tab. 8 Danger levels and their definitions (personal injury)

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

Example:

DANGER
The type and source of the imminent danger is shown here!
The possible consequences of ignoring a warning are shown here.
If you ignore the warning notice, the "DANGER" signal word indicates a lethal or severe injury will occur.

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

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

Example:

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

1.3.2 Potential damage warnings

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

Warning notices for damages are identified by their signal term.

Signal term	Meaning	Consequences of non-compliance
NOTICE	Warns of a potentially dangerous situation	Damage to property is possible

Tab. 9 Danger levels and their definition (damage to property)

Example:

NOTICE
The type and source of the imminent danger is shown here!
Potential effects when ignoring the warning are indicated here.

➢ The protective measures against the damages are shown here.

➢ Carefully read and fully comply with warnings against damages.

1.3.3 Other alerts and their symbols

This symbol identifies particularly important information.

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

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

➢ This symbol denotes lists of actions comprising one stage of a task.
Operating instructions with several steps are numbered in the sequence of the operating steps.

Information referring to potential problems are identified by a question mark.
The cause is named in the help text ...
➢ ... as is a solution.

This symbol identifies important information or measures regarding the protection of the environment.

Further information — Further subjects are introduced here.

2 Technical Specifications

2.1 SIGMA CONTROL 2 Controller

Industrial computer

- Internal temperature monitoring
- Internal undervoltage monitoring
- Battery-buffered real-time clock
  - Battery life span more than 10 years
  - Battery replaceable

2.1.1 User interface with display, CPU and interfaces

User interface

Feature	Value
Material	Plastics
Width [mm]	190
Height [mm]	130
Depth [mm]	45
Number of membrane keys	13
Number of LEDs	9
Degree of protection, control cabinet exterior	IP 54
Degree of protection, control cabinet interior	IP 20
Voltage [V]	24
Current [A]	0,3
Voltage source	Input/output module

Tab. 10 User interface

Display

Feature	Value
Graphical display [px]	255 x 128
Width [mm]	82
Height [mm]	41
Maximum number of lines/characters	8/30
Colours	Black/white with gray levels
Lighting	LED backlit
px ≙ pixel	

Tab. 11 Display data

Interfaces

Interface	Connection	Marking
Ethernet 10/100 Base T	RJ 45 socket	X1
IO bus	9-pole SUB-D pins	X2
RS485–FC (USS interface)	9-pole SUB-D socket	X3
COM modules, slot for communications module	Module optional for: Profibus, Modbus, Profinet, Devicenet	X4
SD card, SD card slot	SD/SDHC card	X5
The positions of the interfaces X1–X5 are marked on the rear of the controller.		

Tab. 12 Interfaces

Identification with RFID Equipment Card

Feature	Value
Hardware on the SIGMA CONTROL 2 controller	RFID write/read device
Hardware (external)	KAESER Equipment Card
Recognition distance [m]	Max. 0.05
Frequency [MHz]	13,56

Tab. 13 RFID

2.1.2 Input/output modules

There are three different types of input/output modules with different amounts of inputs and outputs.
The actually available number of input/output modules depends on the machine type and the available options.
Refer to the machine's wiring diagram for the input/output modules installed in your equipment.

Every input/output module is equipped with:

- Internal temperature monitoring
- Internal undervoltage monitoring
- LED indication of operational status

IOM 1

Input/Output	Input/output module 1		
	Internal, into the control cabinet	available in parallel on both sides	External, into the compressor interior
Digital input (DI), 24 VDC	4	10	2
Analog input current (AII), 0–20 mA	–	1	2
Analog input resistor (AIR), PT100	–	1	3
Digital output relay (DOR), 250 VAC, 8 A	8	–	–
Digital output transistor (DOT), 24 VDC, 0.5 A	–	2	1

Input/Output	Input/output module 1		
	Internal, into the control cabinet	available in parallel on both sides	External, into the compressor interior
Analog output current (AOI), 0–20 mA	–	–	–

Tab. 14 SC2IOM-1

IOM 2

Input/Output	Input/output module 2		
	Internal, into the control cabinet	available in parallel on both sides	External, into the compressor interior
Digital input (DI), 24 VDC	6	–	2
Analog input current (AII), 0–20 mA	–	1	2
Analog input resistor (AIR), PT100	–	3	–
Digital output relay (DOR), 250 VAC, 8 A	4	–	–
Digital output transistor (DOT), 24 VDC, 0.5 A	–	2	2
Analog output current (AOI), 0–20 mA	–	1	–

Tab. 15 SC2IOM-2

IOM 3

Input/Output	Input/output module 3		
	Internal, into the control cabinet	available in parallel on both sides	External, into the compressor interior
Digital input (DI), 24 VDC	6	–	2
Analog input current (AII), 0–20 mA	–	1	3
Analog input resistor (AIR), PT100	–	3	8
Digital output relay (DOR), 250 VAC, 8 A	8	–	–
Digital output transistor (DOT), 24 VDC, 0.5 A	–	1	1
Analog output current (AOI), 0–20 mA	–	1	–

Tab. 16 SC2IOM-3

2.1.2.1 Power supply specifications

Power is provided by the power supply unit within the machine.

Feature	Value
Rated power supply (stabilised) [V DC]	24
Current consumption SIGMA CONTROL 2 with IOM 1 [A]	2,4
Current consumption IOM 2 [A]	2,5
IOM ≙ input/output module	

Feature	Value
Current consumption IOM 3 [A]	1,6
IOM ≙ input/output module	

Tab. 17 Power supply specifications

2.1.2.2 Maximum cable lengths

Input/Output	Conductor length [m]
Analog input current (AII), Analog input resistor (AIR) Analog output current (AOI)	< 30
Digital input (DI), Digital output relay (DOR)	< 100
Digital output resistor (DOT)	< 30

Tab. 18 Cable lengths

2.1.2.3 Input/output modules – degree of protection

Feature	Value
Degree of protection within the machine	IP 54
Degree of protection within the control cabinet	IP 20

Tab. 19 Degree of protection, IOM

2.1.2.4 Input/output modules – dimensions

Feature	Value
Width [mm]	125
Height [mm]	250
Depth [mm]	44

Tab. 20 IOM dimensions

2.1.3 Sensors

Pressure transducer

Feature	Value
Output signal [mA]	0/4–20
Connection	Twin cable

Tab. 21 Pressure transducer

Resistance thermometer

Feature	Value
Sensing resistance (to DIN IEC 751)	PT100

Feature	Value
Connection	Twin cable

Tab. 22 Resistance thermometer

3 Safety and Responsibility

3.1 Basic instructions

SIGMA CONTROL 2 is manufactured to the latest engineering standards and acknowledged safety regulations.

The safety regulations of the machine in which SIGMA CONTROL 2 is installed apply.

3.2 Specified use

SIGMA CONTROL 2 is solely intended for the control of machines in which SIGMA CONTROL 2 is factory-installed. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result from incorrect use. The user alone is liable for any risks incurred.

- ➢ Adhere to the specifications given in these operating instructions and the machine's service manual.
- ➢ Operate the machine only within its performance limits and under the permitted ambient conditions.

3.3 Improper use

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

- ➢ Use SIGMA CONTROL 2 only as intended.
- ➢ Do not use SIGMA CONTROL 2 to control other machines or products for which SIGMA CONTROL 2 is not intended.

4 Design and function

4.1 The controller

SIGMA CONTROL 2 controls, regulates, monitors, and protects the machine.

All parameters needed to operate KAESER rotary screw compressors can be set and displayed using the controller. Various user-dependent password mechanisms protect the parameters.

Components

SIGMA CONTROL 2 comprises the following components:

- **M**ain **C**ontrol **S**ystem (MCS):
  - Industrial PC
  - Software for the control, regulation, and monitoring of the machine, for the display and modification of settings and for communication.
  - User interface with backlit display, touch keys, and interfaces.
  - **R**adio **F**requency **I**denfication (RFID):
    Identification with the KAESER RFID Equipment Card
  - Slot for customer interface; optional communications module
  - SD card slot for SD/SDHC cards:
    Manual loading of updates with an SC card, reading or recording process data
- **I**nput-**O**utput-**M**odule (IOM):
  Modules with digital and analog inputs and outputs with their own power supply.

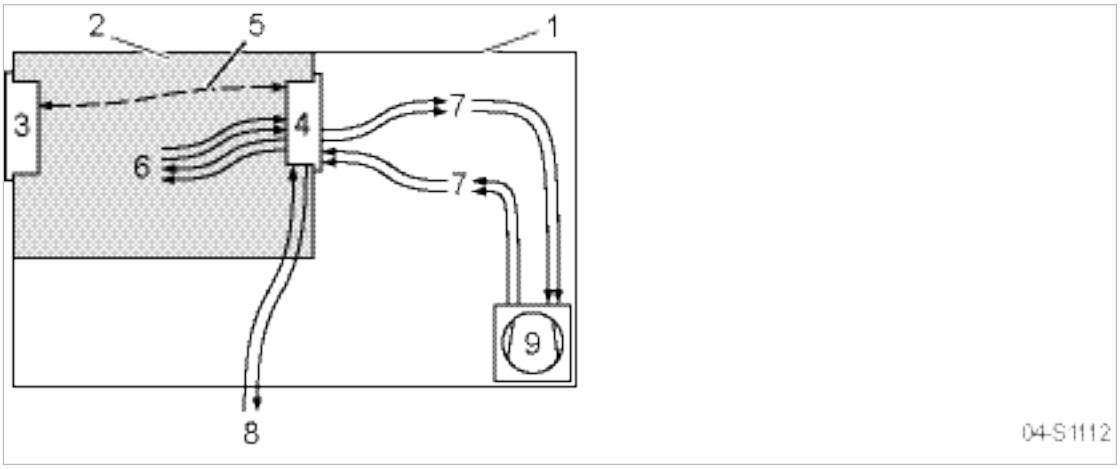


Fig. 2 System structure

1. Machine enclosure
2. Control cabinet
3. SIGMA CONTROL 2
4. Input/output module
5. IO bus
6. Inputs/outputs in the interior of the control cabinet
7. Inputs/outputs in the interior of the compressor
8. Inputs/outputs for external sensors
9. Compressor

Function

The **control and regulating function** allows:

- Automatic changeover of the machine from LOAD to IDLE or STANDSTILL.

- Optimum utilisation of the drive motor in relation to the user's actual air demand.
- Automatic restart of the machine after a power failure (can be deactivated).

The **monitoring function** allows:

- Supervision of all maintenance-relevant components via the maintenance interval counters.
- Display of warning and maintenance messages for due maintenance on the display of the SIGMA CONTROL 2 .

The **protective function** allows:

- Automatic machine shutdown on alarms that may lead to damage to the machine, e.g. overcurrent, overpressure, overtemperature.

4.2 Operating panel SIGMA CONTROL 2

Buttons

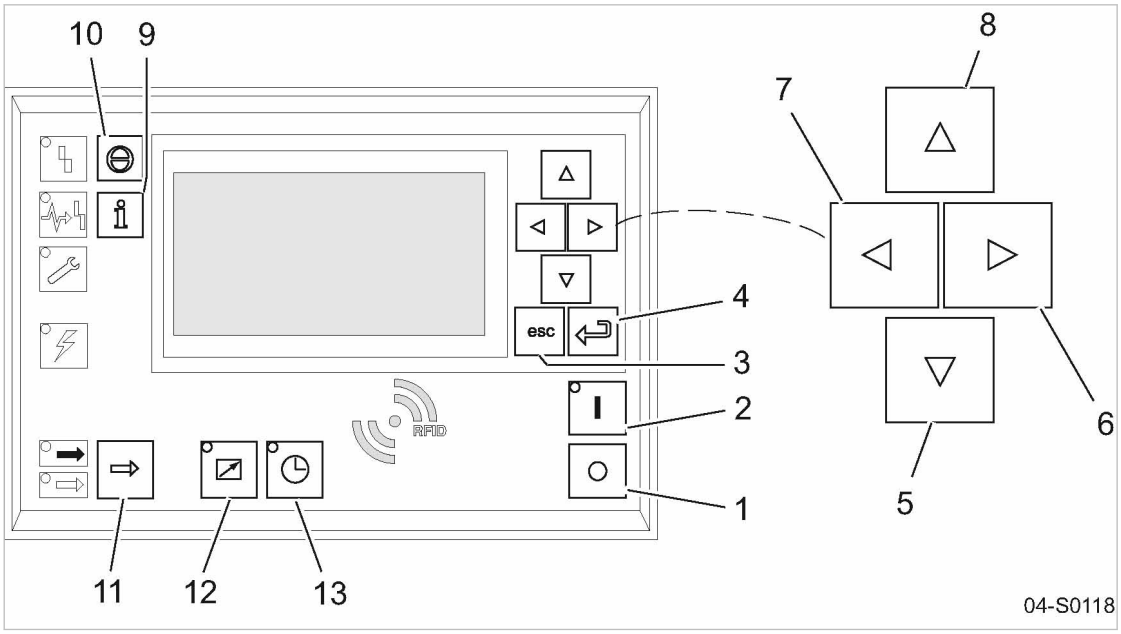


Fig. 3 Keys

Item	Name	Function
1	«OFF»	Switch off the machine.
2	«ON»	Switch on the machine.
3	«Escape»	Returns to the next higher menu level. Exits the edit mode without saving.
4	«Enter»	Returns to the selected submenu. Saves and leaves the edit mode.
5	«DOWN»	Scrolls down menu. Reduces a parameter value.
6	«Right»	Jumps to the right.
7	«Left»	Jumps to the left.

Item	Name	Function
8	«UP»	Scrolls menu up. Increases a parameter value.
9	«Events and information key»	Operating mode: Displays the event memory.
10	«Reset»	Acknowledges alarms and warning messages. If permissible: Resets the fault counter (RESET).
11	«LOAD/IDLE»	Toggles the compressor between LOAD and IDLE operating modes.
12	«Remote control»	Switches remote control on and off.
13	«Shift clock»	Switching clock-control on and off.

Tab. 23 Buttons

Displays

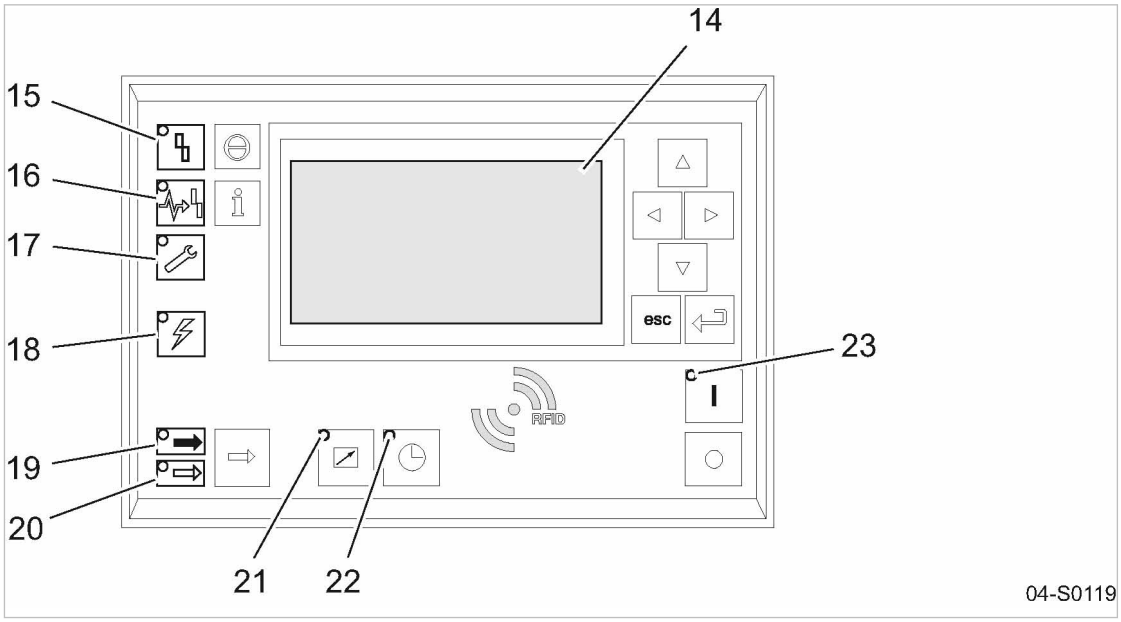


Fig. 4 Indicators

Item	Name	Function
14	Display field	Graphic display with 8 lines and 30 characters.
15	*Fault*	Flashes red when an alarm occurs. Lights continuously when acknowledged.
16	*communication*	Continuous red illumination if a communication connection (Ethernet, USS, COM modules) has a fault.
17	*Warning*	Flashes in yellow in the following events: ■ maintenance work due, ■ Warning message Lights continuously when acknowledged.

Item	Name	Function
18	*Control voltage*	Lights green when the power supply is switched on.
19	*LOAD*	Lights green when the compressor is running under LOAD.
20	*IDLE*	Lights green when the compressor is running in IDLE. Flashes when the «LOAD/IDLE» toggle key is pressed.
21	*Remote control*	The LED lights when the machine is in remote control.
22	*Shift clock*	The LED lights when the machine is in clock control.
23	*Machine ON*	Lights green when the machine switched on.

Tab. 24 Displays

RFID sensor field

RFID is the abbreviation for “**R**adio **F**requency **I**ndentification” and enables the identification of persons or objects.
Placing a suitable transponder in front of the RFID sensor field of the controller will automatically activate the communication between transponder and SIGMA CONTROL 2 .

A suitable transponder is the KAESER RFID equipment card. Two of them have been provided with the machine.

Typical application:

- Users log on to the machine.
  (no manual input of the password required.)

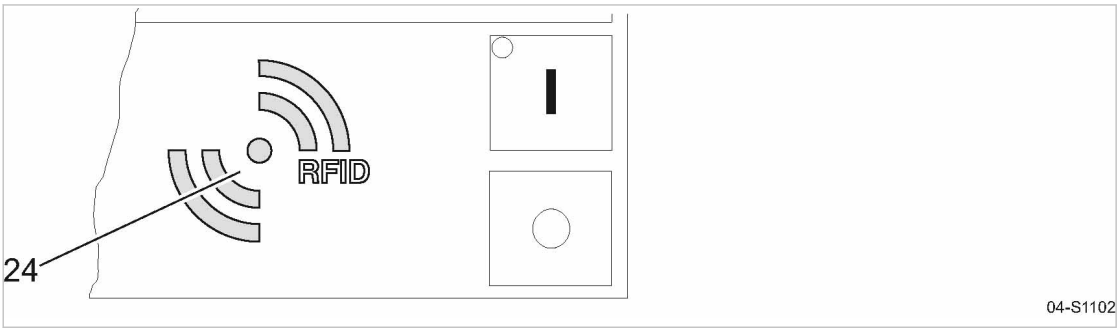


Fig. 5 RFID sensor field

Item	Name	Function
24	RFID	RFID sensor field for the communication with a suitable RFID transponder.

Tab. 25 RFID sensor field

Further information More information about the use of RFID technology is provided in the SIGMA CONTROL 2 operating manual.

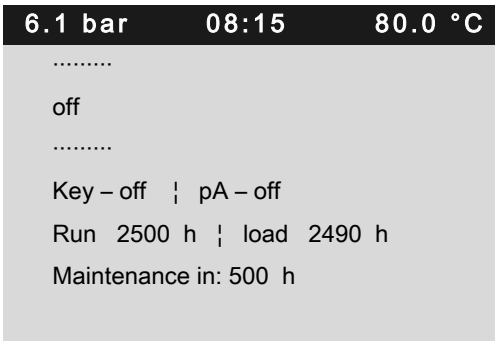
4.3 Display

Use the display to read information and to enter data. The display comprises 8 lines, each of 30 characters.

During operation, the display will indicate the operating mode.

Pressing «Enter» or one the arrow keys opens the main menu. Here, you can set the language to be used for the display of texts or open the various submenus.

4.3.1 Operating mode



Header

The header is the topmost line on the display. It is always shown as white text on a black background.

The following parameters are displayed permanently on the title bar:

- Working pressure
- Time
- Airend discharge temperature

Line 3: Operational state

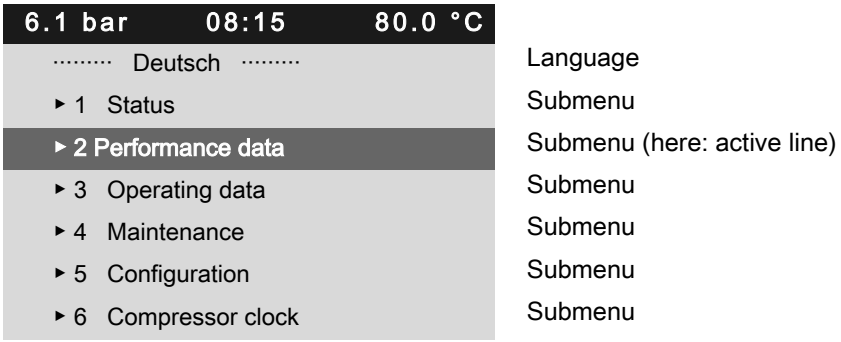
Depending on settings, either the current state of the machine or menu text is shown in line 3.

Lines 5 and 6: Machine state

The following parameters with their current values are displayed in lines 5 and 6:

- Remote control yes/no
- Time control yes/no
- Pressure control
- The hours during which the machine was activated
- The hours during which the machine ran in operating mode LOAD.

4.3.2 Main menu



Description

The main menu is the top menu level. You open the individual submenus in the main menu.

A scrollbar appears at the right side of the display if you open a menu with more than 6 lines. It represents the currently visible portion of the menu. A short scrollbar thus indicates that the opened menu is very long as only a small portion can be displayed.

The image above provides an example for the appearance of the main menu (without scrollbar).

Numbering

Each menu is numbered.

Because the access to certain menus is restricted to specific access rights, not all menus may be shown.

For example, you can recognise subordinate menus in the menu structure by the number preceding their designation. The menu structure is explained in chapter 4.5.2.

Active line

The active line is always shown as white text on a dark background. Do not confuse this with the header which is also shown with white lettering on a black background.

Press «Enter» to open a menu in the active line. This opens the selected menu.
Here, you can change parameters.

Further information For the setting of parameters see chapter 4.3.3.

4.3.3 Setting parameters

In order to set a parameter in the active line of the selected menu, you must always switch to setting mode.

You move to setting mode by:
pressing «Enter». The value of the parameter will flash indicating that it can be changed.

Changing parameters

Press «Enter». The value of the parameter will flash indicating that it can be changed.

The «Enter» key affects only the active line.

In some lines, you can change more than a single parameter.
In this case, you must first select the specific parameter with the «Left» or «Right» keys.

Resetting current parameters

In order to reset current parameters to Zero, activate the check box for Reset in the active line of the display.

First, press «Enter» to switch into setting mode. The check box for Reset will flash.
You then press «UP». The check box is activated and flashes.
Press «Enter» to save the settings.
The parameters no longer flash and are reset. The check box for Reset is again deactivated.

Check boxes for Reset	Status
☒	activated

Check boxes for Reset	Status
☐	deactivated

Tab. 26 Reset check box status

4.3.4 Activating keys with check boxes

Certain keys of the SIGMA CONTROL 2 are locked by default. Activate the corresponding check boxes in the active line of the display to unlock these keys.

First, press «Enter» to switch into setting mode. The check box will flash.
You then press «UP». The check box is activated and flashes.
Press again «Enter» to save the settings.
The display line no longer flashes and the key is activated.
Proceed correspondingly to deactivate a key.

Check box	Status
☑	activated
☐	deactivated

Tab. 27 Check box status

4.4 Access rights

Access to the controller is governed by the user name combined with a password.

Users log on using an RFID Equipment Card by default. Alternatively, you can manually enter the user name and the password.

Throughout this operating manual, the RFID Equipment Card will be simply called the "Equipment Card".

When the controller is switched on, the lowest level of access (level 0) is activated.

You have access to a further level: Level 2.
In level 2, you can display and specify further parameters and, for instance, reset the system pressure or the maintenance counters.

The access level will automatically return to level 0 after 10 minutes without any key being pressed.

4.4.1 Secure storage of the RFID Equipment Cards

You will receive 2 RFID Equipment Cards with each machine.
If both Equipment Cards are misplaced, you can register a new Equipment Card only after entering the user name and the password. A new Equipment Card may registered by the KAESER Service subject to a fee, if the user name and the password are lost.

4.5 Menu Schematic

4.5.1 Operating mode

When the machine is switched on, details of the software are displayed, for example,

Compressor	
Compressor PN	Compressor SN
Compressor EN	
SIGMA CONTROL 2 MCS	
PN: SN:	
Software:	

Machine model
Material number and serial number of the machine
Equipment number of the machine

MCS: Main Control System
Material number and serial number of the controller
Software version

Subsequently, the software is loaded and the current operating mode is displayed (example):

6.1 bar 08:15 80.0 °C
.....
off
.....
Key – off ¦ pA – off
Run 2500 h ¦ load 2490 h
Maintenance in: 500 h

Current operating mode

Operating parameters
Operating parameters

The following parameters are displayed:

- Operating mode of the machine
- Information to the «LOAD/IDLE» keys, «Remote control» or «Clock»
- Value for Setpoint pressure pA
- Number of operating hours and hours of the machine being in LOAD mode

The operations menu provides the most important parameters during the machine's operation.

4.5.2 Menu structure

Pressing «Enter» or one the arrow keys opens the main menu.

In the main menu, you can:

- Retrieve displayed information
- Enter customer-specific settings

The menus shown require access level 4.

Main menu

Navigation	Function/submenu
1 Status	■ 1.1 Messages – Status report – current Warnings current Alarms ■ 1.2 Statistics ■ 1.3 Current pressure control ■ 1.4 Current operating mode ■ 1.5 DI/DO display For details of the *< Status >* menu, see table 29 “Menu Status ”.
2 Performance data	Display of the following Performance data : ■ System pressure pNloc ■ Internal pressure pi ■ ADT ■ Oil separator ■ Starting temperature ■ Motor temperature ■ MCS Temperature ■ First IOM ..... Sixth IOM
3 Operating data	■ Load valve ON
	■ 3.1 Operating hours – Compressor – ON LOAD – Motor – Compressor block – SIGMA CONTROL 2
4 Maintenance	■ Oil filter ■ Oil separator ■ Oil change ■ Air filter ■ Valve inspection ■ Belt/coupling inspection ■ Bearing lube ■ Motor bearings ■ Fan bearing ■ Electrical equipment ■ Annual maintenance
5 Configuration	For details of the *< Configuration >* menu, see table 30 “Menu Configuration ”.

Navigation	Function/submenu
6 Compressor clock	■ Key clock ■ Reset
	Enter weekdays and times: ■ Switching points 01 10
7 User	■ Name Password: ■ Current access level:
8 Communication	■ 8.1 Ethernet ■ 8.2 Com-Module More details of the *< Communication >* menu, see table 33 “Menu Communication ”.
	■ Key remote
9 Machine test	■ 9.1 TÜV inspection
10 Components	■ 10.1 Compressor motor – 10.1.1 Power switching – 10.1.2 Motor temperature ■ 10.2 Fan ■ 10.3 Access doors ■ 10.4 Air filter ■ 10.5 Oil circuit ■ 10.6 Condensate drain ■ 10.8 Mains ■ 10.13 Dryer For details of the *< Components >* menu, see table 34 “Menu Components ”.

Tab. 28 Menu structure

Menu: 1 Status

Navigation	Function/submenu
1.1 Messages	■ 1.1.1 Current messages ■ 1.1.2 Message history – 1.1.2.1 Compressor messages – 1.1.2.2 Diagnostic messages – 1.1.2.3 System messages

Navigation	Function/submenu
1.2 Statistics	■ Load overall ■ Pressure actual value pNloc ■ Internal pressure ■ Motor starts ■ Motor starts /d ■ Motor starts /h ■ Motor starts T↓ ■ Last load run ■ Last idle run ■ Last motor OFF
1.3 Current pressure control	■ Cut-out press. ■ Pressure actual value ■ Setpoint pressure
1.4 Current operating mode	■ Compressor ON Load control ■ Control Mode Idle period ■ Acknowledgement
1.5 DI/DO display	Settings for IOM

Tab. 29 Menu Status

Menu: 5 Configuration

Navigation	Function/submenu
5.1 General	■ Model ■ Date/time ■ Date format ■ Time format ■ Unit of pressure ■ Temperature unit ■ Display lighting
	5.1.1 System information ■ Compressor – Material number – Serial number – Equipment number ■ SIGMA CONTROL 2 MCS – Material number – Serial number – Software
	■ 5.1.2 Serial data

Navigation	Function/submenu
5.2 Pressure control	■ 5.2.1 Pressure sensors ■ 5.2.2 Pressure settings ■ 5.2.3 Load control ■ 5.2.4 Pressure actual value For details of the *< Pressure control >* menu, see table 31 “Menu Pressure control ”.
5.3 Control Mode	■ Dryer
	■ 5.3.1 Venting period ■ 5.3.3 DUAL ■ 5.3.4 QUADRO
5.4 Compressor start	■ Autostart ■ Starting temperature
	■ 5.4.1 Compressor ON ■ 5.4.2 Compressor OFF ■ 5.4.3 Back pressure
5.5 Acknowledgement	■ Remote mode ■ Key remote ■ RC ack
5.6 ADT	■ AIR ■ Conductor correction: ■ ADT rise dT/dt
	■ 5.6.1 T-Switch ADT
5.7 I/O periphery	■ 5.7.1 DO functions ■ 5.7.2 Quantities ■ 5.7.3 External messages ■ 5.7.4 IOM type selection For details of the *< I/O periphery >* menu, see table 32 “Menu I/O periphery ”.

Tab. 30 Menu Configuration

Menu: 5.2 Pressure control

Navigation	Function/submenu
5.2.1 Pressure sensors	■ System pressure pNloc ■ AII 1.00 ■ AOI2.00 ■ Internal pressure pi ■ AII 1.01 ■ AOI2.00
	■ 5.2.1.1 p-Switch pN ■ 5.2.1.2 p-Switch pi

Navigation	Function/submenu
5.2.2 Pressure settings	■ pRV ■ Pressure rise ■ Nominal pressure ■ Setpoint pressure pA ■ Setpoint pressure pB ■ System pressure low ■ Cut-in pressure min
	■ 5.2.2.2 pi Rise ■ 5.2.2.3 pi min
5.2.3 Load control	■ local mode ■ Remote mode ■ Key remote ■ pA/pB clock ■ pA/pB cycle ■ pA/pB RC ■ load RC ■ loc.-loadRC ■ Key idle
5.2.4 Pressure actual value	■ Pressure actual value pNloc ■ AII 1.02 ■ current pNloc

Tab. 31 Menu Pressure control

Menu: 5.7 I/O periphery

Navigation	Function/submenu
5.7.1 DO functions	■ Controller ON ■ Compressor ON ■ Motor running ■ IDLE ■ ON LOAD ■ Group alarm ■ Group warning ■ Remote mode ■ Clock active ■ EMERGENCY STOP
	■ 5.7.1.1 Clock contact – Switching points 01 10
5.7.2 Quantities	■ Display 1 (p) , Display 2 (p) ■ Display 3 (T) , Display 4 (T) ■ Display 5 (I) , Display 6 (I)

Navigation	Function/submenu
5.7.3 External messages	■ External message 1 ..... External message 6
5.7.4 IOM type selection	■ First IOM 1 ..... Sixth IOM 6

Tab. 32 Menu I/O periphery

Menu: 8 Communication

Navigation	Function/submenu
8.1 Ethernet	■ 8.1.1 IP configuration – IP address – Subnet mask – Gateway – DNS Server 1 – DNS Server 2
8.1 Ethernet	■ 8.1.2 Connections – Restart – Timeout – Cycle time
	■ 8.1.2.1 SIGMA CONTROL 2 – Mode – Port – IP address
8.1 Ethernet	■ 8.1.3 E-mail – active: – Compressor number: – Sender address: – Sender name: – Contact telephone: – Receiver address: – SMTP Server: – User name: – Port ¦ Timeout – Interval time
8.2 Com-Module	■ Communication : data – Status Run – Start Com-Module: Slave no.: – Bus alarm Start td: – Timeout

Tab. 33 Menu Communication

Menu: 10 Components

Navigation	Function/submenu
10.1 Compressor motor	■ 10.1.1 Power switching – 10.1.1.1 Star-delta start – 10.1.1.2 DOL start – 10.1.1.3 High-voltage cell – 10.1.1.4 SFC USS Micromaster – 10.1.1.5 SFC USS Sinamics ■ 10.1.2 Motor temperature – PT100-AIR / PT100-AII – PTC – PT100
10.2 Fan	■ 10.2.1 Fan M4 – DOL start 1-stage – DOL start 2-stage ■ 10.2.2 Cabinet fan M7
10.3 Access doors	
10.4 Air filter	■ 10.4.1 Δp-Switch ■ 10.4.2 Δp-Sensor
10.5 Oil circuit	10.5.1 Oil separator ■ 10.5.1.1 Differential pressure – 10.5.1.1.1 Δp-Switch – 10.5.1.1.2 Δp-Sensor ■ 10.5.1.2 Temperature – 10.5.1.2.1 PTC – 10.5.1.2.2 PT100 ■ 10.5.1.3 Oil level
	10.5.2 Oil filter ■ 10.5.2.1 Δp-Switch
	10.5.3 Oil temperature
10.6 Condensate drain	Alarm
10.8 Mains	Power failure monitor Q1
10.13 Dryer	■ Activation ■ Control Mode ■ Timer ■ Temperature ■ Compressor ON ■ Condensate drain

Tab. 34 Menu Components

4.6 Operating modes and control modes

4.6.1 Operating modes

The machine operates in the following modes:

- LOAD:
  The inlet valve is open. The airend delivers compressed air to the distribution network.
  The drive motor runs under full load.
- IDLE:
  The inlet valve is closed. The minimum pressure/check valve shuts off the oil separator from the distribution network. The venting valve is open.
  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 distribution network. The venting valve is open.
  The drive motor is stopped.

Option C1

- MODULATING CONTROL:
  With the help of a control valve (the proportional controller) the degree of opening of the inlet valve is steplessly varied in response to the air demand. The airend delivers compressed air to the distribution network.
  The load and power consumption of the drive motor rises and falls with the air demand.
  The regulating valve is factory set. The setting should not be changed without consultation with KAESER Service.

4.6.2 Control modes

Using the selected control mode, the controller switches the machine between its various operational states in order to compensate for air being drawn of by consumers and maintain system pressure between the set minimum and maximum values. The control mode also rules the degree of energy efficiency of the machine.

The machine-dependant venting phase between the LOAD and STANDSTILL operating modes ensures load changes at minimum material stresses.

The controller SIGMA CONTROL 2 can operate in the following modes:

- DUAL
- QUADRO
- VARIO
- CONTINUOUS
- DYNAMIC

Energy-efficient control modes for various applications:

Application	Recommended control mode
Compressed air station with one machine or several machines with comparable delivery	VARIO
Machine for peak load in a compressed air station	DUAL
Machine for intermediate load in a compressed air station	VARIO

Application	Recommended control mode
Machine for basic load in a compressed air station	QUADRO

Tab. 35 Energy-efficient control modes

The SIGMA CONTROL 2 is factory set to DUAL control mode unless specifically ordered otherwise.

DUAL

In the DUAL control mode, the machine is switched back and forth between LOAD and IDLE to maintain the machine working pressure between the preset minimum and maximum values. When maximum pressure is reached, the machine switches to IDLE. When the preset *idling time* has elapsed the machine switches to STANDSTILL.

The *idling time* is factory preset according to the maximum starting frequency of the drive motor. The shorter the *idling time* setting, the sooner (and more frequently) the drive motor is stopped.

QUADRO

In contrast to the the DUAL regulating mode, the machine will switch from LOAD to STANDSTILL in QUADRO mode after periods with low compressed air consumption.

After periods with a high compressed air consumption, the machine will switch from LOAD to STANDSTILL after passing through IDLE.

In this control mode, the controller requires two specified times: The *running time* and the *idle/ standstill time*.

The shorter these times are set, the sooner (and more frequently) the drive motor is stopped.

VARIO

The VARIO mode is based on the DUAL control mode. The difference to DUAL is that the *idling time* is automatically lengthened or shortened to compensate for higher or lower machine starting frequencies.

CONTINUOUS

In the DUAL control mode, the machine is switched back and forth between LOAD and IDLE to maintain the machine working pressure between the preset minimum and maximum values. When maximum pressure is reached, the machine switches to IDLE. The motor is **not** stopped, i.e. the machine does not switch to STANDSTILL.

DYNAMIC

In contrast to the the DUAL regulating mode, the machine will switch from LOAD to STANDSTILL in DYNAMIC mode at low drive motor temperature.

And from LOAD via IDLE to STANDSTILL at a high drive motor temperature.

The lower the drive motor temperature, the sooner (and, therefore, more often and longer) it is stopped.

4.6.3 Frequency-controlled drive (SFC)

The frequency converter compares the actual network pressure with a target value and adjusts the speed of the drive motor, and thereby the delivery of the compressor, accordingly.
The speed of the airend determines the rate of compressed air delivery and the working pressure.

If air consumption rises, the frequency converter increases motor speed and therefore increases the volume of air delivered.

If air consumption drops, the converter reduces motor speed and therefore reduces the volume of air delivered.

The network pressure remains constant – within the control range of the converter - regardless of fluctuating air demand.

If network pressure exceeds the target value:

Outside the frequency converter's range of control the machine reverts to the selected control mode.

DUAL:

The minimum controllable speed is reached and the machine switches to IDLE. The drive motor runs unloaded with low power consumption.
When the idle period has elapsed, the machine switches to STANDSTILL.

VARIO/QUADRO/CONTINUOUS:

The minimum controllable speed is reached and, depending on the air demand at the time, the machine switches either to IDLE or to STANDSTILL.

DYNAMIC:

The minimum controllable speed is reached and, depending on the air temperature of the drive motor, the machine switches either to STANDSTILL or to IDLE.

If network pressure falls below the set-point:

The frequency converter runs the motor up to a speed at which air delivery matches the air demand.

The inlet valve opens and the machine delivers compressed air.

The converter varies the speed of the drive motor according to the air demand. The power consumption of the drive motor rises and falls according to air demand.

4.7 Factory settings for control modes

Machine model	Control mode
SX, SM, SK	QUADRO
AS	QUADRO
BS	VARIO
CS	VARIO
DS	DYNAMIC
ES	DYNAMIC
FS	DYNAMIC
HS	DYNAMIC

Machine model	Control mode
SFC	QUADRO
DSG-2	DYNAMIC
FSG-2	DYNAMIC

Tab. 36 Factory settings for control modes

4.8 MODULATING control

With the help of a mechanical control valve (the proportional controller), the opening and closing of the inlet valve is continuously varied in relation to the actual air demand. The airend delivers compressed air to the distribution network.
The load and power consumption of the drive motor rises and falls with the air demand.
To ensure optimal control on large compressors, the control air for the proportional controller is taken from an external air receiver.

5 Installation and Operating Conditions

5.1 Maintaining ambient conditions

➢ Follow the instructions in the machine's service manual.

5.2 Installation conditions

The installation and operating conditions depend the machine into which the controller is installed.

NOTICE
UV radiation!
Direct sunlight (UV radiation) can destroy the display screen.
➢ Do not allow the display screen to be subjected to direct sunlight.

➢ See the machine's operating manual for required conditions.

6 Installation

6.1 Safety

Follow the instructions below for safe installation.
Warning instructions are located before a potentially dangerous task.

Disregard of these instructions can result in serious injury.

Basic safety instructions

Disregarding safety instructions can result in unforeseeable hazards.

- ➢ Follow the instructions in chapter 3 'Safety and Responsibility'.
- ➢ Allow maintenance work to be performed by authorised personnel only.
- ➢ Make sure that no one is working on the machine.
- ➢ Ensure that all service doors and panels are locked.

Working on live components

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

- ➢ Work on electrical equipment may only be carried out by authorised electricians.
- ➢ Switch off and lock out the power supply isolating device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.

6.2 Exchanging the controller

The machine cannot be operated during an exchange of the controller.

Proceed as follow when exchanging the controller:

Precondition The machine is switched off (all poles), the device is secured to prevent switching back on, the absence of voltage has been verified.

1. Document the controller's settings, if possible.
2. Remove electrical connections.
3. Remove the retaining clips of SIGMA CONTROL 2 and take the controller out.

Result The controller is removed.

Install the new controller in reverse order. Enter the following settings after the exchange.

Precondition Password level 4 is activated.

1. Initiate a software update to update the IOM modules (see chapter 13)
2. Set the machine type (see chapter 12.2).
3. Set the pressure parameters for the pressure relief valve (see chapter 12.3)
4. Set the pressure parameters for the machine (see chapter 7.3)
5. Set the operating hours for the machine (see chapter 12.1)

6. Set the maintenance hours for the machine (see chapter 8.4)
7. If necessary, activate additional components (e.g., refrigeration dryer).
8. Perform a function test on the machine.

6.3 Machine identification

If the machine is run in sequenced operation its identification as detailed in the installation diagram is to be taken into account.

Identifying the machine for operation in remote mode.

➢ Attach the following notice to warn of remote machine operation (suggestion):

⚠ WARNING
Remote control: danger of unexpected starting!
➢ Make sure the power supply disconnecting device is switched off before commencing any work on the machine.

Tab. 37 Machine identification

➢ Label the starting device in the remote control centre as follows (suggestions):

⚠ WARNING
Remote control: danger of unexpected starting!
➢ Before starting, make sure that no one is working on the machine and that it can be safely started.

Tab. 38 Remote control identification

Identifying the machine for clock control mode operation

➢ Attach the following notice to warn of remote machine operation (suggestion):

⚠ WARNING
Clock control: danger of unexpected starting!
➢ Make sure the power supply disconnecting device is switched off before commencing any work on the machine.

Tab. 39 Machine identification

7 Initial Start-up

7.1 Outline

SIGMA CONTROL 2 was designed and developed for a number of applications. Potential settings are correspondingly varied.

It is possible that only a few of these settings are needed for the initial start-up. This depends on the application.

The following sections explain the large number of practical applications, but only one Configuration is relevant for a specific use.

7.2: Configuring the controller (display format, units, languages, etc.)

7.3: Matching the pressure parameters of the machine and possible modules

7.4: Configuring machine start and stop

7.5: Activating and setting up the control modes

7.6: Configuring the machine for local mode

7.7: Configuring the machine for master control

7.8: Configuring e-mail

7.9: Configuring input and output signals

7.10: Configuring the compressed air outlet temperature

7.11: Activating remote acknowledgement

7.12: Linking to an external pressure transducer

7.13: Activating the energy-saving mode for the refrigeration dryer

7.14: Machine commissioning

7.2 Configuring the controller

All controller settings are explained in detail in the following sections. The most common settings are summarised for experienced users in section "Important settings" in the beginning of this manual.

➢ Carry out settings as required:

- 7.2.1: Selecting menu options (introduction)
- 7.2.2: Changing the display language
- 7.2.4: Entering and displaying passwords
- 7.2.5: Creating additional user names
- 7.2.6: Setting up time and date
- 7.2.7: Setting display formats (date, time, units of pressure and temperature)
- 7.2.8: Activating summer/winter time
- 7.3.3: Activating/deactivating the «IDLE» key

7.2.1 Selecting menu options

All menu options can be selected with the «DOWN», «UP» and «Enter» keys.

Example: Selecting < Configuration > General > menu option

Precondition The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Press the «UP» or «DOWN» key until *Configuration* is displayed as active line.
3. In order to open the *< Configuration >* menu, press «Enter» once.
4. Use the «DOWN» or «UP» keys to select a submenu in the *< Configuration >* menu, *< General >* or *< Pressure control >* for instance.
5. Press the «UP» repeatedly until *General* is displayed as active line.
6. Press «Enter».
   The current menu is the menu option *< General >* in the menu *< Configuration >*.
7. Use the «DOWN» or «UP» keys to select a menu option in the *< General >* submenu, *< System information >* for instance.

7.2.2 Changing the display language

The controller can display text messages in the following languages:

Bulgarian	English (USA)	Indonesian	Norwegian	Slovenian
Chinese	Estonian	Italian	Polish	Spanish
Chinese (Taiwan)	Finnish	Japanese	Portuguese	Spanish (South-America)
Danish	French	Korean	Romanian	Czech
German	French (Canada)	Croatian	Russian	Turkish
English	Greek	Dutch	Swedish	...

Tab. 40 Language diversity

Some of the units, as well as clock and date format, will be adjusted according to the language selected.

Precondition The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Press the «UP» repeatedly until the specified language is displayed as active line.
3. Use the «Enter» key to switch to setting mode.
   The currently set language flashes.
4. Use the «DOWN» or «UP» keys to select the desired language.
5. Press «Enter» to accept the setting.
6. Press «Escape» repeatedly to return to the main menu.
   The display texts are now in the selected language.

7.2.3 Access rights with equipment card

Use the Equipment Card to quickly and easily check the advanced access rights to the SIGMA CONTROL 2 .

Advanced access rights let you:
- read additional data
- change other settings

1. Simply present the equipment card to the sensor field of the controller, see also chapter 4.2.
   Your user name and access level will be displayed.
2. Press «Enter» to confirm the access right.

The Equipment Card is damaged or lost.
➢ Manually enter the user name and password (see also the following chapter).

7.2.3.1 Access via RFID Identity Key

Authorised service technicians can gain access with the RFID Identity Key.
➢ Log on to the controller as you would with the Equipment Card. (See also chapter 7.2.3.)

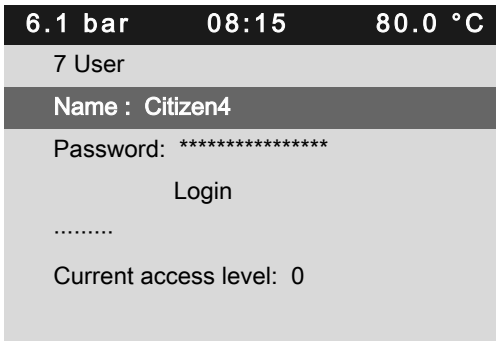
The validity of RFID Identity Keys is limited to one year!

7.2.4 Access right via manual input

Entering the user name

Precondition The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Use the «DOWN» key to select the *<User>* menu option.
   The *Name* line is displayed as being active.



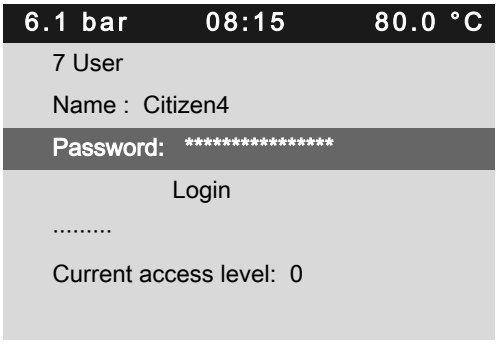
3. Press «Enter» to switch into setting mode.
   A column with alphanumeric characters appears.
4. Repeatedly press «DOWN» or «UP» until the requested character is displayed.
5. Press the «Right» arrow.
   The cursor jumps to the next position.
6. Complete the remaining characters of the name.
7. Press the «Right» arrow.
8. Press «Enter» to accept the settings.

Result The user name is entered in full.

Enter current password

Precondition The user name has been entered.

1. Press «DOWN» once.
   The *Password* line is displayed as being active.
2. Press «Enter» to switch into setting mode.
   A column with alphanumeric characters is displayed.



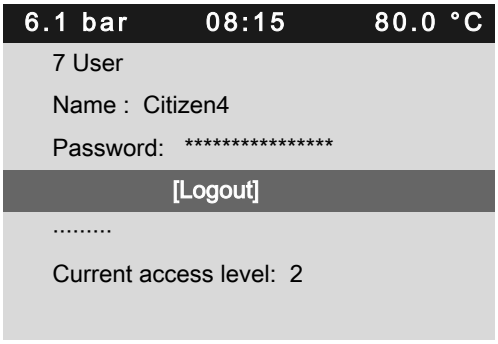
3. Repeatedly press «DOWN» or «UP» until the requested character is displayed.
4. Press the «Right» arrow.
   The cursor jumps to the next position.
5. Complete the remaining characters of the password.
6. Press the «Right» arrow.
7. Press «Enter» to accept the settings.

Result The password is entered in full.

Logging on

Precondition User name and password are entered.

1. Press «DOWN» once.
   The *Login* line is displayed as being active.
2. Press «Enter» to complete the login process.
   The *Login* text in the active line switches to *Logout*.
   You current access level is shown as level *2* .



3. Press «Escape» repeatedly to return to the main menu.

Result You are logged in with a higher access level.

7.2.5 Creating additional user names

In order to change passwords or to create new users, you require a PC application (remote HMI). Use the Equipment Card to quickly and easily check the advanced access rights to the SIGMA CONTROL 2 .

➢ Preferably use the equipment card.

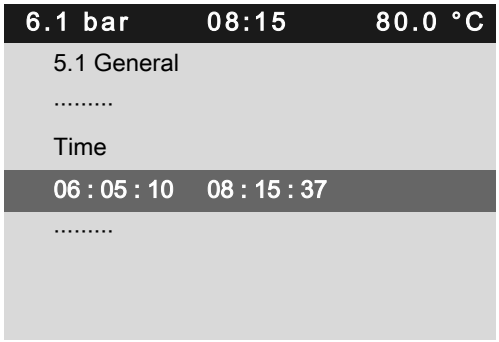
7.2.6 Checking/setting time and date

Precondition Access level 2 is activated.
The operating mode is displayed.

Checking/setting the Time

When operating the machine with a timer program, check the time settings at least once a year.

1. Press «Enter».
   The main menu is displayed.
2. Select the menu *< Configuration ➞ General >*.
3. Press the «DOWN» key repeatedly until the current Time is displayed as active line.

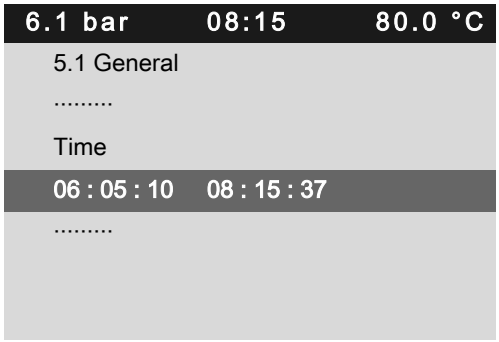


4. Press the «Right» arrow.
5. Press «Enter» to switch into setting mode.
   The hour display flashes *00* : *00* : *00*.
6. Use «UP» or «DOWN» to change the hour setting.
7. Press the «Right» arrow.
   The minute display flashes *00* : *00* : *00*.
8. Use «UP» or «DOWN» to change the minute setting.
9. Press the «Right» arrow.
   The second display flashes *00* : *00* : *00* .
10. Use «UP» or «DOWN» to change the second setting.
11. Press «Enter» to save the settings.
12. Press «Escape» repeatedly to return to the main menu.

Checking/setting the date

Precondition Password level 2 is activated,
the *< Configuration ➞ General >* menu is selected (see 7.2.1).

1. Press the «DOWN» key repeatedly until the current date is displayed as active line.



2. Press «Enter» to switch into setting mode.
   The day display flashes *00* : *00* : *00*.
3. Use «UP» or «DOWN» to change the day setting.
4. Press the «Right» arrow.
   The month display flashes *00* : *00* : *00*.
5. Use «UP» or «DOWN» to change the month setting.
6. Press the «Right» arrow.
   The year display flashes *00* : *00* : *00* .
7. Use «UP» or «DOWN» to change the year setting.
8. Press «Enter» to save the settings.
9. Press «Escape» repeatedly to return to the main menu.

7.2.7 Setting display formats

When setting the language, several display formats will automatically adjust to local usage.

Setting the Date format

Select your preferred date format.

Format	Example:
DD.MM.YY	30.07.10
YY-MM-DD	10–07–30
MM/DD/YY	07/30/10

Tab. 41 Date format

Precondition Password level 2 is activated,
menu *< Configuration > General >* is selected (see 7.2.1).

1. Press the «DOWN» key repeatedly until Date format is displayed as active line.

2. Press «Enter» to switch into setting mode.
   DD.MM.YY flashes.
3. Change the format with the «DOWN» or «UP» keys.
4. Press «Enter» to save the setting.
5. Press «Escape» repeatedly to return to the main menu.

Setting the time format

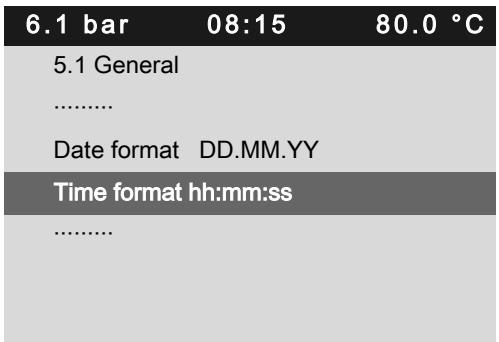
Select your preferred Time format .

Format	Example:
hh:mm:ss	13:33:45
hh:mm	13:33
hh:mm:ssAM/PM	01:33:45PM
hh:mmAM/PM	01:33PM

Tab. 42 Time formats

Precondition Password level 2 is activated,
menu *< Configuration > General >* is selected (see 7.2.1).

1. Press the «DOWN» key repeatedly until *Time format* is displayed as active line.



2. Press «Enter» to switch into setting mode.
   hh:mm:ss flashes.
3. Change the format with the «DOWN» or «UP» keys.
4. Press «Enter» to save the setting.
5. Press «Escape» repeatedly to return to the main menu.

Setting the Unit of pressure

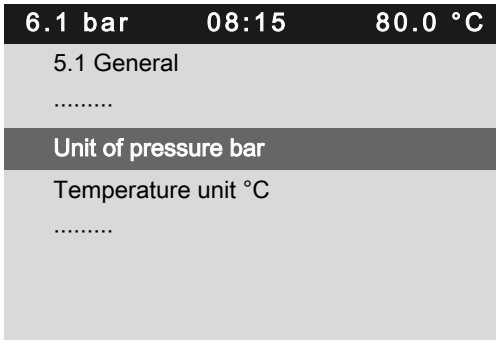
Select your preferred display of the Unit of pressure :

Format	Example:
bar	5.5 bar
hPa	5523 hPa
MPa	0.55 MPa
psi	80 psi
at	5.6 at
"Hg	162.9 "Hg

Tab. 43 Units of pressure

Precondition Password level 2 is activated,
menu *< Configuration > General >* is selected (see 7.2.1).

1. Press the «DOWN» key repeatedly until *Unit of pressure* is displayed as active line.



2. Press «Enter» to switch into setting mode.
   bar flashes.
3. Change the unit with the «DOWN» or «UP» keys.
4. Press «Enter» to save the setting.
5. Press «Escape» repeatedly to return to the main menu.

Setting the temperature display units

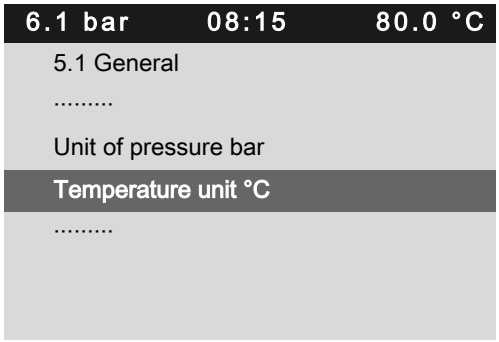
Select your preferred display of the Temperature unit :

Format	Example:
°C	46 °C
K	319 K
°F	114 °F

Tab. 44 Units of temperature

Precondition Password level 2 is activated,
menu *< Configuration > General >* is selected (see 7.2.1).

1. Press the «DOWN» key repeatedly until Temperature unit is displayed as active line.



2. Press «Enter» to switch into setting mode.
   °C flashes.
3. Change the unit with the «DOWN» or «UP» keys.
4. Press «Enter» to save the setting.
5. Press «Escape» repeatedly to return to the main menu.

7.2.8 Setting and activating summer/winter time

The functions for summer/winter time are not yet implemented.

➢ Ignore any corresponding references to chapter 7.2.8 in this manual.

7.3 Pressure parameters of the machine

This chapter contains information on the display and configuration of all the machine pressure parameters and is divided into the following sections:

- 7.3.1: Displaying pressure parameters
- 7.3.2: Configuring the pressure parameters

"Display:" means that the parameter will only be shown.

"Setting:" means that the parameter can also be changed.

Parameter	Explanation
pRV	Display: Activating pressure of the pressure relief valve on the oil separator tank
pE	Pressure increase Setting: ■ pE SP: Switching point pE ; upper safety limit for machine maximum pressure; in an external LOAD control, this value is used to switch the machine from LOAD to IDLE. ■ pE SD: Switching differential pE
dpFC	Limiting value for machines with frequency-controlled drive (SFC). Setting: ■ dpFC Limit for minimum delivery. If this value is exceeded [Setpoint pressure switching point + dpFC], the compressor switches from LOAD to IDLE.

Parameter	Explanation
Nominal pressure	Display: The compressor is designed for this pressure (maximum system pressure set-point)
Setpoint pressure	The Setpoint pressure can be regulated to two different values: pA and pB Setting: ■ Switching point pA or control pressure pA in machines with frequency converter (SFC) ■ Switching point pB or control pressure pB in machines with frequency converter (SFC)
System pressure low	A warning message can be displayed when the limiting value System pressure low is reached. Setting: ■ Be SD: Switching differential System pressure low , SP: Switching point System pressure low ■ Optional warning message: no message, Warning message displayed or an additional output signal is sent, e.g., to a control centre
Cut-in pressure min	Display: For design reasons, pressure can only be built up above this value.

Tab. 45 Compressor pressure parameters

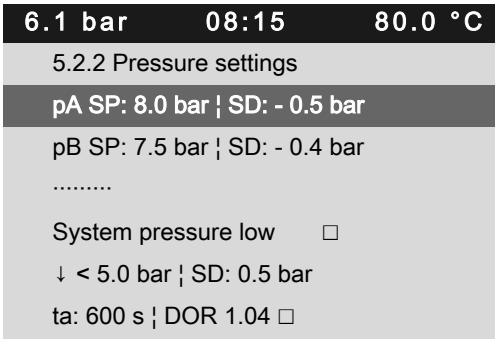
➢ Parameters correspond to the following specifications

7.3.1 Displaying pressure parameters

Precondition Password level 2 is activated.
The *< Configuration ➞ Pressure control >* menu is selected.

Opening the menu for pressure parameters

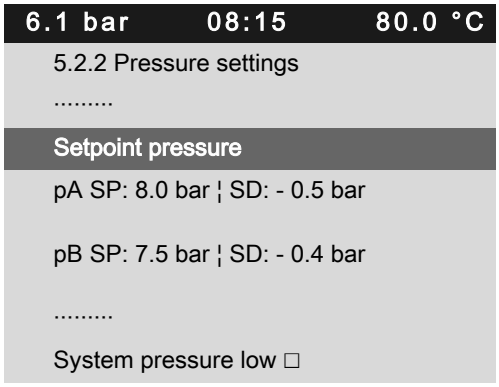
1. Press «DOWN» or «UP» repeatedly until *Pressure settings* is displayed as active line.
2. Press «Enter».
   The system displays the pressure parameters.



Menu
Active line

Displaying compressor parameters

1. Press «DOWN» repeatedly until *Setpoint pressure* is displayed.



Menu

Active line

current Setpoint pressure pA and switching differential

current Setpoint pressure pB and switching differential

2. Display further parameters with «UP» and «DOWN».

7.3.2 Configuring the pressure parameters for compressors

7.3.2.1 Adjusting system set-point pressure pA and pB

The pressure parameters can only be set within certain limits:

Rated machine pressure ≥ SP: pA / pB ≥ minimum cut-in pressure* + switching differential

Tab. 46 Setting limits for system set-point pressure (* Cut-in pressure min)

The machine switches to LOAD under the following condition:

System pressure ≤ SP: pA / pB - switching differential

Tab. 47 Pressure condition for LOAD

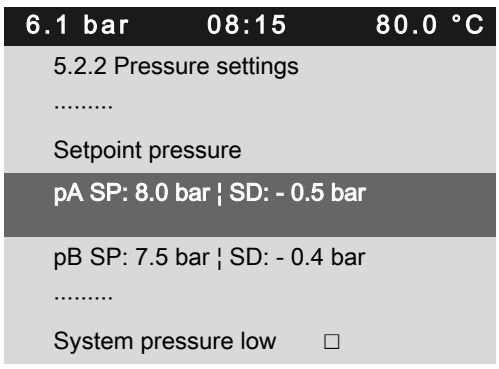
The machine switches to IDLE under the following condition:

System pressure = Setpoint pressure

Tab. 48 Pressure condition for IDLE

Precondition Password level 2 is activated.

1. Select *< Configuration ➞ Pressure control ➞ Pressure settings >* (see Section 7.3.1)
2. Press «UP» or «DOWN» repeatedly until the following is displayed as active line:



Menu

Active line with current value for Setpoint pressure pA

3. Press «Enter» to switch into setting mode.
   The *8.0 bar* parameter flashes.
4. Use «UP» or «DOWN» to adjust Setpoint pressure pA .
5. Press «Enter» to accept the setting.
6. Adjust the switching differential in the same way.
7. Adjust the Setpoint pressure pB and the switching differential in the same way, if necessary.
8. Press «Escape» repeatedly to return to the main menu.

Result The settings for Setpoint pressure pA and pB are adjusted.

7.3.2.2 Adjusting the value for " System pressure low "

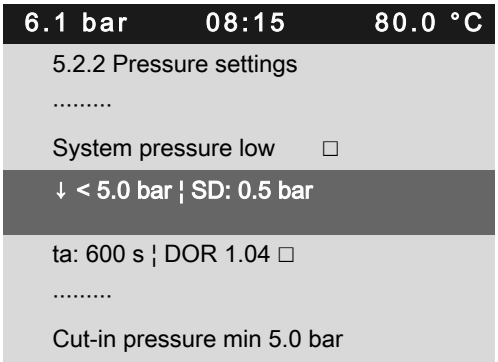
If the system pressure falls to the " System pressure low " value, SIGMA CONTROL 2 will display a warning message for the system pressure being too low.
The switching differential influences the pressure at which the message can be acknowledged or the optionally activated output will again switch:

Message	Output
5,0 bar Message coming	active
5,5 bar Message going	inactive

Tab. 49 Example: Activated output

Precondition Password level 2 is activated.

1. Select *< Configuration ➞ Pressure control ➞ Pressure settings >* (see Section 7.3.1)
2. Press the «DOWN» key repeatedly until the following is displayed as active line:



Menu

Current value System pressure low ¦ current switching differential

3. Press «Enter» to switch into setting mode.
   The *5.0 bar* parameter flashes.
4. Use «UP» or «DOWN» to adjust the setting.
5. Press «Enter» to accept the setting.
6. Adjust the switching differential if necessary in the same way.
7. Press «Escape» repeatedly to return to the main menu.

7.3.2.3 Adjusting pressure rise pE

The value for pressure rise pE serves as a safety limit value when the machine is externally controlled. When the system set pressure reaches the value pE (for example, when the external control functions incorrectly) the machine switches to IDLE.

The warning message *External load signal?* is triggered.

Precondition Password level 2 is activated.

1. Select *< Configuration ➞ Pressure control ➞ Pressure settings >* (see Section 7.3.1)
2. Press the «DOWN» key repeatedly until the following is displayed as active line:

6.1 bar 08:15 80.0 °C 5.2.2 Pressure settings pRV 16.0 bar ..... Pressure rise	Menu
pE SP: 8.4 bar ¦ SD: - 0.5 bar	Active line with current switching point Pressure rise ¦ current switching differential
dpFC : 0.2 bar	

3. Press «Enter» to switch into setting mode.
   The *8.4 bar* parameter flashes.
4. Use «UP» or «DOWN» to adjust the setting.
5. Press «Enter» to accept the setting.
6. Adjust the switching differential if necessary in the same way.
7. Press «Escape» repeatedly to return to the main menu.

7.3.2.4 Adjusting pressure rise in frequency-controlled machines (SFC)

The pressure rise value *dpFC* is the limit from which the machine switches to IDLE.

This value can be between 0.2 bar and 0.4 bar. The factory setting is 0.2 bar.

The pressure rise is added to the set-point pressure. In this way, the set-point pressure can be changed without having to adjust the parameter again.

Precondition Password level 2 is activated.

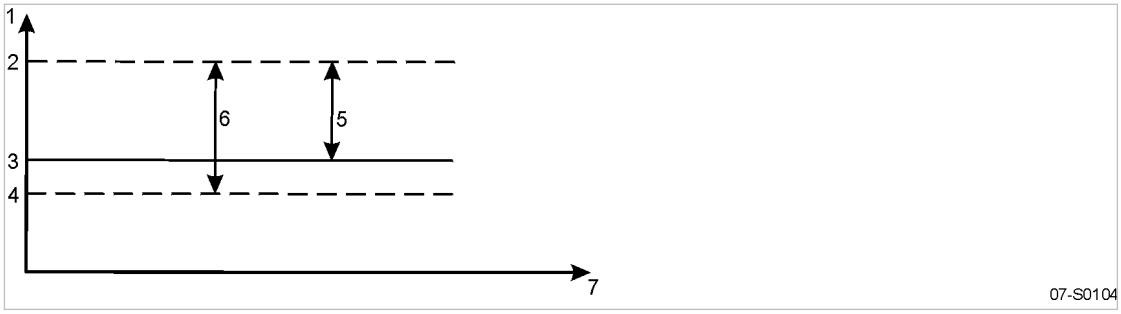
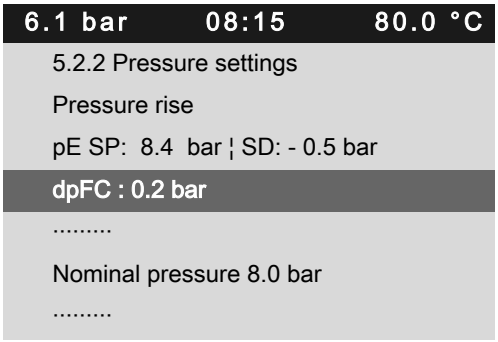


Fig. 6 Pressure rise in frequency-controlled machines

1. System pressure
2. IDLE switching point: Setpoint pressure + dpFC
3. Setpoint pressure pA or pB
4. LOAD switching point: (Setpoint pressure + dpFC) - switching differential
5. Pressure rise dpFC
6. System pressure band width

1. Select *< Configuration ➞ Pressure control ➞ Pressure settings >* (see Section 7.3.1)

2. Press «DOWN» repeatedly until the following is displayed:



Menu

Pressure increase

Active line with pressure increase value dpFC

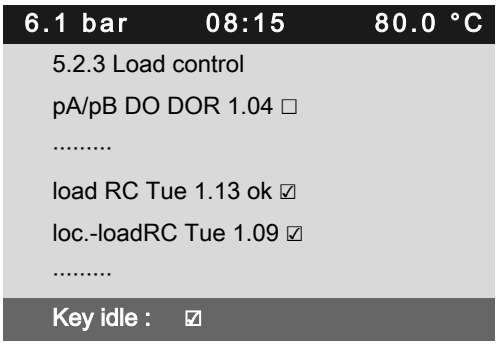
3. Press «Enter» to switch into setting mode.
4. Use «UP» or «DOWN» to adjust the setting.
5. Press «Enter» to accept the setting.
6. Press «Escape» repeatedly to return to the main menu.

7.3.3 Activating/deactivating the «IDLE» key

In order to prevent unauthorised users from switching the machine to IDLE, you can deactivate the «IDLE» key on the operating panel.

Precondition Password level 2 is activated,
The *< Configuration ➞ Pressure control ➞ Load control >* menu is selected (see Section 7.2.1).

1. Press «UP» or «DOWN» repeatedly until «IDLE» key is displayed as active line.
2. Press «Enter» to switch into setting mode.
   The check box for «IDLE» key will flash.

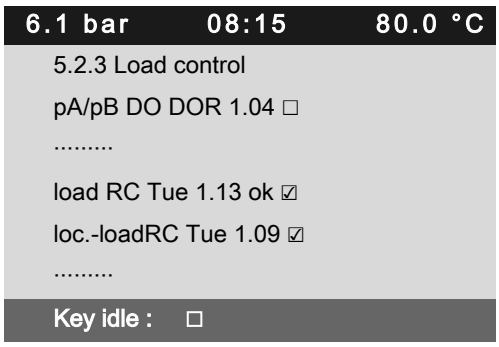


Menu

Active line with check box

3. Press «UP».
   The deactivated check box is displayed.

4. Press «Enter» to save the setting.
   The «IDLE» key is de-activated.



Menu

Active line with deactivated check box

5. Press «Escape» repeatedly to return to the main menu.

Result Thus, it is ensured that unauthorised users can press the «IDLE» key without the machine switching to IDLE.

7.4 Configuring machine start and stop

➢ In addition to manually starting the machine locally, you have the following alternatives:

Function	State on delivery/setting	See
Automatic start/stop in programmed clock mode	No clock (time) program entered	7.4.1
Holidays	Not set	7.4.2
Remote start, e.g. from a control centre	Deactivated	7.4.3
IDLE (venting)	Activated	7.4.4
Automatic restart after power failure (after delay period).	Activated	7.4.5

Tab. 50 Settings for machine start and stop.

7.4.1 Automatic start/stop in programmed clock mode

Overview

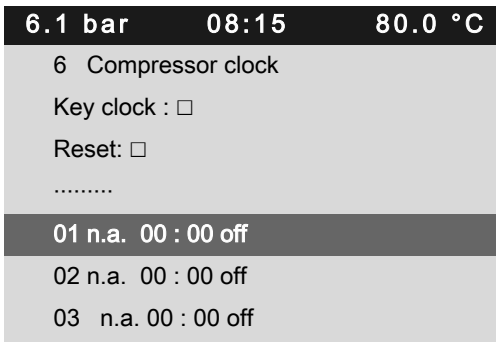
- If not activated, enter password for level 2.
- Select *< Compressor clock >*.
- set/adjust the time program.
- Activate the «clock» key.

7.4.1.1 Selecting the Compressor clock menu

Precondition Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.

2. Select *< Compressor clock >*.
   The display for setting the Compressor clock timing program appears.



7.4.1.2 Setting the clock program (example)

When setting a clock program for the first time, note the switching times on a sheet of paper first.

In addition to individual week days, the controller has the following cycles:

- Mon-Thu
- Mon-Fri
- Mon-Sat
- Mon-Sun
- Sat-Thu

You can also program an OFF time (Shutdown periods) (see Section 7.4.2).

Example:

- Machine ON: Weekdays 6:30 – 17:00, Fridays 6:30 – 15:00.
- Machine OFF: Sat – Sun and during midday break from 12:00 – 13:00.

The following switching points result:

No.	Day	Time	Function
1	Mon-Fri	06:30	ON
2	Mon-Fri	12:00	OFF
3	Mon-Fri	13:00	ON
4	Mon-Thu	17:00	OFF
5	Fri	15:00	OFF

Tab. 51 Example of a machine ON/OFF clock program

Precondition Password level 2 is activated,
the «clock» key is activated,
the "clock" menu is selected.

1. Press «DOWN» repeatedly until the 01 switching point is displayed as active line.

6.1 bar 08:15 80.0 °C	
6 Compressor clock	Menu
.....	
01 n.a. 00 : 00 off	Active line with 01 switching point
02 n.a. 00 : 00 off	Switching point 02
03 n.a. 00 : 00 off	Switching point 03
04 n.a. 00 : 00 off	Switching point 04
05 n.a. 00 : 00 off	Switching point 05

2. Press «Enter» to switch into setting mode.
   The *n.a.* column flashes in the active line.
3. Use «UP» to specify the settings for the weekdays.
4. Press «Enter» to accept the setting.
5. Press the «Right» key once.
6. Press «Enter» to switch into setting mode.
   Time column, hours display, *00 : 00* flashes in the active line.
7. Use «UP» to specify the settings for the hours.
8. Press the «Right» key once.
9. Time column, minutes display, *00 : 00* flashes in the active line.
10. Use «UP» to specify the settings for the minutes.
11. Press «Enter» to accept the settings.
    The display stops flashing and the time (hours/minutes) is set.

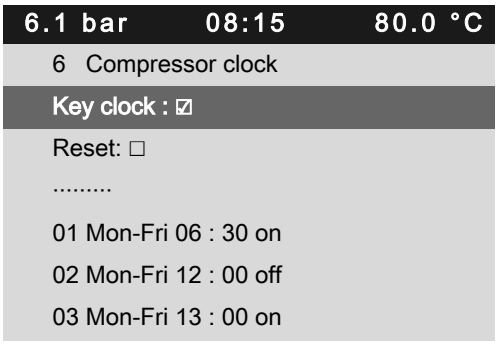
6.1 bar 08:15 80.0 °C	
6 Compressor clock	Menu
.....	
01 Mon-Fri 06 : 30 on	Switching point 01 is set
02 Mon-Fri 12 : 00 off	Switching point 02 is set
03 Mon-Fri 13 : 00 on	Switching point 03 is set
04 Mon-Thu 17 : 00 off	Switching point 04 is set
05 Fri 15 : 00 off	Switching point 05 is set

12. Press the «Right» key once.
    The *Action off / on* column flashes.
13. Press «Enter» to switch into setting mode.
14. Use «UP» to specify the settings for the Compressor ON action.
15. Press «Enter» to accept the setting.
    The Compressor ON action is set for the first switching point.
16. Specify further switching points in the same manner.

Result Weekdays, time and the Compressor ON / Compressor OFF actions are set for all switching points.

7.4.1.3 Activating the«compressor clock» key

1. Press the «UP» repeatedly until *Key clock* is displayed as active line.
2. Press «Enter» to switch into setting mode.
   The check box flashes in the active line.



3. Activate the check box with «UP» and press «Enter».
4. Press «Escape» repeatedly to return to the main menu.
   The «clock» key is activated and can be used.
5. Press «clock» to enable the operation with a timing program.

7.4.2 Setting up the holiday period

The functions for company shutdown are not yet implemented.

➢ Ignore any corresponding references to chapter 7.4.2 in this manual.

7.4.3 Starting the machine remotely from a control centre (remote ON/OFF or remote control function)

If the machine is to be started and stopped from a remote control centre then the following settings have to be made:

Overview

- Make the electrical connection (a spare input for the remote contact is shown in the electrical wiring diagram for the machine, preferably DI 1.12).
- Switch machine start to remote mode.
- Activate the «remote control» key.
- If required, activate the «clock» key and configure the clock program (see Section 7.4.1.2)
- If required, assign the remote contact to another input.
- Press the «remote control» key.

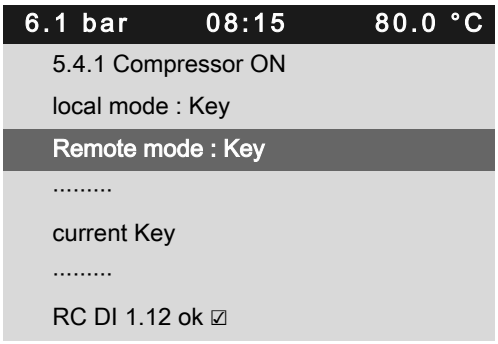
7.4.3.1 Switching the machine start to Remote mode

Two methods are available to start the machine remotely from a control centre:

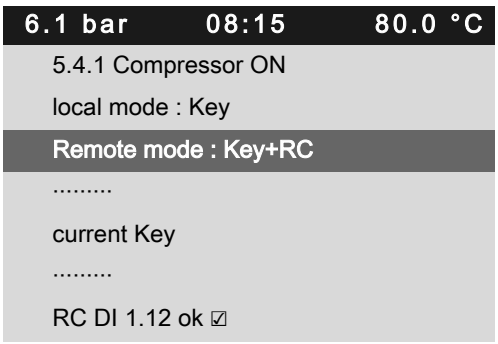
- Method **A**: Starting the machine with the input signal from the remote control centre.
- Method **B**: Starting the machine from the remote control centre in addition to a configured ON/OFF clock program.
  The machine can be started from the remote control centre even though the clock is activated and the actual program sequence is OFF at this point in time.

Precondition
The electrical connection has been made.
Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the < *Configuration* → *Compressor start* → *Compressor ON* > menu.
3. Press the «UP» repeatedly until *Remote mode* is displayed as active line.
4. Press «Enter» to switch into setting mode.
   Key flashes.



5. Press «DOWN» repeatedly until *Key+RC* is displayed.
6. Press «Enter» to accept the setting.



Result
The machine start is set to Remote mode with Key+RC .

7.4.3.2 Activating/deactivating the «remote control» key

Precondition
The electrical connection has been made.
Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the < *Configuration* → *Compressor start* → *Compressor ON* > menu.
3. Press «DOWN» repeatedly until *Key remote* is displayed as active line.

4. Press «Enter» to switch into setting mode.
   The check box for Key remote will flash.

6.1 bar 08:15 80.0 °C	
5.4.1 Compressor ON	Menu
.....	
current Key	
.....	
RC DI 1.12 ok ☑	
Key remote : ☐	Active line with check box
Key clock : ☐	

5. Press «UP».
   The activated check box is displayed.
6. Confirm the setting with «Enter».

6.1 bar 08:15 80.0 °C	
5.4.1 Compressor ON	Menu
.....	
current Key	
.....	
RC DI 1.12 ok ☑	
Key remote : ☑	Active line with deactivated check box
Key clock : ☐	The clock key is not activated.

7. Press «Escape» repeatedly to return to the main menu.
   The «remote control» key is activated and can be used.
8. If method **B** with the clock program is selected, the «clock» key must be activated in the same manner.

7.4.3.3 Assigning another input

Inputs already assigned cannot be further assigned.

1. Press the «DOWN» key repeatedly until the following is displayed as active line:

6.1 bar 08:15 80.0 °C	
5.4.1 Compressor ON	Menu
.....	Remote contact DI 1.12 (default)
current Key	
.....	
RC DI 1.12 ok ☑	Active line
Key remote : ☑	
Key clock : ☐	

2. Press «Enter».
   An inverse cursor appears.

3. Use the «UP» or «DOWN» keys to select another input and confirm with «Enter».
   The input has now been assigned.
4. Press the «Remote» key to enable the machine to be started from the remote control centre.

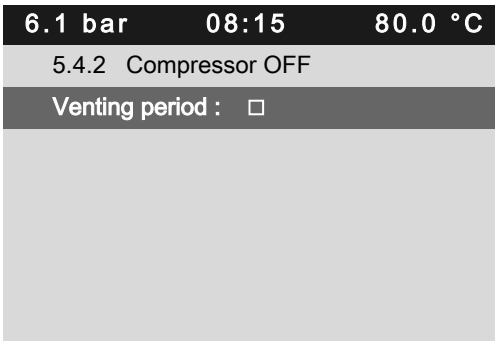
If an input is rejected it means it is already assigned.
➢ Select a different input.

7.4.4 Activating/deactivating the idle phase (Venting period function)

After receiving the OFF signal from the remote control centre, an additional idling (Venting period function) phase can be activated before the machine is stopped completely. The duration of the idling phase can be timed and/or regulated by internal pressure.

Precondition Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the *< Configuration ➞ Compressor start ➞ Compressor OFF >* menu.
   The *" Venting period "* function is displayed in the active line.
3. Press «Enter» to switch into setting mode.
   The check box for the " Venting period " function will flash.



Menu
Current setting " Venting period " is deactivated

4. Press «UP».
   The check box for the " Venting period " function is activated.
5. Press «Enter» to save the setting.

The function can be deactivated in the same manner.

Result The " Venting period " function is activated.

7.4.5 Activating/deactivating and adjusting the "automatic restart after a power failure" function

' Autostart ' is activated as standard.

To avoid overloading the mains power supply through several machines starting simultaneously a delay period determining the restart of each machine can be entered.

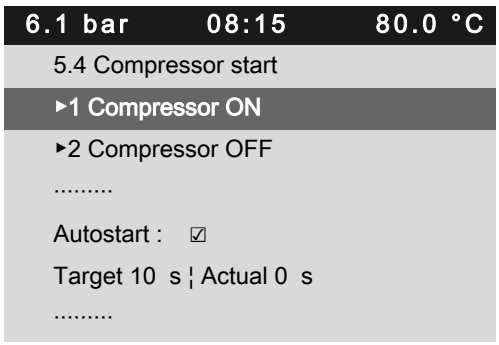
Overview

- If not activated, enter password for level 2

- Select the *< Configuration → Compressor start >* menu.
- Activate/deactivate the restart function
  or
  set the restart delay.

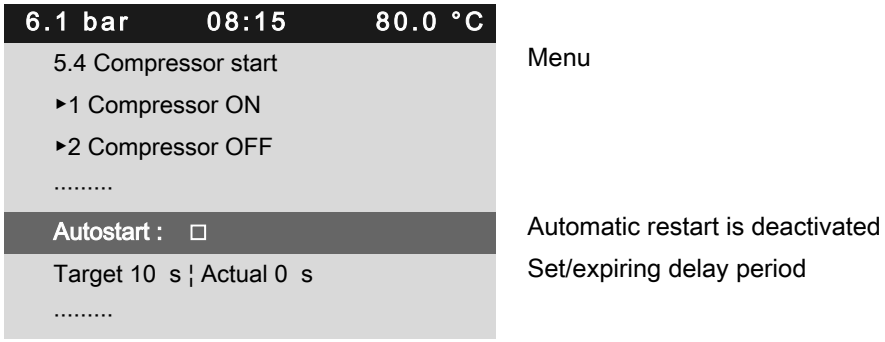
Precondition Password level 2 is activated.
The *< Configuration → Compressor start >* menu option is selected.

1. Press «Enter».
   The *Compressor start* menu is displayed.



Deactivating/activating automatic restart

1. Press «DOWN» repeatedly until Autostart is displayed as active line.



2. Press «Enter» to switch into setting mode.
   The check box for the " Autostart " function will flash.
3. Press «UP».
   The check box for the " Autostart " function is activated.
4. Press «Enter» to accept the setting.

Activate the “ Autostart ” function in the same manner.

5. Press «Escape» repeatedly to return to the main menu.

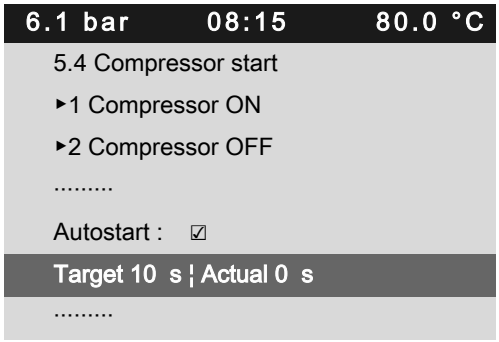
Result Automatic restart after a power failure is now deactivated.

Setting up the automatic restart delay period

If you operate several machines, it is better to start them in sequence.
Time for restart: Use the set times (IDLE to LOAD) of the other machines as base.

Precondition Password level 2 is activated.
The *< Compressor start >* menu is selected.

1. Press «DOWN» repeatedly until the delay time for the restart is displayed as active line.

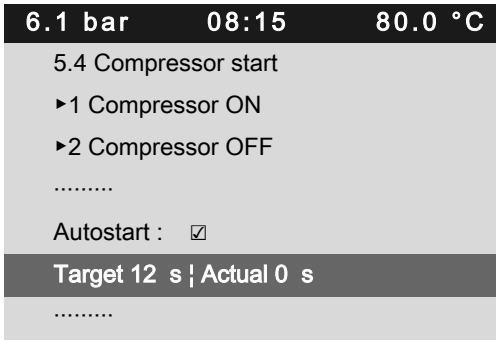


Menu

automatic restart is activated

Set/expiring delay period

2. Press «Enter» to switch into setting mode.
   Target flashes.
3. Change the time using the «DOWN» or «UP» keys.



Menu

Active line

4. Press «Enter» to accept the setting.
5. Press «Escape» repeatedly to return to the main menu.

Result You have adjusted the delay tome for the restart after a mains failure from 10 s to 12 s.

7.5 Activating and setting up the control modes

The controller is provided with various control modes that can bring about different capacity utilisation depending on machine application. Chapter 4.6 provides a comprehensive description of all control modes.

7.5.1 Selecting a control mode

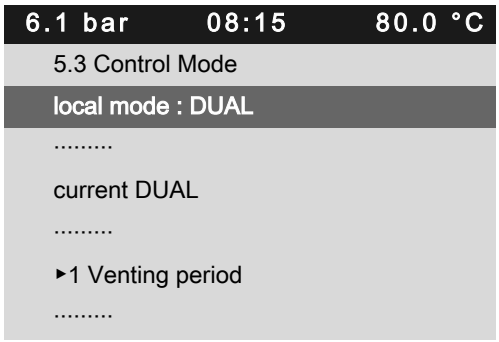
The following control modes are possible:

- DUAL
- QUADRO
- VARIO
- DYNAMIC
- CONTINUOUS

The standard setting of Control Mode depends on the machine type.

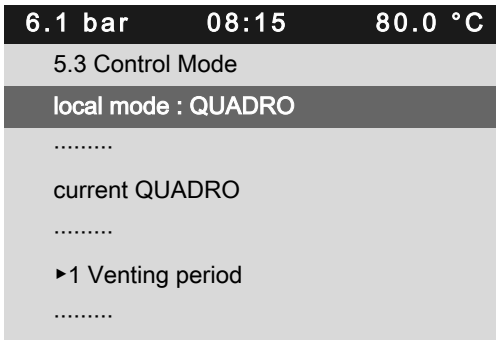
Precondition Password level 2 is activated.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the < *Configuration* → *Control Mode* > menu.
3. Press «UP» repeatedly until *local mode* is displayed as active line.
   The Control Mode setting is shown in the active line.



Menu
Active line
Current Control Mode
Menu Venting period

4. Press «Enter» to switch into setting mode.
   DUAL flashes.



Menu
Active line
Changed current Control Mode
Menu Venting period

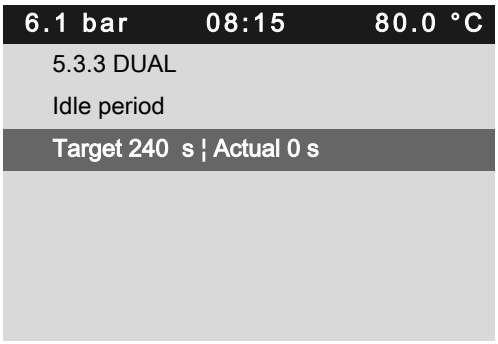
5. Use «UP» to adjust Control Mode to the QUADRO setting.
6. Press «Enter» to accept the setting.
   The new Control Mode *QUADRO* is shown in the *current* line.
7. Press «Escape» repeatedly to return to the main menu.

7.5.2 Adjusting Idle period of Control Mode DUAL

When the Idle period period has elapsed, the machine comes to a STANDSTILL.
The shorter the period, the more often the machine will switch from IDLE to STANDSTILL.
SIGMA CONTROL 2 will take into account the maximum motor switching capacity.
Depending on the machine type, the machine may not fall below a minimum Idle period or standstill time.

Precondition Password level 2 is activated.
DUAL control mode is selected.
The display shows the operating mode.

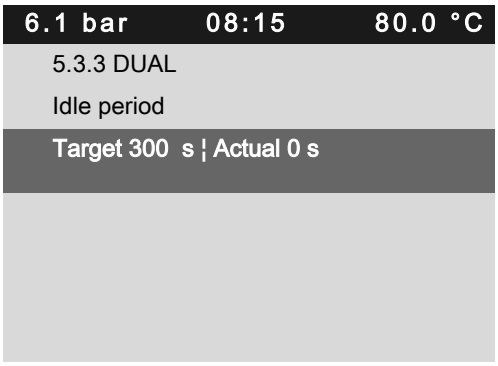
1. Press «Enter».
   The main menu is displayed.
2. Select the *< Configuration ➞ Control Mode ➞ DUAL >* menu. (see section 7.5.1)
   The Idle period setting is shown in the active line.



Menu

Active line

3. Press «Enter» to switch into setting mode.
   The current *Idle period 240 s* flashes.



Menu

Active line with changed Idle period , (example: 300 seconds)

4. Use «UP» to change to the desired Idle period .
5. Press «Enter» to accept the setting.
6. Press «Escape» repeatedly to return to the main menu.

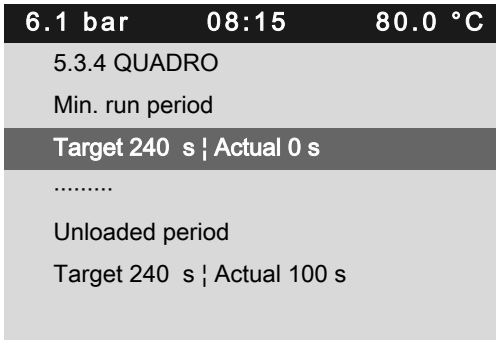
7.5.3 Adjusting the unloaded and minimum running period in Control Mode QUADRO

When the Min. run period has elapsed, the machine switches from IDLE to STANDSTILL. Depending on the setting for Unloaded period , the machine switches from LOAD to IDLE or directly to STANDSTILL.

Precondition
Password level 2 is activated.
QUADRO control mode is selected.
The display shows the operating mode.

1. Press «Enter».
   The main menu is displayed.
2. Select the *< Configuration ➞ Control Mode ➞ QUADRO >* menu.

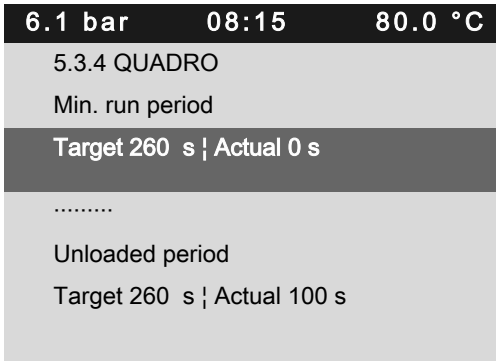
3. Press «DOWN» repeatedly until *Target* is displayed as active line.



Menu

Active line set-point value for Min. run period

4. Press «Enter» to switch into setting mode.
   The set-point value *240 s* flashes.



Menu

Active line with changed set-point value for Min. run period

Changed set-point value for Unloaded period

5. Use «UP» to change the Min. run period .
6. Press «Enter» to accept the setting.
7. Change the Unloaded period accordingly.
8. Press «Escape» repeatedly to return to the main menu.

Further information See chapter 4.6 for an overview of the control modes.

7.6 Configuring the machine for local mode

In local mode the machine is regulated with the Setpoint pressure pA or pB . The controller is provided with the following modes of operation:

Operating mode	Description	See section
pA	The machine is controlled by Setpoint pressure pA	7.6.3.3
pB	The machine is controlled by Setpoint pressure pB	
pA/pB clock	The changeover between pA and pB is regulated by a timer program.	7.6.2
pA/pB cycle	The changeover between pA and pB is regulated by a programmed time pulse.	7.6.3

Tab. 52 Local operating mode (local mode)

➢ Adapting the Setpoint pressure as described in Section 7.3.

Overview

- If not activated, enter password for level 2
- Select *< Configuration >*.
- Set/adjust the clock program (see Section 7.6.2)
  or
  Timer (see Section 7.6.3).
- Local mode

7.6.1 Selecting < Configuration ➙ Pressure control ➙ Load control >

Precondition Password level 2 is activated.

1. In operating mode, switch to the main menu with the «Enter» key.
2. Select *< Configuration ➙ Pressure control ➙ Load control >*.
   The *< Load control >* menu is displayed.

7.6.2 Configuring the system pressure set-point changeover using the timer program

Note the configuration sequence:

➢ First, determine the timer program.

➢ Then select the operating mode.

Overview

- If not activated, enter password for level 2
- Set the day of the week for the first switching point (delete any existing timer program).
- Enter Time for the first switching point.
- Select Setpoint pressure for the first switching point pA or pB
- Specify any further switching points.
- Select Operating mode pA/pB clock , see Section 7.6.3.3.

When setting a timer program for the first time, note the switching times on a sheet of paper first.

In addition to individual week days, the controller has the following cycles:

- Mon-Thu
- Mon-Fri
- Mon-Sat
- Mon-Sun
- Sat-Thu

Example:

- Peak load period: weekdays 06:30 – 17:00, Fridays 06:30 – 16:00;
- Low load period: midday from 12:00 – 13:00 and the remaining period.

The clock program is established with the following switching points (maximum 10 switching points available):

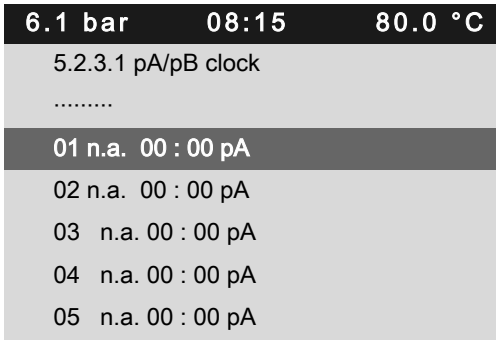
No.	Weekday	Time	System set-point pressure
01	Mon-Fri	06:30	pA on
02	Mon-Fri	12:00	pB on
03	Mon-Fri	13:00	pA on
04	Mon-Thu	17:00	pB on
05	Fri	16:00	pB on

Tab. 53 Example of system pressure changeover switching points

Setting the day of the week for the first switching point

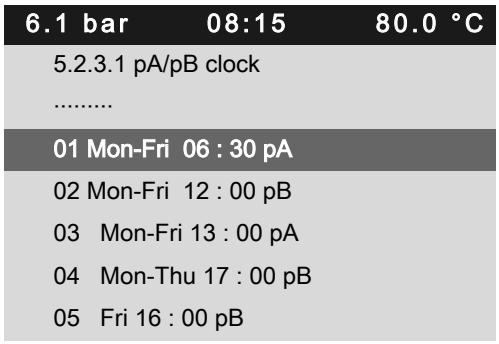
Precondition Password level 2 is activated,
The *< Configuration ➞ Pressure settings ➞ Load control >* menu is selected (see Section 7.6.1).

1. Press «DOWN» repeatedly until *pA/pB clock* is displayed as active line.
2. Press «Enter».
   The system displays the setting options for the switching points.



Menu

3. Press «Enter» to switch into setting mode.
   n.a. flashes in the active line.



Menu

Active line (settings for weekdays, time, pA)

(settings for weekdays, time, pB)

4. Use «DOWN» or «UP» to set the time and confirm by pressing «Enter».
5. Press the «Right» key once.
6. Press «Enter» once.
   Time column, hours display, *00 : 00* flashes in the active line.
7. Use «UP» or «DOWN» to change the hour setting.
8. Press the «Right» key once.
9. Time column, minutes display, *00 : 00* flashes in the active line.

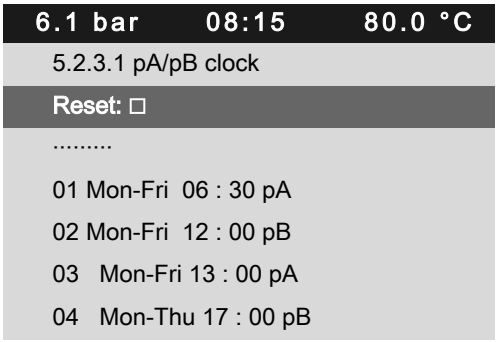
10. Use «DOWN» or «UP» to set the minutes and confirm by pressing «Enter».
    The display stops flashing and the time (hours/minutes) is set.
11. Press the «Right» key once.
12. Press «Enter».
    Setpoint pressure pA / Setpoint pressure pB flashes.
13. Use «UP» or «DOWN» to change the setting for pA or pB .
14. Specify further switching points in the same manner.

Deleting the existing timer program

Take the following steps to delete an existing timer program:

Precondition Password level 2 is activated.
The *< Configuration ➞ Pressure settings ➞ Load control >* menu is selected.

1. Press «DOWN» repeatedly until *pA/pB clock* is displayed as active line.
2. Press «Enter».
   The current timer program is displayed.
3. Press the «UP» repeatedly until *Reset* is displayed as active line.



4. Press «Enter» to switch into setting mode.
   The check box for Reset will flash.
5. Press «UP».
   The check box is activated.
6. Press «Enter» to accept the settings.

Result The timer program is now deleted.

Selecting the Operating mode

1. Press the «DOWN» key.
2. Press «Enter» and use the «DOWN» or «UP» key to select pA or pB (not required in this example).
3. Specify any other Switching points in the same manner.
   The timer program is now created.
4. Select the pA/pB clock operating mode, see Section 7.6.3.3.
5. Press «Escape» repeatedly to return to the main menu.

7.6.3 Configuring the system pressure set-point changeover using the Timer

Overview

- If not activated, enter password for level 2
- Delete the old timer configuration, if necessary
- Set timer periods pA and pB .
- Select the starting time for pA or pB .
- Select Operating mode pA/pB cycle , see Section 7.6.3.3.

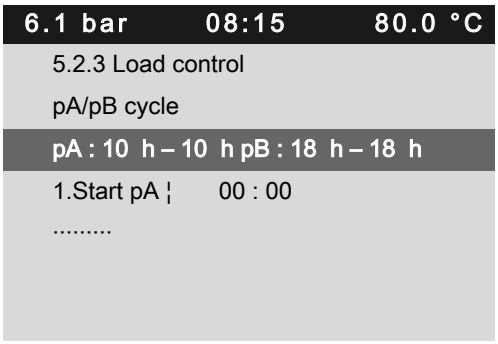
7.6.3.1 Setting the timer periods pA and pB

Note the Configuration sequence. For the Configuration of the timer period, Operating mode pA/pB cycle must be deactivated.

➢ First, configure the Timer , then select the Operating mode , if necessary, select first a different Operating mode .

Precondition Password level 2 is activated.
The *< Configuration ➞ Pressure control ➞ Load control >* menu is selected.

1. Press the «DOWN» repeatedly until the *Settings* for pA and pB menu section is displayed as active line.
2. Press «Enter» to switch into setting mode.
   pA flashes.
3. Press the «UP» repeatedly until the desired timer period is displayed as active line.
4. Press «Enter» to accept the setting.



Menu

pA : timer period – expiring period (example)

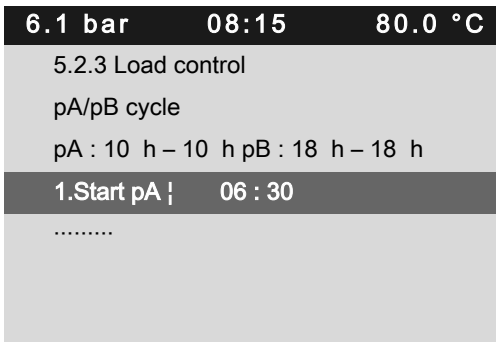
5. Set the timer period for pB in the same manner.
6. Press «Enter» to accept the setting.

Result The timer period for Setpoint pressure pA and pB is set.

7.6.3.2 Setting the starting time for pA or pB

1. Press the «DOWN» key.
2. Press the «Right» key.

3. Press «Enter» to switch into setting mode.
   The starting time *h* flashes.



Menu

Starting time for pA (active line)

4. Press «UP» to set the hours.
5. Press the «Right» key.
   The starting time *min* flashes.
6. Press «UP» to set the minutes.
7. Press «Enter» to accept the settings.

Result The starting time for pA is set.

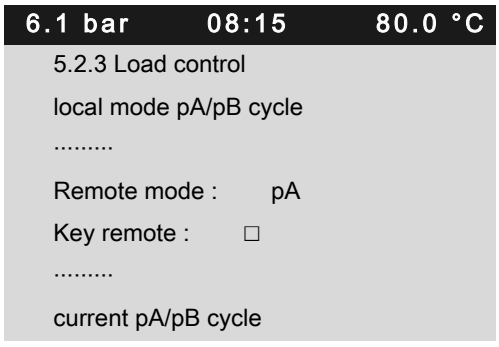
The period is to start with pB .

➢ Press «Enter» and specify 1.Start pB with «UP».

7.6.3.3 Selecting local mode

Precondition Password level 2 is activated.
The *< Configuration ➞ Pressure control ➞ Load control >* menu is selected.
The timer program or the Timer is set.

1. Press the «UP» repeatedly until *local mode* is displayed as active line.
2. Press «Enter» to switch into setting mode.
   Operating mode flashes.



Menu

Active line

Display of the current operating mode

3. Press the «UP» or «DOWN» key to select the required operating mode (pA , pB , pA/pB clock or pA/pB cycle).
4. Press «Enter» to accept the setting.
   The actual operating mode is displayed.
5. Press «Escape» repeatedly to return to the main menu.

Result The timer is fully configured.

7.7 Configuring the machine for master control

The functions for a master control are not yet implemented.

➢ Ignore any corresponding references to chapter 7.7 in this manual.

7.8 Configuring e-mail

The functions for the e-mail configuration are not yet implemented.

➢ Ignore any corresponding references to chapter 7.8 in this manual.

7.9 Configuring input and output signals

The configuration of input and output signals is not yet implemented.

➢ Ignore any corresponding references to chapter 7.9 in this manual.

7.10 Configuring the compressed air outlet temperature (PD temperature)

The functions for the compressed air outlet temperature are not yet implemented.

➢ Ignore any corresponding references to chapter 7.10 in this manual.

7.11 Activating remote acknowledgement

The functions for remote acknowledgement are not yet implemented.

➢ Ignore any corresponding references to chapter 7.11 in this manual.

7.12 Linking to an external pressure transducer

The functions for the external pressure transducer are not yet implemented.

➢ Ignore any corresponding references to chapter 7.12 in this manual.

7.13 Activating the energy-saving mode for Dryer

The functions for the energy-saving mode are not yet implemented.

➢ Ignore any corresponding references to chapter 7.13 in this manual.

7.14 Commissioning the machine

The functions for machine commissioning are not yet implemented.

➢ Ignore any corresponding references to chapter 7.14 in this manual.

8 Operation

8.1 Switching on and off

Always switch the machine on with the «ON» key and off with the «OFF» key.

A power supply disconnecting device has been installed by the user.

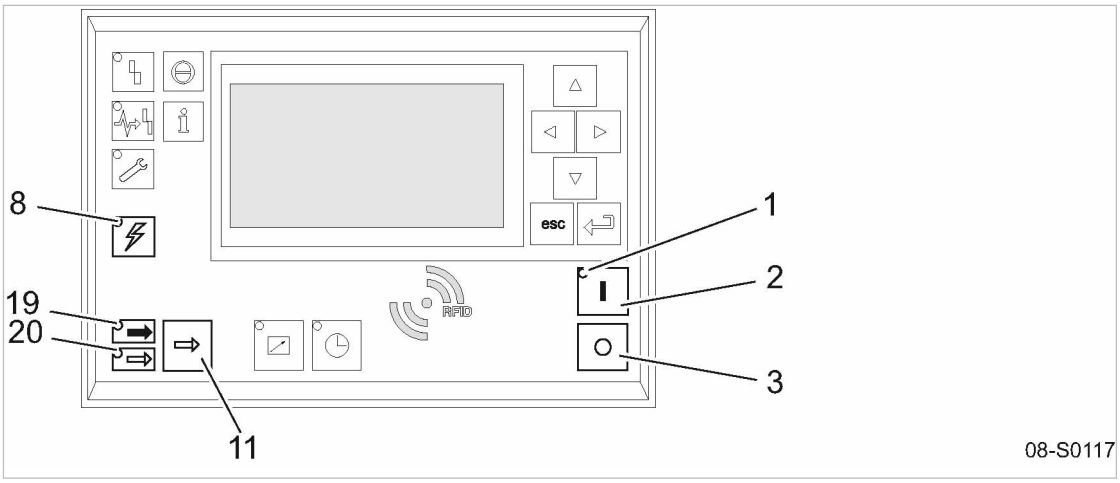


Fig. 7 Switching on and off

1 *Machine ON* LED (green)
2 «ON» key
3 «OFF» key
8 *Control voltage* LED (green)
11 «LOAD/IDLE» toggle key
19 *LOAD* LED
20 *IDLE* LED

8.1.1 Switching on

Precondition No personnel are working on the machine.

All access doors and panels are closed and secure.

1. Switch on the power supply isolating device.
   After the controller has carried out a self-test, the green *Control voltage* LED is lit continuously.
2. Press the «ON »key.
   The green *Machine ON* LED is lit continuously.

If a power failure occurs, the machine is **not** prevented from re-starting automatically when power is resumed.
It can re-start automatically as soon as power is restored.

Result The compressor motor starts as soon as system pressure is lower than the set point pressure (cut-off pressure).

8.1.2 Switching off

1. Press the «LOAD/IDLE» key.
   The machine switches to IDLE and the *IDLE* LED flashes.
2. After allowing the machine to IDLE for 20 seconds, Press the «OFF» key.
   The *Machine ON* LED extinguishes.

3. Press the «LOAD/IDLE» key.
   The *IDLE* LED extinguishes.
   The machine is ready for further operation. The machine can be re-started.
4. Switch off and lock out the power supply disconnecting device.

Result The *Control voltage* LED extinguishes. The machine is switched off and disconnected from the mains supply.

8.1.3 Switching off in an emergency and switching on again

The EMERGENCY STOP control devicen is located below the control panel.

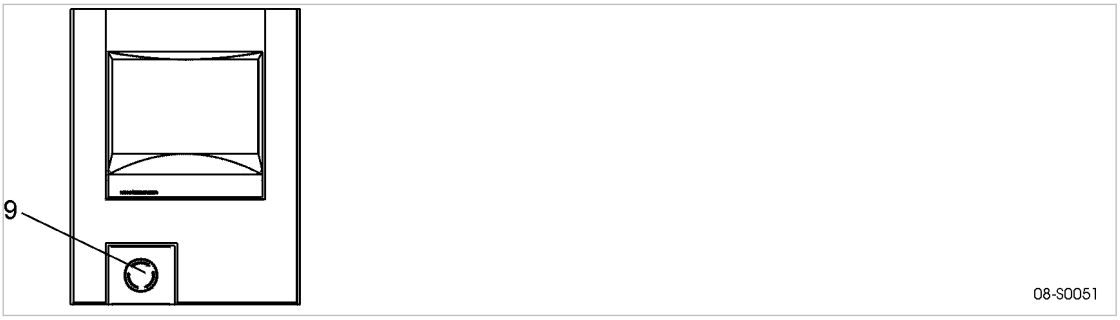


Fig. 8 Switching off in an emergency
[9] EMERGENCY STOP control device

Switching off

➢ Press the EMERGENCY STOP control device.

Result The EMERGENCY STOP button remains latched after actuation.
The compressor's pressure system is vented and the machine is prevented from automatically re-starting.

Switching on

Precondition The fault has been rectified

1. Turn the EMERGENCY STOP button in the direction of the arrow to unlatch it.
2. Acknowledge any existing alarm messages.

Result The machine can now be started again.

8.2 Acknowledging alarm and warning messages

The functions for acknowledging alarm and warning messages are not yet implemented.
➢ Ignore any corresponding references to chapter 8.2 in this manual.

8.3 Displaying operating data

The following information can be called up in the operating data menu option:

- Operating hours
  - Compressor run: Total machine running time
  - ON LOAD : Machine on-load running time
  - Motor: Motor running time (can be changed)
  - Airend: Airend running time (can be changed)
  - SIGMA CONTROL 2 : Controller running time
  - Modulating control valve: Modulating valve operating hours
- Load valve: Total number of activations
- Machine power consumption (according to version)

Displaying operating data

Precondition Password level 2 is activated.

1. In operating mode, switch to the main menu with the «Enter» key.
2. Select *< Operating data >*.
   The *Operating data* menu is displayed.

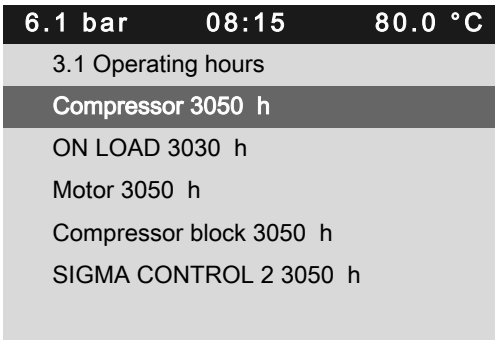
Changing the operating hours

The run times of the motor and airend components can be changed if, for example, a component exchange is required.

Example: Airend exchange

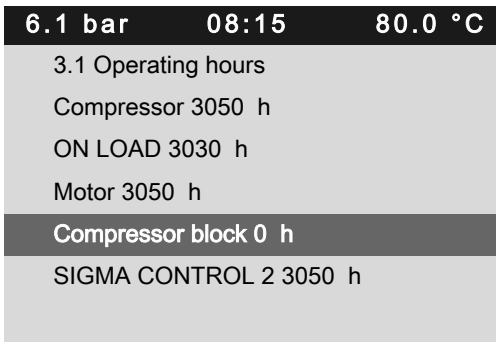
Precondition Password level 2 is activated.

1. Select the *< Operating data → Operating hours >* menu.
   The *Operating hours* menu is displayed.



2. Press «DOWN» repeatedly until *Compressor block* is displayed as active line.

3. Press «Enter» to switch into setting mode.
   The runtime value *3050 h* flashes.



4. Use «DOWN» or «Up» to set the value for operating hours to zero.
5. Press «Enter» to accept the setting.
6. Press «Escape» repeatedly to return to the main menu.

Result The operating hours for the new airend are set to *0 h*.

8.3.1 Interpreting operation messages

The controller will automatically display operation messages informing you about the current operational state of the machine.

Operating messages are identified with the letter O .

The message numbers are not numbered consecutively.

Messages 0081 to 0095 are customer-specific and undefined. Complete them with your defined message text and interpretation.

Message	Meaning
0001 O load control pA	The machine is regulated by system set point pressure pA .
0002 O load control pB	The machine is regulated by system set point pressure pB .
0003 O load control RC	The machine is regulated via the remote contactor.
0004 O load control RB	The machine is remotely regulated via the bus connection.
0005 O ready	The machine is switched on and in STANDSTILL operating mode.
0006 O IDLE	The machine is switched on and in IDLE operating mode.
0007 O ON LOAD	The machine is switched on and in LOAD operating mode.
0008 O off	The machine is switched off. The power supply is connected.
0009 O Compressor ON	The machine is switched on.

Message	Meaning
0010 O Controller ON	The power supply is connected. The controller is powered.
0011 O Cold start release	The machine can be switched on although the machine temperature is below the permissible starting temperature. The machine can be switched on only as long as the message is displayed.
0025 O Setpoint pressure pA	The value for pA is output.
0026 O Setpoint pressure pB	The value for pB is output.
0027 O Power OFF → ON	Request: Switch the power supply off and on.
0028 O DYNAMIC motor T↑	Control mode DYNAMIC: The temperature of the compressor motor is too high.
0081 O	
0082 O	
0083 O	
0084 O	
0085 O	
0086 O	
0087 O	
0088 O	
0089 O	
0090 O	
0091 O	
0092 O	
0093 O p-Switch pi	

Message	Meaning
0094 O T-Switch ADT	
0095 O p-Switch pN	

Tab. 54 Operational Messages

8.4 Setting the maintenance interval

The functions for setting maintenance intervals are not yet implemented.

➢ Ignore any corresponding references to chapter 8.4 in this manual.

8.5 Testing the pressure relief valve

Overview

- Preparing the test
- Performing the test
- Correct conclusion of the test
- Performing a Reset

When the check mode is activated, monitoring of internal pressure (blow-off protection - if provided) and regulation of network pressure are deactivated.

The measured value of the internal pressure pi is used to describe the test below.

Check box	Status
☑	activated
☐	deactivated

Tab. 55 Check box status

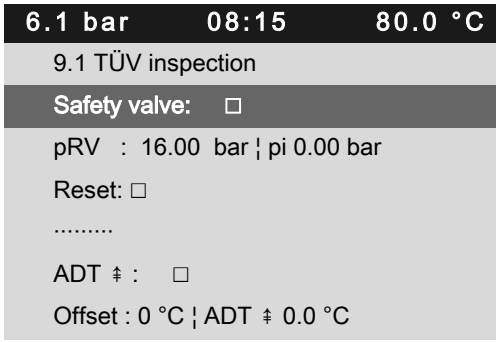
WARNING
Danger of injury from pressurised components!

➢ Perform the following actions in the sequence provided.

Preparing the test

1. Note the activating pressure of the pressure relief valve from the machine's nameplate.
2. Press the «OFF» key to shut down the machine.
3. Close the user's shut-off valve between the machine and the air distribution network.
4. Log on to SIGMA CONTROL 2 with access level 2 (see chapter 7.2.4).
5. In operating mode, switch to the main menu with the «Enter» key.

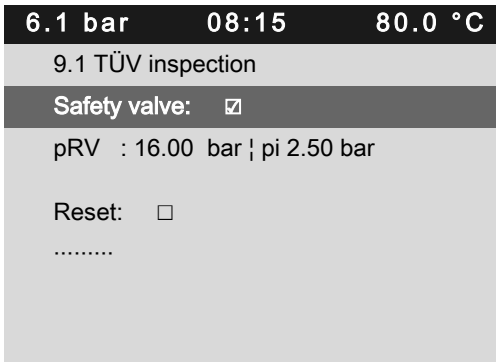
6. Select the < *Machine test* ➞ *TÜV inspection* > menu.
   Safety valve line is displayed as being active.



Menu
Active line with check box
Safety valve activating pressure (example)

Performing the test

1. Press «Enter» to switch into setting mode.
   The check box flashes in the active line.
2. Use the «UP» key to activate the check box.
3. Press «Enter» to accept the setting.
   The test mode is now activated.
   The monitoring of internal and network set point pressures is deactivated!



Menu
Active line with check box
Activating pressure Safety valve (pRV) ¦ Internal pressure pi (current)

4. **WARNING!**
   Excessive noise is caused when the pressure relief valve blows off!
   - ➞ Close all access doors, replace and secure all removable panels.
   - ➞ Wear hearing protection.

5. **WARNING!**
   Risk of burns due to released cooling oil and compressed air when blowing off the pressure relief valve!
   - ➞ Close all access doors, replace and secure all removable panels.
   - ➞ Wear eye protection.
6. Press and hold the «ON» key.
   The machine switches to load, the machine's internal pressure pi rises.
7. Manually monitor on the display the pressure rise pi during the TÜV inspection .
8. If the internal pressure pi increases to more than 10 % above the correct opening pressure of the pressure relief valve, shut down the machine with the «OFF» key and replace the Safety valve .
9. Have the Safety valve replaced immediately.

If the alarm message *pRV ≠* appears, the Safety valve is defective. The permissible internal pressure was exceeded by 2 bar.

➢ Have the Safety valve replaced immediately.

Avoid oil mist:

➢ Release the «ON» key immediately when the Safety valve responds, in order to prevent unnecessary oil mist.

Correct conclusion of the test

1. Press «Enter» to switch into setting mode.
   The check box flashes in the active line.
2. Use the «DOWN» key to deactivate the check box.
3. Press «Enter» to accept the setting.
   The " Safety valve " test mode is de-activated and the test is completed.
4. Press «Escape» repeatedly to return to the main menu.
5. Open the shut-off valve from the machine.

Result The machine is ready for operation.

Resetting

If the test is canceled when opening the pressure relief valve, the internal pressure *pi* will indicate the highest measured value.
Activate the check box for Reset in order to reset the stored value.

➢ Activate the check box for Reset .

8.6 Checking the temperature sensor and overheating shutdown function

The machine should shut down if the airend discharge temperature (ADT) reaches a maximum of 110 °C.
SIGMA CONTROL 2 will simulate a higher temperature for checking this function.

For this purpose, SIGMA CONTROL 2 automatically determines an offset value to be displayed. During the test mode, this Offset is added to the actual airend discharge temperature to cause the machine to shut down prematurely.

In standard operation, SIGMA CONTROL 2 generates the "overtemperature" fault message when the maximum airend discharge temperature is reached. Since the modified test temperature is 2 K below the fault message switching point for overtemperature, the system will not generate a fault message in test mode.

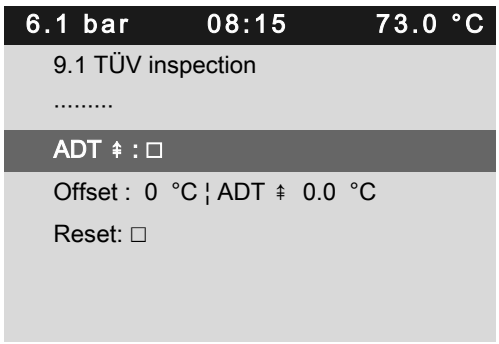
Overview

- Shut down the machine and allow to cool down slightly
- Performing the test
- Correct conclusion of the test
- Performing a Reset

Performing the test

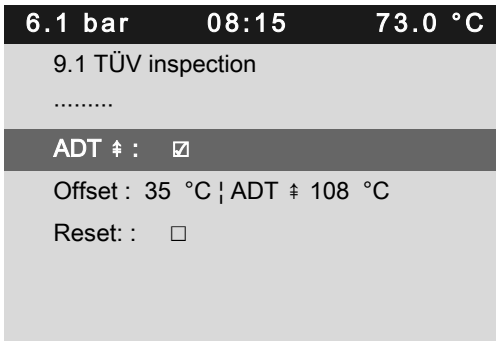
Precondition Machine cooled down by approx. 5 °C

1. Log on to SIGMA CONTROL 2 with access level 2 (see section 7.2.4).
2. In operating mode, switch to the main menu with the «Enter» key.
3. Select the *< Machine test ➞ TÜV inspection >* menu.
   Safety valve is displayed in the active line.
4. Press «DOWN» repeatedly until *ADT ⇞* is displayed as active line.
5. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.



Fallen airend discharge temperature (73.0 °C)
Menu
Active line

6. Use the «UP» key to activate the check box.
7. Press «Enter» to accept the setting.
   The Offset display changes to *35 °C*.
   The ADT ⇞ display changes to *108 °C*.
   The test mode is now activated.



Menu
Active line
Offset ¦ ADT ⇞ in test mode

8. Press the «ON» key to switch the machine to LOAD.
   The machine switches to LOAD and the airend discharge temperature rises again.
   The machine will switch off as soon as *ADT* attains a value of *108 °C*.

The machine does not shut down?

➢ Cancel the test and gave the temperature sensor replaced immediately.

Correct conclusion of the test

1. Press «Enter» to switch into setting mode.
   The check box in the active line flashes.
2. Use the «DOWN» key to deactivate the check box.
3. Press «Enter» to accept the setting.
   The offset is reset to *0 °C*.
   The test mode is de-activated and the test is completed.
4. Press «Escape» repeatedly to return to the main menu.

Resetting

ADT ≠ will display the highest measured value if the test for switching off at overtemperature is aborted.
Activate the check box for Reset in order to reset the stored value.

➢ Activate the check box for Reset .

9 Fault Recognition and Rectification

9.1 Basic instructions

The following tables are intended to assist in locating faults.

SIGMA CONTROL 2 will indicate three types of faults:

- Fault on the machine: red LED flashes - see chapter 9.2.
- Fault on the controller: red LED flashes - see chapter 9.3.
- Warning: yellow LED lights- see chapter 9.5.

The messages valid for your machine are dependent on the controller and individual equipment.

➢ Do not attempt fault rectification measures other than those given in this manual!

9.2 Alarm indications

Alarm messages are identified with the letter A .

The message numbers are not numbered consecutively.

Messages 0081 to 0095 are customer-specific and may differ from the suggested values. Complete them with your defined message text, possible causes and remedies.

Message	Possible cause	Remedy
0001 A Direction of rotation	The compressor drive motor is turning in the wrong direction.	Changeover phase lines L1 and L2.
0002 A Motor T‡	Compressor drive motor overheated.	Clean the motor. Keep ambient conditions within specified limits.
0003 A pRV ‡	The activating pressure of the pressure relief valve on the oil separator tank has been exceeded.	Change the pressure relief valve.
0004 A EMERGENCY STOP	EMERGENCY STOP control device actuated.	Unlatch the push-button.
0005 A Oil separator T‡	Maximum air temperature at the oil separator tank outlet is exceeded.	Check the line to the trip relay.
0007 A Mains monitor	Fault in mains power supply.	Have the mains power supply checked.
0009 A Sigma Control T‡	Permissible enclosure temperature for SIGMA CONTROL 2 exceeded.	Keep ambient conditions within specified limits. Control cabinet: Check filter mats and fan.

Message	Possible cause	Remedy
0010 A Blow-off protection ↟	The activating 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.
0011 A Fan M4 I↟	Overload shut-down of the first fan motor.	Investigate cause of shut-down. Reset the overload relay.
0012 A Access doors	Door open / interlocked panel removed while the machine is running.	Fit and secure all panels and close access doors.
0013 A Motor I↟	Overload shut-down of the compressor drive motor.	Investigate cause of shut-down. Change the oil separator cartridge.
0014 A Fan M5 I↟	Overload shut-down of the second fan motor.	Investigate cause of shut-down. Reset the overload relay.
0015 A ADT ↟	Maximum permissible airend discharge temperature (ADT) exceeded.	Keep ambient conditions within specified limits. Clean the cooler. Check the cooling oil level.
0016 A Fan M6 I↟	Overload shut-down of the third fan motor.	Investigate cause of shut-down. Reset the overload relay.
0019 A Internal pressure pi↟	–	–
0021 A Refrigeration dryer T↟	Refrigeration dryer: Compressed air temperature too low.	
0022 A Oil separator dp↟	Oil separator cartridge clogged.	Change the oil separator cartridge.
0023 A Motor bearings	Drive motor bearings overheated.	Re-grease the motor bearings.
0024 A Water-cooling water shortage	Cooling water pressure is too low.	Check cooling water supply.
0034 A Mains contactor on?	Mains contactor does not close.	Check mains contactor and wiring.
0035 A Fan M7 I↟	Overload shut-down of the control cabinet fan motor.	
0038 A PD T↟	Package discharge (PD) temperature too low.	

Message	Possible cause	Remedy
0039 A PD T⇞	Package discharge (PD) temperature too high.	Check the cooling oil level. Clean the radiator. Check the fan motor.
0040 A Mains contactor off?	Mains contactor does not open.	Check mains contactor and wiring.
0041 A Mains voltage ⇞	Second power failure.	Check power supply voltage. Check the door interlock switch.
0042 A Back pressure stop	Back pressure in the oil separator tank caused by defective venting.	Check venting line.
0043 A ADT dT/dt ⇞	The rate of rise of the airend discharge temperature (ADT) is too fast.	Check the cooling oil level.
0044 A No pressure buildup	The machine produces no compressed air. The working pressure does not rise above 3.5 bar within the preset period.	Check the machine for leaks. Check coupling/V-belt
0045 A Compressor T⇞	Thermostatic valve defective	
0048 A High-voltage cell	Fault in the high voltage cell.	
0051 A Aggregate A	Aggregate A failed.	
0052 A Aggregate B	Aggregate B failed.	
0056 A RD condensate drain	Refrigeration dryer: The condensate drain is defective.	Refrigeration dryer: Check condensate drain and condensate conduits.
0057 A Model	Compressor model uncertain.	
0058 A Condensate drain	The condensate drain is defective.	Check condensate drain and condensate conduits.
0059 A Back pressure run	Drive belts or coupling broken.	Drive belt: Replace drive belt. Coupling:
0060 A Softstart	Fault in the soft start equipment.	
0061 A Oil separator dT/dt⇞	The rate of rise of the airend discharge temperature is too fast.	Check the cooling oil level.

Message	Possible cause	Remedy
0062 A Refrigeration dryer p⇞	Refrigeration dryer: pressure too high in the refrigerant circuit. Safety pressure switch tripped.	Clean the refrigerant condenser. Check the fan motor. Maintain operating conditions.
0063 A Refrigeration dryer p⇟	Refrigeration dryer: Refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	
0081 A		
0082 A		
0083 A		
0084 A		
0085 A		
0086 A		
0087 A		
0088 A		
0089 A		
0090 A		
0091 A		
0092 A		
0093 A p-Switch pi		
0094 A T-Switch ADT		
0095 A p-Switch pN		
0097 A High-voltage cell on?	High-voltage cell does not activate.	Check high-voltage cell and wiring.
0098 A High-voltage cell off?	High-voltage cell does not deactivate.	Check high-voltage cell and wiring.
0099 A Mains contactor on?	Mains contactor does not close.	Check mains contactor and wiring.

Message	Possible cause	Remedy
0100 A Mains contactor off?	Mains contactor does not open.	Check mains contactor and wiring.
0101 A Motor I⇞	Overload shut-down of the compressor drive motor.	Investigate cause of shut-down. Change the oil separator cartridge.
0102 A Fan M4 I⇞	Overload shut-down of the first fan motor.	Investigate cause of shut-down. Reset the overload relay.
0200 A Compressor motor USS alarm	Frequency converter fault	
0201 A Compressor motor USS alarm	Frequency converter fault	
0202 A Compressor motor USS alarm	Frequency converter fault	
0205 A Compressor motor USS alarm	Communications error	Check connection and line path.
0210 A Compressor motor FC Motor overload alarm	Frequency converter fault	
0211 A Compressor motor FC Group alarm	Frequency converter fault	

Tab. 56 Alarm messages and measures

9.3 System messages

System messages are identified with the letter Y .

The message numbers are not numbered consecutively.

Message	Possible cause	Remedy
0001 Y Hardware watchdog reset	System error	
0002 Y Internal software error	System error	
0003 Y Filesystem Read/Write failure	System error	
0004 Y CPU load too high	System error	
0005 Y RAM out of memory	System error	
1000 Y RFID error: switch SIGMA CONTROL power supply OFF→ON!	System error	

Tab. 57 System messages and remedies

9.4 Diagnostic messages

Diagnostic messages are identified with the letter D.

They provide information on the status of the controller, the connected input and output modules and support the KAESER service in trouble-shooting.

9.5 Warning messages

Warning messages are identified with the letter W .

The message numbers are not numbered consecutively.

Messages 0081 to 0092 are customer-specific and may differ from the suggested values. Complete them with your defined message text, possible causes and remedies.

Message	Possible cause	Remedy
0002 W Motor T↑	Drive motor overheating.	Clean the motor. Keep ambient conditions within specified limits.
0003 W V-belt tension	Belt tension is too low.	Re-tension drive belt.
0004 W Oil separator dp↑	The pressure drop across the oil separator cartridge has risen. Oil separator cartridge clogged.	Change the oil separator cartridge.
0005 W Start inhibit	Too frequent manual on and off switching.	Do not exceed the maximum number of motor switchings per hour when manual on/off switching.
0007 W Motor bearings	Drive motor bearing defective.	
0008 W ADT↑	Maximum airend discharge temperature will soon be reached.	Clean the cooler. Check the cooling oil level. Replace the oil filter. Ensure adequate ventilation. Keep surrounding temperature within recommended limits.
0010 W Buffer battery	Data retention battery is almost discharged.	Change the battery.
0011 W Oil filter Δp↑	The pressure differential of the oil filter has risen. Oil filter clogged.	Change the oil filter.
0012 W Modem problem	SIGMA CONTROL 2 does not recognize modem.	Check the link between the SIGMA CONTROL 2 and the modem.
0013 W Air filter dp↑	Air filter clogged.	Change the air filter element.
0015 W Bus alarm	The bus link from the Profibus DP interface is interrupted.	Check bus highway and plug.

Message	Possible cause	Remedy
0016 W Error: RAM	Internal RAM defective.	
0017 W Refrigeration dryer T↓	Refrigeration dryer: Compressed air temperature too high.	Maintain operating conditions. Clean the refrigerant condenser. Clean the cooler. Install an extractor fan.
0018 W Refrigeration dryer p↓	Refrigeration dryer: Refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	
0025 W Oil separator h⇟	Oil separator cartridge: Maintenance interval has elapsed.	Change the oil separator cartridge.
0026 W Oil change h⇟	Cooling oil: Maintenance interval has elapsed.	Change the cooling oil.
0027 W Oil filter h⇟	Oil filter: Maintenance interval has elapsed.	Change the oil filter.
0028 W Air filter h⇟	Air filter: Maintenance interval has elapsed.	Change the air filter element.
0029 W Valve inspection h⇟	Valves: Maintenance interval has elapsed.	
0030 W Belt/coupling inspection h⇟	Belt tension/coupling: Maintenance interval has elapsed.	Carry out a visual inspection. Re-tension drive belts.
0031 W Motor bearing h⇟	Motor bearing of compressor motor: Maintenance interval has elapsed.	
0032 W Electrical equipment h⇟	Electric components and installation: Maintenance interval has elapsed.	Inspect and reset the maintenance interval counter.
0033 W Fan bearing h⇟	Motor bearing of fan motors: Maintenance interval has elapsed.	
0034 W PD T↓	Package discharge (PD) temperature too low.	
0035 W PD T↑	Compressed air discharge temperature too high.	Clean the cooler. Check the cooling oil level.
0036 W Motor starts /h⇟	The permissible number of motor starts was exceeded in the last 60 minutes.	Extend the idle period. Increase the capacity of air receiver. Increase the cross-section of piping between compressor and air receiver.

Message	Possible cause	Remedy
0037 W Motor starts /d ⇞	The permissible number of motor starts was exceeded in the last 24 hours.	Extend the idle period. Increase the capacity of air receiver. Increase the cross-section of piping between compressor and air receiver.
0038 W Blow-off protection ↑	The pressure relief valve's activating pressure will soon be reached.	Change the oil separator cartridge. Open the shut-off valve in the venting line.
0041 W Mains voltage ↓	1. Power failure: The machine is automatically restarted.	Check power supply. Check the door interlock switch.
0043 W External load signal?	Ambiguous external load signal: Increased cut-out pressure exceeded. The external load control has not switched to idle (off load).	Check settings of the external controller. Take into account pressure drops across filters and dryer.
0044 W Oil T↓	Cooling oil temperature too low.	Check temperature switch, line and connection. Check the oil circulation. Increase room temperature.
0046 W System pressure ↓	Network pressure has fallen below the set 'low' value. Air consumption too high.	Check air demand. Check cable runs and sensor connections. Check the 'sys.press. low' warning setting.
0047 W No pressure buildup	The compressor cannot build-up to working pressure.	Check for air leaks. Check the value for internal pressure given in the *<analog data >*menu against the reading on the oil separator tank pressure gauge.
0048 W Bearing lube h ⇞	Re-grease the motor bearings. Maintenance interval has elapsed.	Re-grease the motor bearings.
0049 W Annual maintenance	Last maintenance was 1 year ago.	Carry out the necessary maintenance and reset the corresponding maintenance interval counter.
0059 W Start T↓ ↓	The airend temperature is too low (<−10 °C) for the machine to be operated.	Keep ambient conditions within specified limits.
0060 W Start T↓	The airend temperature is too low (<+2 °C).	Keep ambient conditions within specified limits.
0061 W Compressor T↓	The airend discharge temperature (ADT) did not reach the minimum value within the specified time.	
0066 W Air filter dp ⇞	Initial warning: Air filter clogged.	Change the air filter element soon.

Message	Possible cause	Remedy
0068 W Condensate drain	The condensate drain is defective.	Check the condensate drain and drain line.
0069 W Refrigeration dryer p↑	Refrigeration dryer: pressure too high in the refrigerant circuit. Safety pressure switch tripped.	Clean the refrigerant condenser. Check the fan motor. Maintain operating conditions.
0070 W Refrigeration dryer T↑	Refrigeration dryer: Compressed air temperature too high.	Maintain operating conditions. Clean the refrigerant condenser. Clean the cooler. Install an extractor fan.
0071 W Oil level ↓	Cooling oil level too low.	Replenish the cooling oil.
0072 W RD condensate drain	Refrigeration dryer: The condensate drain is defective.	Check condensate drainage
0081 W		
0082 W		
0083 W		
0084 W		
0085 W		
0086 W		
0087 W		
0088 W		
0089 W		
0090 W		
0091 W		
0092 W		
0093 W p-Switch pi		
0094 W T-Switch ADT		

Message	Possible cause	Remedy
0095 W p-Switch pN		

Tab. 58 Warning messages and remedies

9.6 Faults and troubleshooting

9.6.1 Monitoring pressure rise time

The following components may have caused the fault:

- Check the minimum pressure check valve if a fault occurs during the start with an empty compressed air network.
- The inlet valve is not opening.
- The combined venting/auxiliary valve does not change over.
- The signal amplifier for the control air of the inlet valve (from DSD) does not switch.

9.6.2 Network contactor on / network voltage low

The Sigma Control 2 sporadically displays the "Network contactor on" fault message.

Explanation
Using an NO contact from Q1 , the contactor response is switched to the input DI 1.02 of the Sigma Control. The fault message will be displayed if this response is not active within 0.5 seconds after the system start, i.e., after the controller has switched the contactor.

Possible causes:
Possible originators are the electrical voltage supply to the contactor, all contact elements within the voltage supply and the response contact itself.

We recommend to check the following:

- 230V NO contact of the door interlock switch (except in directly coupled systems).
- 230V switching contact of the Emergency-off push-button
- Output DOR 1.00 of the Sigma Control.
- Check the auxiliary contact 13/14 of contactor Q3.
- Check the lock-in contact 13/14 of contactor Q1 .
- Check the response contact for input DI 1.02 .
- Correct latching of auxiliary contacts on the contactors.
- All wires and clamping points of the wiring connecting these components are tight and properly connected.
- No isolation is left beneath a terminal.
- The 400/230V supply is in proper order.

10 Maintenance

10.1 Safety

Follow the instructions below for safe installation.
Warning instructions are located before a potentially dangerous task.

Disregard of these instructions can result in serious injury.

Basic safety instructions

Disregarding safety instructions can result in unforeseeable hazards.

- ➢ Follow the instructions in chapter 3 'Safety and Responsibility'.
- ➢ Allow maintenance work to be performed by authorised personnel only.
- ➢ Make sure that no one is working on the machine.
- ➢ Ensure that all service doors and panels are locked.

Working on live components

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

- ➢ Work on electrical equipment may only be carried out by authorised electricians.
- ➢ Switch off and lock out the power supply isolating device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.

11 Spares, Operating Materials, Service

11.1 Note the nameplate

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

➢ Please give the information from the nameplate with every enquiry and order for spares.

11.2 Displaying the version number, machine model, material, serial, and equipment numbers

1. In operating mode, switch to the main menu with the «Enter» key.
2. Select the *< Configuration ➞ General ➞ System information >* menu.
   The system information is displayed.

6.1 bar 08:15 80.0 °C	
5.1.1 System information	Menu
Compressor	Compressor overview
Compressor PN *** Compressor SN ***	Material number, serial number
Compressor EN ***	Equipment number
SIGMA CONTROL 2 MCS	Controller overview SIGMA CONTROL 2
PN: 7.7601P0 SN: 10-34-000-	Material number, serial number
Software: 0.7.4.1	Software version

3. Press «Escape» repeatedly to return to the main menu.

12 Special Chapter for Service Technicians

12.1 Setting the operating hours

After the exchange of components, the Operating hours may require reprogramming.

This applies to:

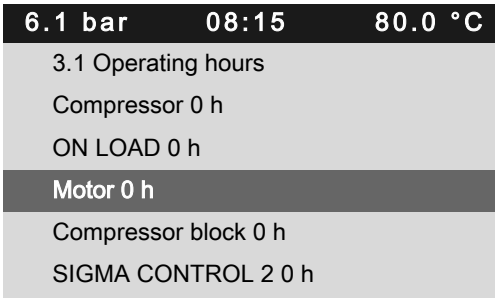
- Compressor
- ON LOAD
- Motor
- Compressor block
- SIGMA CONTROL 2

The hour counter for the SIGMA CONTROL 2 itself cannot be set.

Example: Following the exchange of an engine, the corresponding operating hours counter must be set to 0.

Precondition Password level 4 is activated.

1. Select menu *< 3.1 Operating hours >*.
2. Enter Operating hours .



12.2 Setting the machine type

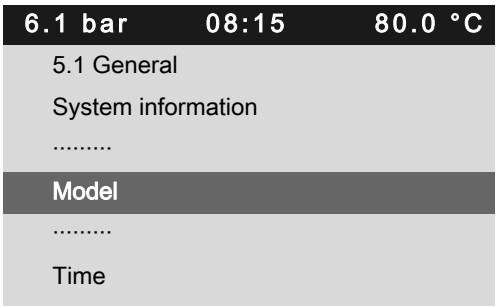
Following an upgrade or exchange of the controller, it may be necessary to re-enter the machine type.

Upon re-entering the machine type, the following settings must be checked.

- Pressure setting
- Response value of the pressure relief valve
- Operating hours counter
- Maintenance hours
- Refrigeration dryer in T machines
- Power switching module and fan settings in SFC machines

Precondition Password level 4 is activated.

1. Actuate the Emergency-off switch
2. Press the «Acknowledgement» key



Active line

12.3 Pressure settings

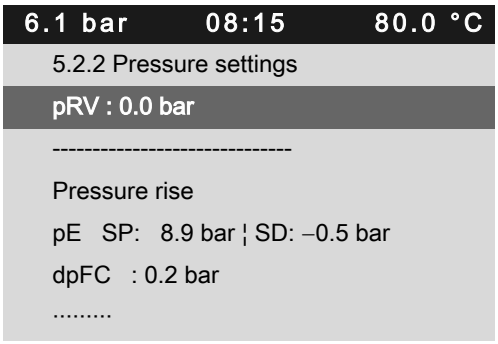
12.3.1 Pressure relief valve

The response value for the pressure relief valve must be set following the change of the working pressure or setting the machine type. This value is found on the valve's nameplate.

The following settings are required.

Precondition Password level 4 is activated.

1. Select *< 5.2.2 Pressure settings >*.
2. Enter a value for Safety valve *pRV* .



12.3.2 Pressure rise pE

When resetting the pressure parameters after, for example, the exchange of a controller, this value must be entered with 0,4 bar over the Nominal pressure of the machine.

Precondition Password level 4 is activated.

➢ Enter a value for Pressure rise pE in the *< 5.2.2 Pressure settings >* menu.

12.3.3 Nominal pressure

This value must be taken from the machine's nameplate.

Precondition Password level 4 is activated.

➢ Enter a value for Nominal pressure in the *< 5.2.2 Pressure settings >* menu.

12.3.4 Cut-in pressure min

The value for Cut-in pressure min is automatically determined when entering the machine type. The switching pressure of the minimum pressure check valve may not fall below its minimum during operation.

The value for Cut-in pressure min must be set differently in low-pressure machines. Proceed as follows:

Precondition Password level 4 is activated.

➢ Enter a value for Cut-in pressure min in the *< 5.2.2 Pressure settings >* menu.

12.3.5 Monitoring the pressure rise time

After the compressor is switched on, the pressure rise time is monitored in all systems with a second pressure transducer monitoring the internal pressure in the oil separator tank.

When troubleshooting, it may be necessary to correct the monitoring time itself or to deactivate the function during fault finding.

Precondition Password level 4 is activated.

➢ Select the menu *< 5.2.2.2 pi Rise >*.

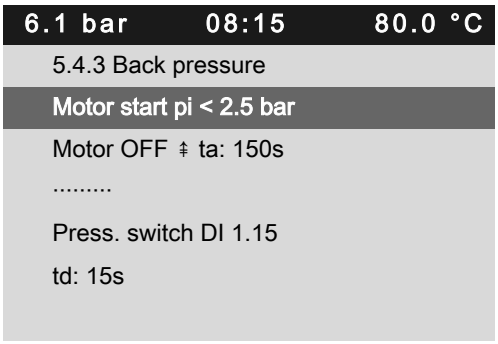
Display - legend

- Line 3: Activation (deactivate only during troubleshooting)
- Line 5: Minimum pressure to be attained in the oil separator tank.
- Line 6:
  - ↟ ta: If this pressure is not attained in the specified time, the machine will switch off and return a fault message (*0044 S No pressure buildup*).
  - ↓ ta: If the pressure is not attained in the specified time, the SIGMA CONTROL 2 will display the "*0044 S No pressure buildup*" warning message.

12.3.6 Back pressure monitoring – re-start inhibitor

All rotary screw compressors may start only when the internal pressure has fallen below 1.2 bar. This function is realised with a safety pressure switch at the inlet valve. In all systems featuring a pressure transducer for internal pressure monitoring, it is monitored as well.

If the system does not vent, a fault message will be triggered after a certain time (system-specific).



- Line 3: Back pressure switching threshold in the oil separator tank
- Line 4: If the system does not vent, a fault message will be triggered after 150s.
- Line 7: Back pressure is assumed for 15 seconds after the system is switched off, regardless of the switching position of the safety pressure switch in the inlet valve.

12.4 Idle mode pressure monitoring

The idle mode pressure is monitored in all systems with a second pressure transducer monitoring the internal pressure in the oil separator tank.

If this function is deactivated, low idle mode pressure can result in insufficient lubrication of the compressor.

Precondition Password level 4 is activated.

➢ Select the menu *< 5.2.2.3 pi min >*.

- Line 3: Activating/deactivating the function
- Line 5: Switching threshold for the idle mode pressure monitoring
- Line 6:
  - ta: The message is deactivated for this period of time during the system start.
  - td: If the idle mode pressure falls below the defined value, the compressor will switch off after this time, displaying a fault message (message text).

12.5 Airend discharge temperature

This menu (5.6 ADT) shows the settings for the monitoring of the airend discharge temperature.

Access level 4 must be activated.

6.1 bar 08:15 80.0 °C	
5.6 ADT	
AIR 1.00 err 0 °C	Line 3
Conductor correction: –5.2 °C	Line 4
.....	
↕ > 110 °C ↑ > 105 °C	Line 6
.....	
ADT rise dT/dt 0.0 °C	Line 8
active: ☑	Line 9
↕ 3.0 °C /s ¦ > 30 °C	Line 10
▸1 T-Switch ADT	Line 11

Explanation

- Line 3: Address analog input, status input, actual temperature value
- Line 4: Conduit correction; the measuring result is affected by the length of the connecting cable and will be compensated by the correction factor.
- Line 6: Switching points for fault message and warning.
- Line 8: Measured value of temperature rise speed
- Line 9: Activation/deactivation of the temperature rise speed monitoring
- Line 10:
  - ↕ 3.0 °C /s : Switching point for the monitoring of the temperature rise speed
  - > 30 °C : The temperature rise speed is monitored only at an airend discharge temperature of more than 30°C.
- Line 11: *< T-Switch ADT >* submenu

12.6 Correction factor for wire lengths in PT100 analog inputs

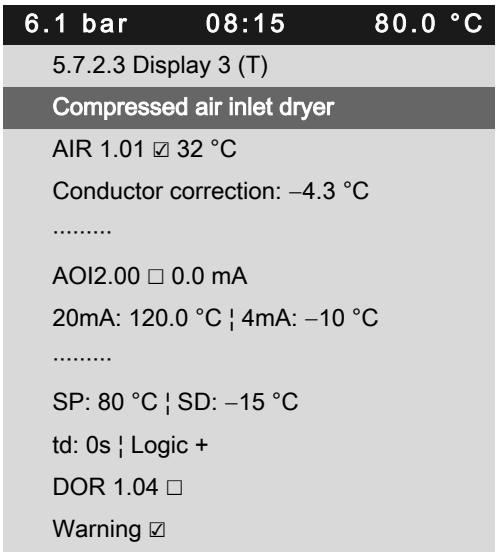
If a PT100 is connected to the SIGMA CONTROL 2 , the measurement result is affected by the length of the connecting wire. This can be corrected by defining a correction factor.

Example: The customer wants to monitor the compressed air inlet temperature using a PT100 upstream from a refrigeration dryer. Upon connecting the sensor with the analog input AIR 1.01 of the SIGMA CONTROL 2 , the difference between the actual temperature and the SIGMA CONTROL 2 display is +4.3°C.

The following example explains how to proceed.

Precondition Password level 2 is activated.

1. Select the menu *< 5.7.2.3 Display 3 (T) >*.
2. Press the «DOWN» repeatedly until *conduit correction* is displayed as active line.
3. Use the «Enter» key to switch to setting mode.
4. Use the «UP» or «DOWN» keys to enter the value for the conduit correction.
5. Press «Enter» to save the setting.



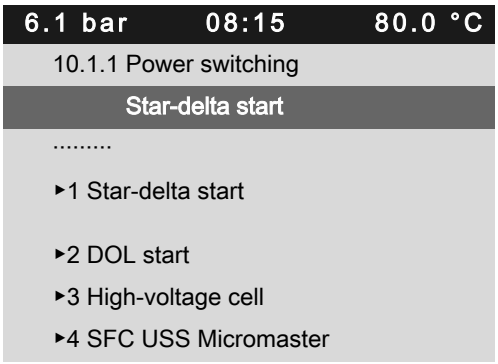
12.7 Settings for compressor motor

Power switching

Various power switching modules are available for the power supply to the compressor motor.

Precondition Password level 4 is activated.

➢ Select the *< 10.1.1 Power switching >* menu to specify the power switching module.



For each power switching module, additional settings are required.

12.7.1 Star-delta start

Precondition Password level 4 is activated.

➢ Select the menu *< 10.1.1.1 Star-delta start >*.

6.1 bar 08:15 80.0 °C	
10.1.1.1 Star-delta start	
Temp. warm start > 55 °C	If the compressor starts with an airend discharge temperature > 55°C, the SC2 will apply the short "star" time.
.....	
Star time T↑ : 4.0s	Short star time at warm start
Star time T↓ : 10.0s	Standard star time at ADT start temperature < 55°C
Y/Δ switching time : 0.05s	Contact switching time
.....	
Overload relay DI 1.01 err ☑	Digital input, compressor motor overcurrent trip
.....	
Mains contactor DI 1.02 err ☑	Digital input, mains contactor response
DOR 1.00 err	Relay output, activation of mains contactor
Star contactor DI 1.11 ☐	Digital input, star contactor feedback
DOR 1.01 err	Relay output, activation star contactor
Delta contactor DI 1.11 ☐	Digital input, delta contactor feedback
DOR 1.02 err	Relay output, activation delta contactor

12.7.2 DOL start

Precondition Password level 4 is activated.

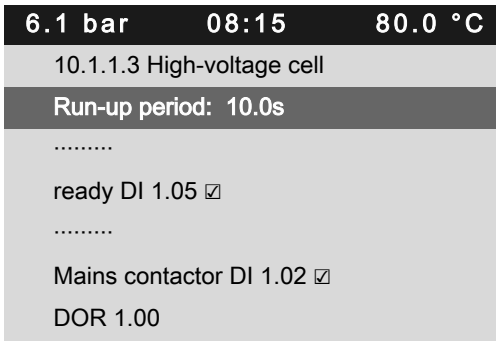
➢ Select the menu *< 10.1.1.2 DOL start >*.

6.1 bar 08:15 80.0 °C	
10.1.1.2 DOL start	
Run-up period: 10.0s	After this run-up time, the load valve is activated.
.....	
Overload relay DI 1.01 ☑	Digital input for the compressor motor's overcurrent trip
.....	
Mains contactor DI 1.02 ☑	Digital input, mains contactor response
DOR 1.00	Relay output, activation of mains contactor

12.7.3 High-voltage cell

Precondition Password level 4 is activated.

➢ Select the menu *< 10.1.1.3 High-voltage cell >*.



After this run-up time, the load valve is activated.

Feedback high-voltage cell ready

Feedback high-voltage cell on

Relay output, activation high-voltage cell

12.7.4 SFC USS Micromaster

Precondition Password level 4 is activated.

➢ Select the menu *< 10.1.1.4 SFC USS Micromaster >*.

When activated, the mains contactor will engage. The frequency converter is supplied with voltage but does not receive a switching on command.

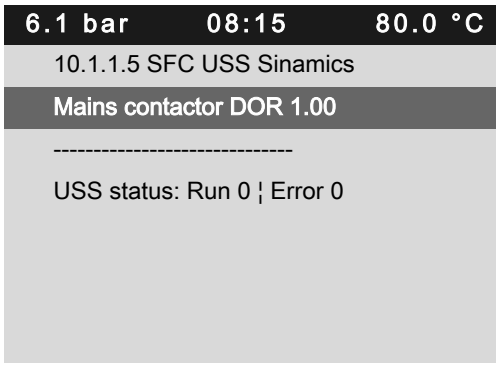
Relay output, mains contactor

Status indication USS communication SC2 – converter

12.7.5 SFC USS Sinamics

Precondition Password level 4 is activated.

➢ Select the menu *< 10.1.1.5 SFC USS Sinamics >*.



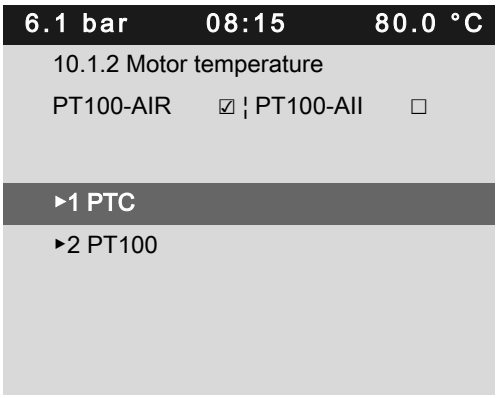
Relay output, Mains contactor

Status indication USS communication SC2 – converter

12.8 Motor temperature

The temperature of the compressor motor can be monitored with either a PTC or a PT100. The parameters for both are found in the *< 10.1.2 Motor temperature >* menu.

Access level 4 must be activated.

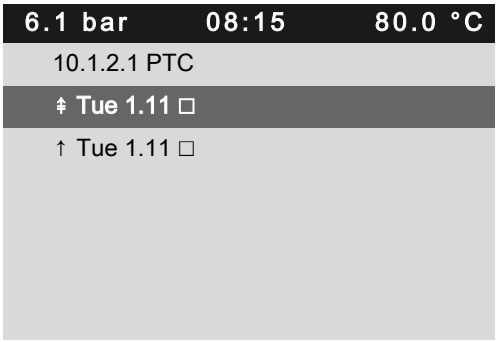


Choice of PT100 connection variants. Both checkboxes are unchecked if the motor is not equipped with either sensors or PTC resistors.
Setting menu for PTC monitoring
Setting menu for PT100 monitoring

12.8.1 Setting menu for PTC monitoring

The setting parameters for PTC monitoring are located in the *< 10.1.2.1 PTC >* menu.

Access level 4 must be activated.



Line 3
Line 4

- Line 3: Digital input for the switching contact from the evaluation relay of the PTC resistors. Alarm message
- Line 4: Digital input for the switching contact from the evaluation relay of the PTC resistors. Warning message

The inputs may differ depending on the machine type. Refer to the wiring diagram for the inputs.

12.8.2 Setting menu for PT100 monitoring

12.8.2.1 Settings for " PT100-AIR " activation mode

The setting menu *< 10.1.2.2 PT100 >* is designed for PT100 sensor connected directly to the IOM.

Access level 4 must be activated.

6.1 bar 08:15 80.0 °C	
10.1.2.2 PT100	
AIR err 0 °C	Line 3
Conductor correction: –2.0 °C	Line 4
AIR err 0 °C	Line 5
Conductor correction: –2.0 °C	Line 6
AIR err 0 °C	Line 7
Conductor correction: –2.0 °C	Line 8
.....	
⇞ > 160 °C ☑	Line 10
↑ > 150 °C ☑	Line 11

- Line 3: Analog input and actual temperature PT100 winding 1
- Line 4: Conduit correction factor
- Line 5: Analog input and actual temperature PT100 winding 2
- Line 6: Conduit correction factor
- Line 7: Analog input and actual temperature PT100 winding 3
- Line 8: Conduit correction factor
- Line 10: Switching temperature fault message motor temperature
- Line 11: Switching temperature, warning message motor temperature

12.8.2.2 Settings for " PT100-All " activation mode

Setting menu for PT100 monitoring with measured value module.

Access level 4 must be activated.

6.1 bar 08:15 80.0 °C	
10.1.2.2 PT100	
All 1.02 err 0 °C	Line 3
20mA: 200 °C ¦ 4mA: 0 °C	Line 4
.....	
⇞ > 160 °C ☑	Line 6
↑ > 150 °C ☑	Line 7

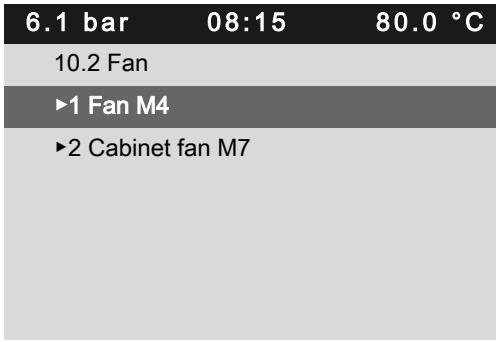
- Line 3: Analog input for measured value module and actual temperature.
- Line 4: Calibration for module output
- Line 6: Switching temperature fault message motor temperature
- Line 7: Switching temperature warning message motor temperature

12.9 Settings for the fan motor

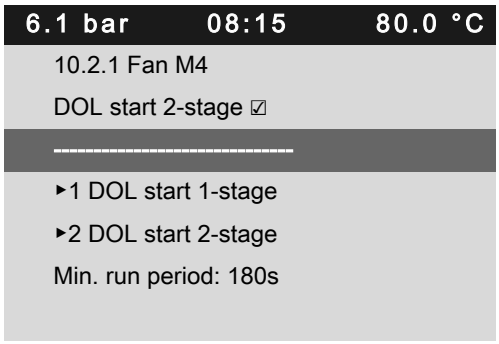
Menu *< 10.2 Fan >*.

Depending on the system type, various fan configurations are available, e.g., pole-changing, quantity, country-specific temperature switching levels, etc.

Access level 4 must be activated.



12.9.1 Fan M4

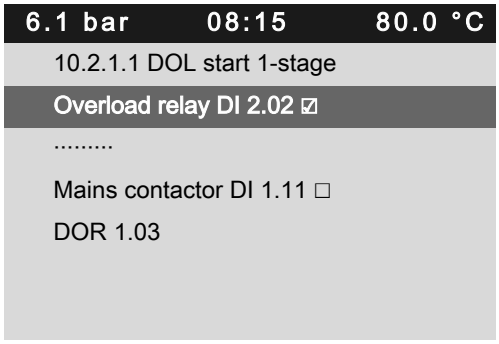


Line 3
Line 5
Line 6
Line 7

Display lines – legend

- Line 3: Selection 1-step/2-step (pole-switching fan motors) and activation.
- Line 5: Call up of settings menu for 1-step fan (one RPM).
- Line 6: Call up of settings menu for 2-step fan (pole-switching).
- Line 7: The fan will run for at least the specified minimum running time after each start. Even, if the compressor motor switches off.

12.9.1.1 DOL start 1-stage



Line 3
Line 5
Line 6

Display lines – legend

- Line 3: Digital input for the fan's motor protective switch. Address and activation.

- Line 5: Digital input for the feedback from fan to mains contactor.
- Line 6: Relay output for the activation fan mains contactor.

12.9.1.2 DOL start 2-stage

6.1 bar 08:15 80.0 °C	
10.2.1.2 DOL start 2-stage	
Fan high-speed	
T > 85 °C ¦ SD: –5 °C	Line 4
Run td: 0s	Line 5
.....	
Overload relay DI 2.02 err ☑	Line 7
.....	
Speed ↓ DI 2.04 □	Line 9
DOR 2.00 err	Line 10
Speed ↑ DI 2.03 □	Line 11
DOR 2.01 err	Line 12

Display lines – legend

- Line 4: Switching temperatures for high-speed fan. e.g., 85°C high speed, 85°C–5°C = 80°C low speed.
- Line 5: Minimum run time for high speed. If this time is defined, the fan will only switch to low speed after the set time has elapsed, even when the temperature falls below the switching value.
- Line 7: Digital input for the fan's motor protective switch. Address and activation.
- Line 9: Digital input for the feedback from fan to mains contactor. Low speed
- Line 10: Relay output for the activation fan mains contactor. Low speed
- Line 11: . Digital input for the feedback from fan to mains contactor. High speed
- Line 12: Relay output for the activation fan mains contactor. High speed

12.9.2 Cabinet fan M7

6.1 bar 08:15 80.0 °C	
10.2.2 Cabinet fan M7	
active: □	Line 3
Run on: 120s	Line 4
.....	
Overload relay DI 2.04 □	Line 6
.....	
Mains contactor DOR 1.04 □	Line 8

Display lines – legend

- Line 3: Activation of a control cabinet fan.
- Line 4: Run-on time; the fan will run for at least the specified time after start, even if the compressor motor switches off.

- Line 6: Digital input for the control cabinet fan's motor protective switch. Address and activation.
- Line 8: Relay output for the activation of the control cabinet fan mains contactor.

12.10 Door interlock switches – maintenance doors

Depending on the system type, a digital input is assigned to the door interlock switches. The input address is verified in the following menu.

Precondition Password level 4 is activated.

1. Select the menu *< 10.3 Access doors >*.
2. Check the input for door interlock switches and correct, if required.

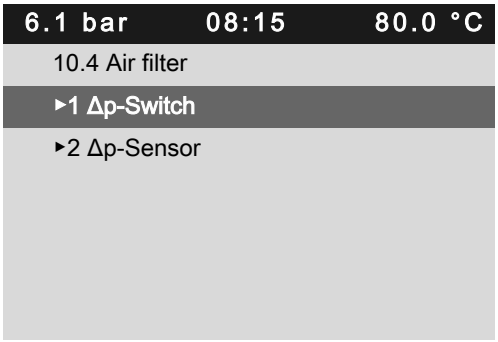
12.11 Settings for the air filter monitoring

The differential pressure monitoring for the air filter is realised with a vacuum switch in all rotary screw compressors from type BS/BSD. This is also possible as option in smaller machines.

Proceed as follows.

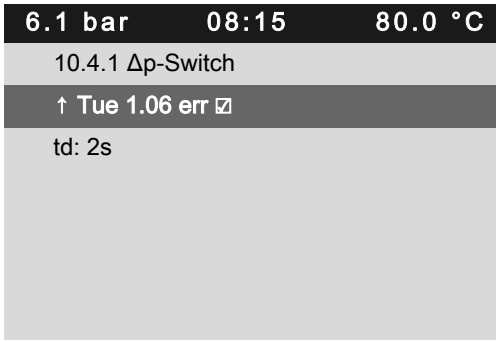
Precondition Password level 4 is activated.

➢ Select menu *< 10.4 Air filter >*.



Menu 10.4.1 Δp-Switch

➢ Select the menu *< 10.4.1 Δp-Switch >*.

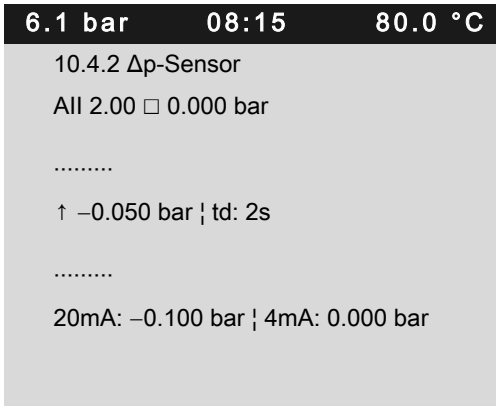


Digital input for vacuum switch and activation.

Adjustable time delay.

Menu 10.4.2 Δp-Sensor

➢ Select the menu *< 10.4.2 Δp-Sensor >*.



Analog input for sensor connection, activation and current measured value.

Switching point for the air filter warning message and adjustable time delay.

Sensor calibration. Measured value at 20mA and 4mA.

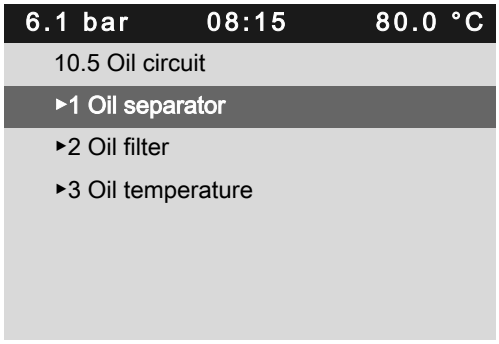
12.12 Settings for the oil circuit

Depending on the system type and the options selected, different parameters can be monitored in the oil circuit.

The main menu for the oil circuit is organised as follows.

Precondition Password level 4 is activated.

➢ Select the menu *< 10.5 Oil circuit >*.



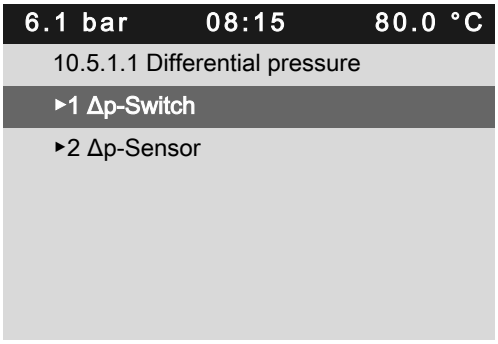
12.12.1 Oil separator

This submenu contains the setting parameters for the differential pressure monitor of the oil separator cartridge, for the temperature monitor of the compressed air outlet of the oil separator tank and for the oil level monitoring.

12.12.1.1 Differential pressure

Selection menu for oil separator cartridge – differential pressure monitoring via differential pressure switch or pressure transducer.

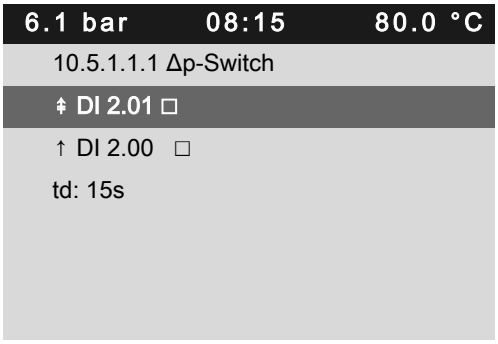
Access level 4 must be activated.



Switch

Setting menu for the differential pressure monitoring of the oil separator cartridge using a differential pressure switch.

Access level 4 must be activated.



- Line 3: Input address and activation of differential pressure switch for a shutting down fault.
- Line 4: Input address and activation of differential pressure switch for a warning or maintenance message.
- Line 5: Delay time for the response to messages.

Sensor

The oil separator cartridge is monitored using the pressure differential between the network pressure (measured at the air cooler) and the internal pressure (wet side, oil separator tank).

Access level 4 must be activated.

6.1 bar 08:15 80.0 °C	
10.5.1.1.2 Δp-Sensor	
pi-pN ☑ 0.000 bar	Line 3
Correction: −0.150 bar	Line 4
AII 1.02 □ 0.000 bar	Line 5
.....	
current 0.000 bar	Line 7
↨ 1.500 bar ☑	Line 8
↑ 1.000 bar ☑	Line 9
SD: −0.200 bar ¦ td: 15s	Line 10
.....	
20mA: 2.500 bar ¦ 4mA: 0.000 bar	Line 12

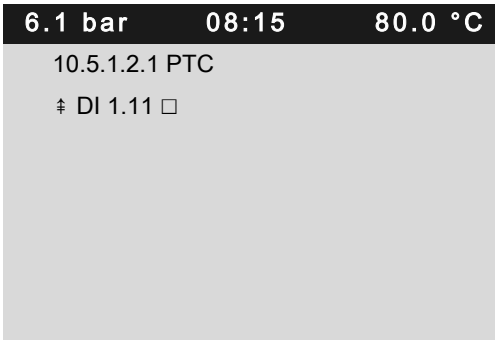
- Line 3: Current differential pressure value of the oil separator cartridge. (Measured value, internal pressure transducer – measured value, pressure transducer at the air cooler – correction factor.)
- Line 4: Correction factor for the differential pressure resulting from the pipe conduits and the minimum pressure check valve.
- Line 5: Analog input, activation and measured value for an alternative measuring method with an optional differential pressure sensor.
- Line 7: Current differential pressure value of the oil separator cartridge.
- Line 8: Switching point for differential pressure fault message at the oil separator.
- Line 9: Switching point for differential pressure warning message at the oil separator.
- Line 10: Switching difference for the acknowledgement and settable time delay for messages.
- Line 12: Calibration when using the optional differential pressure transducer.

12.12.1.2 Temperature

Oil-injected rotary screw compressors from DSD(X) are fitted with a temperature monitoring system at the compressed air outlet of the oil separator tank. Either a PTC (sensor and switching device) or a Pt100 temperature sensor may be used.

6.1 bar 08:15 80.0 °C
10.5.1.2 Temperature
▸1 PTC
▸2 PT100

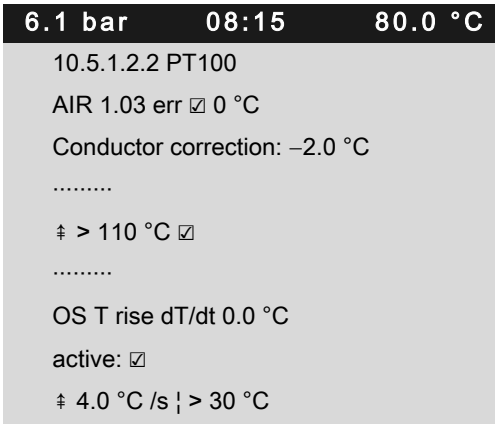
PTC



Line 3

- Line 3: Address for digital input and activation.

PT100



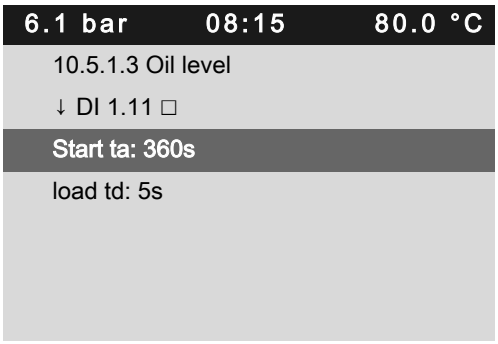
Line 3
Line 4
Line 6
Line 8
Line 9
Line 10

- Line 3: Address analog input, activation and current measured value.
- Line 4: Correction factor for the compensation of resistance caused by the measuring sensor conduit
- Line 6: Switching point and activation for a shutting down fault.
- Line 8: Current measured value for the speed of temperature rise at the compressed air outlet of the oil separator tank.
- Line 9: Activation of a fault message at excessive speed of temperature rise at the compressed air outlet of the oil separator tank
- Line 10: Switching threshold for the fault message and minimum temperature to be attained before a fault message will be activated

12.12.1.3 Oil level

Setting parameters for an oil level monitoring consisting of a sensor installed instead of an oil sight glass. The sensor requires a power supply module with tripping device. The switching contact of the tripping device is connected to the SIGMA CONTROL 2 via a digital input (see VKI Info 55/93 for operation)

Access level 4 must be activated.

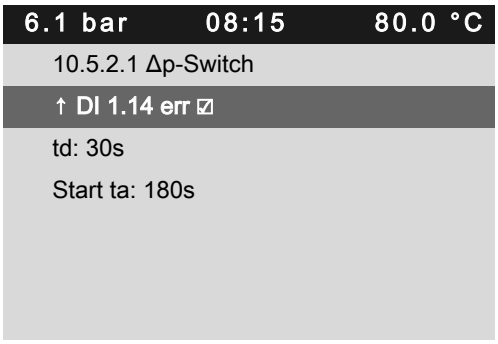


- Line 3: Address for digital input and activation of warning message
- Line 4: Enter a delay time following machine start before a message is admissible.
- Line 5: Enter a delay time at load operation before a message is admissible (suppresses a false alarm in frequent load changes.)

12.12.2 Oil filter

This submenu contains the setting parameters for the differential pressure monitoring at the oil filter cartridge.

Access level 4 must be activated.



- Line 3: Address for digital input and activation of differential pressure switch. Refer to the wiring diagram for the input.
- Line 4: Delay time for a message after system start, in order to suppress a warning due to cold oil, for example.
- Line 5: General delay time to suppress warning messages caused by pressure peaks during a switching change.

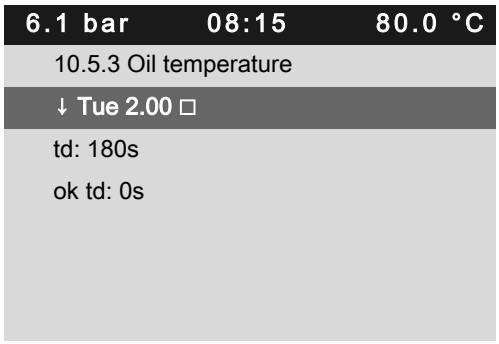
12.12.3 Oil temperature

For this option, a thermostat is installed in the pipeline between the oil separator tank and the combination valve. Depending on the machine type, the switching is usually somewhere between 40°C and 60°C.

If the function is activated, the machine will switch to load operation only when the oil temperature has been attained. Furthermore, maintenance messages for the oil filter and the oil separator cartridge at cold oil are suppressed.

A warning message is returned if the machine is unable to attain the oil temperature after three minutes.

Access level 4 must be activated.



- Line 3: Address for the thermostat's digital input and function activation.
- Line 4: Delay time for the warning message if the set temperature cannot be attained.
- Line 5: If the contact at the thermostat closes, you can set a short delay time before the machine will switch to load mode (avoids unnecessary load/idle switching in the threshold range of the thermostat).

12.13 Settings for a condensate drain monitoring

In systems with integrated condensate drain (e.g., ASD T, BSD T etc.), the floating contact is is used by SIGMA CONTROL 2 for fault messages.

Because a de-pressurised system with active monitoring will result in a fault message, the condensate drain message is interpreted as follows.

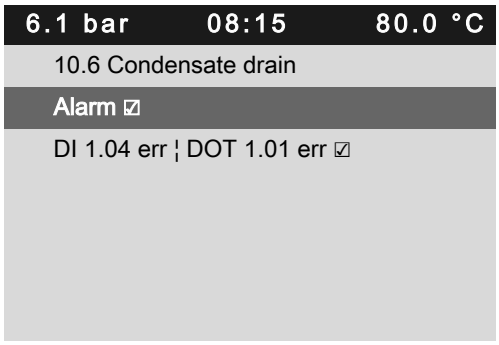
Operation:
The system activates the monitoring with a time delay when the machine is active and the pressure at the ECO DRAIN is > 1.5 bar (reset at 1.1 bar).

The ECO DRAIN can operate in two different modes:

- Fixed supply voltage: The aforementioned delay time is 200 seconds.
- Switched supply voltage: The aforementioned delay time is 5 seconds. The supply voltage is turned on at the same conditions as the monitoring, i.e., when the machine is active and the pressure at the ECO DRAIN is > 1.5 bar.

Precondition Access level 4 is activated.

➢ Select the menu *< 10.6 Condensate drain >*.



12.14 Mains failure monitoring

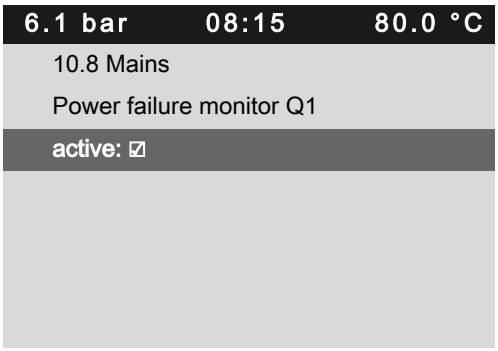
The voltage supply of all systems is monitored by a feedback contact of the mains contactor to a digital input.

Precondition Password level 4 is activated.

1. Select the menu *< 10.8 Mains >*.
2. Activate/deactivate Power failure monitor Q1

If the system sporadically returns a "Mains voltage low" error message, do NOT simply deactivate the message as a remedy.

For more information on fault findings, see Chapter 9.6.2



12.15 Settings for an integrated refrigeration dryer

In rotary screw compressors with integrated refrigeration dryer, it will be controlled and monitored by SIGMA CONTROL 2 .

The dew point of the refrigeration dryer is transmitted as an analog signal from a Pt100 sensor to the controller.

A minimum standstill time of 10 seconds prevents the refrigerant compressor restarting immediately after stopping.

All required inputs and outputs are automatically loaded during the activation of the refrigeration dryer function; however, they should be always compared with the wiring diagram.

The monitoring of the high dew point is activated only when the compressor falls below 14°C after activation or has not attained this temperature 15 minutes after being started.

Access level 4 must be activated.

➢ Select menu *< 10.13 Dryer >*.

6.1 bar 08:15 80.0 °C	
10.13 Dryer	
Activation : ☐	Line 3
Control Mode : Timer	Line 4
.....	
Timer on: 120s	Line 6
off: 360s	Line 7
Min. run period: 240s	Line 8
.....	
Temperature	
AIR 1.01 0 °C	Line 11
Conductor correction: –2.2 °C	Line 12
.....	
T↑ > 14 °C ¦ SD: –2 °C	Line 14
DOR 2.03 ☑	Line 15
Enable 1. load 900s	Line 16
2. load 200s	Line 17
.....	
T↓ < –1 °C ¦ SD: 4 °C	Line 19
Warning ¦ DOR 1.07 ☐	Line 20
.....	
p↓ DI 2.06 ☑	Line 22
Warning ¦ td: 20s	Line 23
.....	
p⇞ DI 2.07 ☑	Line 25
Alarm	
.....	
Compressor ON DOR 2.02	Line 28
.....	
Condensate drain ☑	Line 30
Warning ¦ DI 2.05	Line 31
DOT 2.02 ☑	Line 32

- Line 3: General activation of the refrigeration dryer function. The dryer may be switched off for service.
- Line 4: The refrigerant compressor switches according to the selected RD control mode.
- Line 6: Switch on time in clock control
- Line 7: Switch off time in clock control
- Line 8: Following a compressor start, the dryer will work for at least this specified time.
- Line 11: Analog input of the PT100 sensor and the actual measured dew point in active refrigeration dryer.
- Line 12: Conduit correction to compensate for the resistance of the measuring conduit.

- Line 14: Switching point for the "high dewpoint" warning message and switching differential for acknowledging the "high dewpoint" warning message.
- Line 15: Digital relay output for the "high dewpoint" fault message.
- Line 16: After the compressor start, the "high dewpoint" message is suppressed for this period of time.
- Line 17: After switching to load mode, the "high dewpoint" message is suppressed for this period of time.
- Line 19: Switching point for the "low dewpoint" message and switching differential for the acknowledgement of the message.
- Line 20: Definition of the message type for low dewpoint (warning or fault). Digital relay output for the message.
- Line 22: Digital input and activation of the "refrigerant pressure low" message.
- Line 23: Definition of the message type for low refrigerant pressure (warning or fault). Adjustable time delay for the message.
- Line 25: A message is displayed if the high pressure safety switch in the refrigerant circuit switches. The dryer switches off and the compressor keeps running. Alternatively, a fault message may be configured. This results in the compressor system switching off. Digital input for the high pressure safety switch in the refrigerant circuit.
- Line 28: The refrigerant compressor is activated with this digital output.
- Line 30: Activation of the condensate drain in the refrigeration dryer.
- Line 31: Message type for the condensate drain (fault or warning); digital input for the "condensate drain fault" message.
- Line 32: Digital relay output for the fault message of the condensate drain.

13 Software update

13.1 Fundamentals

This update program is protected by the German Copyright Act and the provisions of international agreements. Un-authorised duplication or unauthorized sale or distribution of this program or any part thereof is punishable by law. Such violations will be prosecuted under both penal and civil law and may result in severe penalties and claims for damages.

- Use a SD/SDHC card to perform the update.
- Data are imported but all setting data of the machine are retained.
- If possible, document all setting data of the machine prior to exchanging the controller.
- When exchanging a controller (MCS Main Control System) or an IOM (Input/Output module) you must perform an update to attain the current software version.
- Report any update to KAESER (servicecbg@kaeser.com) for updating the machine data.

13.1.1 Time required for the update

The update takes approximately 3 minutes.

The compressor cannot be operated during this period.

13.2 Software update with SD card

CAUTION
Electric shock! Touching voltage carrying components can result in electric shocks, burns or death.

➢ Allow only qualified and authorised electricians or trained personnel under the supervision of a qualified and authorised electrician to carry out work on electrical equipment according to electrical engineering regulations.

13.2.1 Important notes to the SD card

1. Copy without changes **ONLY** the "swl_image.tgz" file!
2. Do **NOT** copy the entire superordinate folder structure to the SD card!
3. Do **NOT** unzip the "swl_image.tgz" file!

13.2.2 Procedure

1. Actuate the EMERGENCY STOP control device.
2. Switch off the voltage supply (F11) to the SIGMA CONTROL 2 .
3. Insert SD card.
4. Switch on the voltage supply (F11) to the SIGMA CONTROL 2 .
   SIGMA CONTROL 2 starts and checks the update version.

Fig. 9 Checking update version

Fig. 10 Request to start the update

5. Press «Enter» to start the update.
   The system is updating.

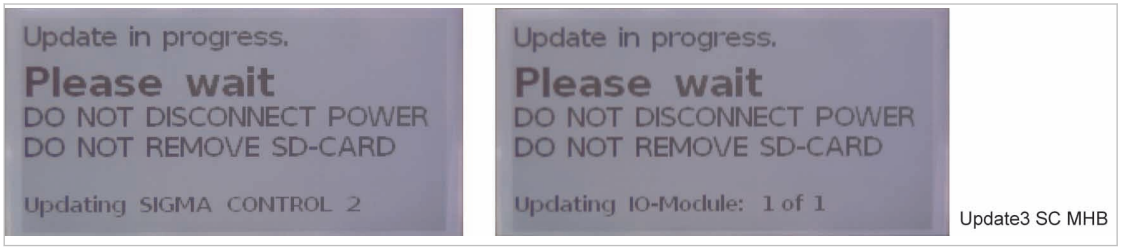


Fig. 11

6. After the update is concluded, switch the power supply (F11) to the SIGMA CONTROL 2 off and on again.
   The update is concluded.

Fig. 12 Update is concluded and the system requests a restart of the controller.

7. Check the functions and settings of the machine.

During the start after the update, the system will display the new software version which can be verified in the " System information “ menu, if required.

13.3 Possible errors after the update

13.3.1 General

In compressors with star-delta start and a mains contactor NC feedback contact, the error message "Mains contactor On?" occurs after update to version 1.0.3.1 or higher. This error must be corrected by changing the setting for the mains contactor feedback contact from NO to NC.

➢ In the *<10.1.1.1 Star delta start>* menu, change the setting for the mains contactor feedback contact from NO to NC.

13.3.2 Compressors with refrigeration dryer

In compressors with refrigeration dryer (e.g., ASD T) in particular, the update to the new software version 1.0.1.3 may cause conflicts with digital relay outputs that are assigned twice. In this event, the controller returns the error message *"0500 IO parameterisation incorrect in module XX!"*. The controller then displays a new menu "*<1.1.3 Address error>*". This menu item (which is visible only in the event of an error) indicates the location of the conflict due to a double assignment.

If the update caused a digital relay output to be assigned twice (for example, DOR 1.07), proceed as follows.

1. In the *<5.7.1 DO functions>* menu, deactivate the "Motor runs" function or
2. In the *<10.13 Refrigeration dryer>* menu, deactivate the "High dew point fault" function.

Both functions represent feedback to the customer (potential-free outputs) and are not functionally relevant for the machine.

13.3.3 Compressors with frequency converter

13.3.3.1 SFC Compressors, types ASD to CSDX

If an update from a software version earlier than 1.0.1.3 to 1.0.1.3 or higher is required for an SFC compressor of the types ASD to CSDX (applies only to CSDX.2 without frequency-controlled fan motor), the fan motor must be activated after the update as follows:

➢ In the *<10.2.1 oil/air cooler fan>* menu, change the "PS DIL separately excited" setting to "PS DIL1 mode 1".

13.3.3.2 Mains contactor feedback

In compressors with frequency converter for the compressor motor, the error message "Mains contactor On?" is returned after the update to software version 1.0.3.1. In this case, you must deactivate the mains contactor feedback message "Mains contactor DI".

Prior to the deactivation, check whether the compressor truly does not have a mains contactor feedback (digital input DI 1.02).

➢ Deactivate the mains contactor feedback "Mains contactor DI" in the *<10.1.1.4 SFC USS>* menu.

13.3.3.3 Masterdrive parameterisation

Concerns: Frequency-controlled rotary screw compressors with MASTERDRIVE frequency converter and SC2 with Sigma Control 2 software, Version 1.0.1.3 or lower. Due to the different design of the SC software during the conversion of the MASTERDRIVE drives from SC1 to SC2, it is possible that the data and switchings parameterised in the converter are not up to date. Thus, subsequently to an update of the SC2 from software versions older than 1.0.1.3 to the actual version, functionality may be limited and errors may occur.

Example: Error P444.E11 in the **P**arameter **I**dentification **Value** query (also known as a PKW query); the controller can be turned on but the converter does not start.

To avoid and to correct this, it is necessary to check and adjust the parameterisation of the frequency converter.

➢ Check and adjust, if required, the following parameters:

Parameter	Index	Value
0360	001	60
0360	002	53
0360	003	50
0360	004	1
0360	005	2
0360	006	3
0360	007	4
0360	008	5
0360	009	6
0360	010	7
0360	011	8
0360	012	9
0360	013	10
0360	014	11
0360	015	12
0360	016	13
0360	017	14
0360	018	15
0360	019	30
0360	020	31
0360	021	32
0360	022	33
0360	023	48
0360	024	49
0360	025	947
0360	026	358
0360	027	353
0360	028	350

Parameter	Index	Value
0360	029	351
0360	030	354
0360	031	452
0360	032	457
0360	033	69
0360	034	444
0360	035	445
0443	001	523
0444	001	100.00
0444	003	100.00
0927	000	0000000000100111
2166	000	6104
2168	000	6104
2170	000	6105
2172	000	6106
2173	001	11
2173	002	13

Tab. 59

14 Annex

14.1 Series SKT Compressors – wiring diagram

Electrical diagrams

Compressor series SK T

200V±10% 50/60Hz
380V±10% 60Hz
440V±10% 60Hz
230V±10% 50/60Hz
400V±10% 50Hz
460V±10% 60Hz

TT/TN power supply with common point grounding

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.

Manufacturer: KAESER KOMPRESSOREN GmbH
96450 Coburg
GERMANY

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forwarded or otherwise made accessible to third parties.

c				Datum	23.06.2010 E		KAESER KOMPRESSOREN	Cover page Compressor series SK T	=
b				Bearbeiter	Sitter				+
a				Geprüft	Büchner				
A	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	SIGMA CONTROL 2 / DSK.T-03002.00 / page 1 / 1 Bl.

Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	Cover page			DSK.T-03002.00	1	
2	List of contents			ZSK.T-03002.00	1	
3	general instructions			USK.T-03002.00	1	
4	electrical equipment identification			USK.T-03002.00	2	
5	Equipment parts list			USK.T-03002.00	3	
6	Equipment parts list			USK.T-03002.00	4	
7	Circuit diagram	Power switching/Control		SSK.T-03002.00	1	
8	Circuit diagram	Power switching Dryer		SSK.T-03002.00	2	
9	Circuit diagram	Dryer Control		SSK.T-03002.00	3	
10	Circuit diagram	Control voltage tapping		SSK.T-03002.00	4	
11	Circuit diagram	Condensate drain		SSK.T-03002.00	5	
12	Circuit diagram	Power supply unit		SSK.T-03002.00	6	
13	Circuit diagram	IO-module/Configuration		SSK.T-03002.00	7	
14	Circuit diagram	sensors/actuators		SSK.T-03002.00	8	
15	Circuit diagram	Volt-free contacts		SSK.T-03002.00	9	
16	Circuit diagram	inputs/outputs		SSK.T-03002.00	10	
17	Circuit diagram	transformer diagrams		SSK.T-03002.00	11	
18	Terminal schedule	Terminal strip -X0,-X11		KSK.T-03002.00	1	
19	Terminal schedule	Terminal strip -X31,-3X31		KSK.T-03002.00	2	
20	Component layout	Mounting plate		ASK.T-03002.00	1	

c				Datum	23.06.2010		KAESER KOMPRESSOREN	List of contents Compressor series SK T	=
b				Bearbeiter	Sitter				+
a				Geprüft	Büchner				
B	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	SIGMA CONTROL 2 / ZSK.T-03002.00 / page 1 / 1 Bl.

general instructions

ATTENTION !!!
Install supplies, grounding and shock protection
to local safety regulations.
Control circuits are single-end-earthed, if they are floating
they may only be used together with insulation monitoring.
Do not make or break
live plug-in connectors.

control cabinet wiring for non-designated conductors
with multi-standard stranded conductors

primary circuits:	black
Control voltage AC:	red 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
Control voltage DC:	blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
external voltage:	orange 1,5mm² H07V-K, 16AWG UL-Style 1015, CSA-TEW
measuring circuits:	violet 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
earth conductor:	green/yellow H07V-K, UL-Style 1015, CSA-TEW

option F1 = microfilter AIR CENTER

option T2 = transformer power supply for refrigeration dryer

c				Datum	23.06.2010		KAESER KOMPRESSOREN	general instructions Compressor series SK T	=
b				Bearbeiter	Sitter				+
a				Geprüft	Büchner				
C	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:	SIGMA CONTROL 2	USK.T-03002.00	page 1 / 4 Bl.

electrical equipment identification

general components

-B25	Overload relay, Compressor motor
-F11	Overload protection switch, Control transformer
-F30	Overload protection switch, Dryer
-M1	Compressor motor
-M30	Compressor motor Dryer
-M31	Fan motor Dryer
-Q1	Mains contactor
-Q2	Delta contactor
-Q3	Star contactor
-Q30	Motor contactor Dryer
-S1	EMERGENCY STOP pushbutton
-S5	Door safety interlock switch
-T11	Control transformer
-T21	Power unit
-T30	Transformer/option T2

Control

-K20	*Main Control System SC2MCS*
-X1	Ethernet
-X2	IO-Bus
-X3	RS485-FC (USS)
-X4	Communication module (Bus)
-X5	SD card slot
-X6	Earth connection
-K21	*IO-module SC2IOM-1*
	internal
-X1	IO-Bus, Input
-X2	IO-Bus, Output
-X3,-X8	digital inputs
-X4	Power supply unit, digital outputs
-X5,-X9	Relay outputs
-X6	Analog input, 4-20mA
-X7	Analog input, PT100
	external
-X11...-X13	analog inputs, 4-20mA
-X14...-X17	analog inputs, PT100
-X18...-X29	digital inputs
-X30...-X32	digital outputs

sensors/actuators

-B1	Pressure transducer, Air main pressure
-B2	Direction of rotation pressure switch
-B30	Safety pressure switch Dryer
-B39	Temperature probe dew point temperature
-B40	Temperature probe, Airend discharge temperature
-K1	Control valve
-K34	Condensate drain, Dryer
-K13	Condensate drain, microfilter/option F1

terminal strips

-X0	Terminal strip, Power supply
-X11	Terminal strip, Control
-X31,-3X31	Terminal strip, Dryer

c				Datum	23.06.2010		KAESER KOMPRESSOREN	electrical equipment identification	=
b				Bearbeiter	Sitter			Compressor series SK T	+
a				Geprüft	Büchner				
C	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	SIGMA CONTROL 2 / USK.T-03002.00 / page 2 / 4 Bl.

model

Equipment parts list
SK 22 T

machine power supply	200 V ±10 %, 50 Hz 200 V ±10 %, 60 Hz	230 V ±10 %, 50 Hz 230 V ±10 %, 60 Hz	380 V ±10 %, 60 Hz	400 V ±10 %, 50 Hz	440 V ±10 %, 60 Hz 460 V ±10 %, 60 Hz
Motor **-M1**	11kW diagram 2, Sht.1	11kW diagram 1, Sht.1 (50 Hz) diagram 2, Sht.1 (60 Hz)	11kW diagram 1, Sht.1	11kW diagram 1, Sht.1	11kW diagram 1, Sht.1
supply terminals **-X0**	7.3140.02090	7.3140.02090	7.3140.02080	7.3140.02080	7.3140.02080
Siemens	3RV1935-5A	3RV1935-5A	3RV1915-5A	3RV1915-5A	3RV1915-5A
terminal strips **-X0**	7.6836.00430 Wieland	7.6836.00430 Wieland	7.6836.00170 Wieland	7.6836.00170 Wieland	7.6836.00170 Wieland
-X11/X31	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland
Contactor **-Q1**	7.6867.0	7.6867.0	7.6865.0	7.6865.0	7.6865.0
	3RT1034-1AL20	3RT1034-1AL20	3RT1025-1AL20	3RT1025-1AL20	3RT1025-1AL20
Auxiliary switch	7.3140.04050	7.3140.04050	7.3140.04050	7.3140.04050	7.3140.04050
	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3
Interference suppressor	7.3140.00920	7.3140.00920	7.3140.01400	7.3140.01400	7.3140.01400
Siemens	3RT1936-1CD00	3RT1936-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor **-Q2**	7.6867.0	7.6867.0	7.6865.0	7.6865.0	7.6865.0
	3RT1034-1AL20	3RT1034-1AL20	3RT1025-1AL20	3RT1025-1AL20	3RT1025-1AL20
Auxiliary switch	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030
	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01
Interference suppressor	7.3140.00920	7.3140.00920	7.3140.01400	7.3140.01400	7.3140.01400
Siemens	3RT1936-1CD00	3RT1936-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor **-Q3**	7.6866.0	7.6866.0	7.6864.0	7.6864.0	7.6864.0
	3RT1026-1AL20	3RT1026-1AL20	3RT1024-1AL20	3RT1024-1AL20	3RT1024-1AL20
Auxiliary switch	7.3140.01690	7.3140.01690	7.3140.01690	7.3140.01690	7.3140.01690
	3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10
Auxiliary switch	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030
	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01
Interference suppressor	7.3140.01400	7.3140.01400	7.3140.01400	7.3140.01400	7.3140.01400
Siemens	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor **-Q30**	7.3140.01920	7.3140.01920	7.3140.01920	7.3140.01920	7.3140.01920
Siemens	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41
Overload relay **-B25**	7.6873.00200	7.6873.00200	7.6873.00190	7.6873.00190	7.6873.00190
	3RB2036-1UB0	3RB2036-1UB0	3RB2026-1QB0	3RB2026-1QB0	3RB2026-1QB0
	12,5-50 A	12,5-50 A	6-25 A	6-25 A	6-25 A
	setting: 30 A (50 Hz)	setting: 26 A (50 Hz)	setting: 16 A	setting: 15 A	setting: 14 A
Siemens		setting: 27 A (60 Hz)			
Overload protection switch **-F11**	7.6860.00090	7.6860.00090	7.6860.00090	7.6860.00090	7.6860.00090
	3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10
	0,7-1 A	0,7-1 A	0,7-1 A	0,7-1 A	0,7-1 A
Siemens	setting: 0,9 A	setting: 0,77 A	setting: 0,7 A	setting: 0,7 A	setting: 0,7 A
Overload protection switch **-F30**	7.6860.00180	7.6860.00170	7.6860.00170	7.6860.00170	7.6860.00170
	3RV1011-1HA10	3RV1011-1GA10	3RV1011-1GA10	3RV1011-1GA10	3RV1011-1GA10
	5,5-8 A	4,5-6,3 A	4,5-6,3 A	4,5-6,3 A	4,5-6,3 A
Siemens	setting: 6,6 A	setting: 5,2 A	setting: 5,2 A	setting: 5,2 A	setting: 5,2 A
Transformer **-T11**	7.0776.10040	7.0776.10040	7.0775.2	7.0775.2	7.0776.10040
	9916497 Eltra	9916497 Eltra	B0001089 Block	B0001089 Block	9916497 Eltra
	160 VA	160 VA	160 VA	160 VA	160 VA
	diagram 2, Sht.11	diagram 2, Sht.11	diagram 1, Sht.11	diagram 1, Sht.11	diagram 2, Sht.11
Transformer **-T30**	7.3717.00260	---	7.2292.10060	7.3717.00240	7.2292.10060
	B0406058		USTE1600	B0312005	USTE1600
	8,0 A		7,0 A	6,4 A	7,0 A
Block	diagram 12, Sht.11		diagram 11, Sht.11	diagram 10, Sht.11	diagram 11, Sht.11
Power supply **-T21**	7.7030.1	7.7030.1	7.7030.1	7.7030.1	7.7030.1
Siemens	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A
connection **-W13**	7.3140.02120	7.3140.02120	7.3140.02110	7.3140.02110	7.3140.02110
Siemens	3RV1935-1A	3RV1935-1A	3RT1926-4CC20	3RT1926-4CC20	3RT1926-4CC20
connection **-W14**	1x6 mm² black	1x6 mm² black	7.3140.02130	7.3140.02130	7.3140.02130
Siemens	500 V, 70°C	500 V, 70°C	3RA1923-3D	3RA1923-3D	3RA1923-3D
cables **-W19.1/.2**	4G10 mm²	4G10 mm²	7x1x4 mm²	7x1x4 mm²	7x1x4 mm²
	750 V, 90°C	750 V, 90°C	750 V, 120°C	750 V, 120°C	750 V, 120°C
Compressor control **-K20**	7.7601.0	7.7601.0	7.7601.0	7.7601.0	7.7601.0
Prodrive	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS
IO-module **-K21**	7.7602.0	7.7602.0	7.7602.0	7.7602.0	7.7602.0
Prodrive	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1
EMERGENCY STOP pushbutton **-S1**	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV
Switching element **Schlegel**	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00
Control cabinet **KAESER**	7.7681.0	7.7681.0	7.7681.0	7.7681.0	7.7681.0
Mounting plate **KAESER**	212761.0	212761.0	212761.0	212761.0	212761.0

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USK.T-03002.00

SIGMA CONTROL 2

Equipment parts list
Compressor series SK T

KAESER KOMPRESSOREN

Ursprung:
Ersatz für:
Ersatz durch:

	Datum	Name	Datum
c			
b	23.06.2010	Sitter	
a	Bearbeiter	Büchner	
C	Änderung	Geprüft	Norm

Equipment parts list
SK 25 T

model						
machine power supply		200 V ±10 %, 50 Hz 200 V ±10 %, 60 Hz	230 V ±10 %, 50 Hz 230 V ±10 %, 60 Hz	380 V ±10 %, 60 Hz	400 V ±10 %, 50 Hz	440 V ±10 %, 60 Hz 460 V ±10 %, 60 Hz
Motor	-M1	15 kW diagram 2, Sht. 1	15 kW diagram 1, Sht. 1 (50 Hz) diagram 2, Sht. 1 (60 Hz)	15 kW diagram 1, Sht. 1	15 kW diagram 1, Sht. 1	15 kW diagram 1, Sht. 1
supply terminals	-X0	7.3140.02090	7.3140.02090	7.3140.02080	7.3140.02080	7.3140.02080
	Siemens	3RV1935-5A	3RV1935-5A	3RV1915-5A	3RV1915-5A	3RV1915-5A
terminal strips	-X0	7.6836.00430 Wieland	7.6836.00430 Wieland	7.6836.00170 Wieland	7.6836.00170 Wieland	7.6836.00170 Wieland
	-X11/X31	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland	7.6836.00400 Wieland
Contactor	-Q1	7.6869.0	7.6869.0	7.6866.0	7.6866.0	7.6866.0
		3RT1036-1AL20	3RT1036-1AL20	3RT1026-1AL20	3RT1026-1AL20	3RT1026-1AL20
Auxiliary switch		7.3140.04050	7.3140.04050	7.3140.04050	7.3140.04050	7.3140.04050
		3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3	3RH1921-1XA31-0MA3
Interference suppressor		7.3140.00920	7.3140.00920	7.3140.01400	7.3140.01400	7.3140.01400
	Siemens	3RT1936-1CD00	3RT1936-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor	-Q2	7.6869.0	7.6869.0	7.6866.0	7.6866.0	7.6866.0
		3RT1036-1AL20	3RT1036-1AL20	3RT1026-1AL20	3RT1026-1AL20	3RT1026-1AL20
Auxiliary switch		7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030
		3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01
Interference suppressor		7.3140.00920	7.3140.00920	7.3140.01400	7.3140.01400	7.3140.01400
	Siemens	3RT1936-1CD00	3RT1936-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor	-Q3	7.6866.0	7.6866.0	7.6865.0	7.6865.0	7.6865.0
		3RT1026-1AL20	3RT1026-1AL20	3RT1025-1AL20	3RT1025-1AL20	3RT1025-1AL20
Auxiliary switch		7.3140.01690	7.3140.01690	7.3140.01690	7.3140.01690	7.3140.01690
		3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10	3RH1921-1CA10
Auxiliary switch		7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030	7.3140.02030
		3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01	3RH1921-1CA01
Interference suppressor		7.3140.01400	7.3140.01400	7.3140.01400	7.3140.01400	7.3140.01400
	Siemens	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00	3RT1926-1CD00
Contactor	-Q30	7.3140.01920	7.3140.01920	7.3140.01920	7.3140.01920	7.3140.01920
	Siemens	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41	3RT1016-1JB41
Overload relay	-B25	7.6873.00200	7.6873.00200	7.6873.00190	7.6873.00190	7.6873.00190
		3RB2036-1UB0	3RB2036-1UB0	3RB2026-1QB0	3RB2026-1QB0	3RB2026-1QB0
		12,5-50 A	12,5-50 A	6-25 A	6-25 A	6-25 A
		setting: 38 A (50 Hz)	setting: 33 A (50 Hz) setting: 34 A (60 Hz)	setting: 21 A	setting: 19 A	setting: 17 A
	Siemens					
Overload protection switch	-F11	7.6860.00090	7.6860.00090	7.6860.00090	7.6860.00090	7.6860.00090
		3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10	3RV1011-0JA10
		0,7-1 A	0,7-1 A	0,7-1 A	0,7-1 A	0,7-1 A
	Siemens	setting: 0,9 A	setting: 0,77 A	setting: 0,7 A	setting: 0,7 A	setting: 0,7 A
Overload protection switch	-F30	7.6860.00180	7.6860.00170	7.6860.00170	7.6860.00170	7.6860.00170
		3RV1011-1HA10	3RV1011-1GA10	3RV1011-1GA10	3RV1011-1GA10	3RV1011-1GA10
		5,5-8 A	4,5-6,3 A	4,5-6,3 A	4,5-6,3 A	4,5-6,3 A
	Siemens	setting: 6,6 A	setting: 5,2 A	setting: 5,2 A	setting: 5,2 A	setting: 5,2 A
Transformer	-T11	7.0776.10040	7.0776.10040	7.0775.2	7.0775.2	7.0776.10040
		9916497 Eltra	9916497 Eltra	B0001089 Block	B0001089 Block	9916497 Eltra
		160 VA	160 VA	160 VA	160 VA	160 VA
		diagram 2, Sht. 11	diagram 2, Sht. 11	diagram 1, Sht. 11	diagram 1, Sht. 11	diagram 2, Sht. 11
Transformer	-T30	7.3717.00260	---	7.2292.10060	7.3717.00240	7.2292.10060
		B0406058		USTE1600	B0312005	USTE1600
		8,0 A		7,0 A	6,4 A	7,0 A
	Block	diagram 12, Sht. 11		diagram 11, Sht. 11	diagram 10, Sht. 11	diagram 11, Sht. 11
Power supply	-T21	7.7030.1	7.7030.1	7.7030.1	7.7030.1	7.7030.1
	Siemens	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A	100-240 VAC/24 VDC 2,5 A
connection	-W13	7.3140.02120	7.3140.02120	7.3140.02110	7.3140.02110	7.3140.02110
	Siemens	3RV1935-1A	3RV1935-1A	3RT1926-4CC20	3RT1926-4CC20	3RT1926-4CC20
connection	-W14	1x6 mm² black	1x6 mm² black	7.3140.02130	7.3140.02130	7.3140.02130
	Siemens	500 V, 70°C	500 V, 70°C	3RA1923-3D	3RA1923-3D	3RA1923-3D
cables	-W19.1/.2	4G10 mm²	4G10 mm²	7x1x6 mm²	7x1x6 mm²	7x1x6 mm²
		750 V, 90°C	750 V, 90°C	750 V, 120°C	750 V, 120°C	750 V, 120°C
Compressor control	-K20	7.7601.0	7.7601.0	7.7601.0	7.7601.0	7.7601.0
	Prodrive	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS	SIGMA CONTROL 2 MCS
IO-module	-K21	7.7602.0	7.7602.0	7.7602.0	7.7602.0	7.7602.0
	Prodrive	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1	SIGMA CONTROL 2 IOM-1
EMERGENCY STOP pushbutton	-S1	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV
Switching element	Schlegel	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00
Control cabinet	KAESER	7.7681.0	7.7681.0	7.7681.0	7.7681.0	7.7681.0
Mounting plate	KAESER	212761.0	212761.0	212761.0	212761.0	212761.0

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USK.T-03002.00

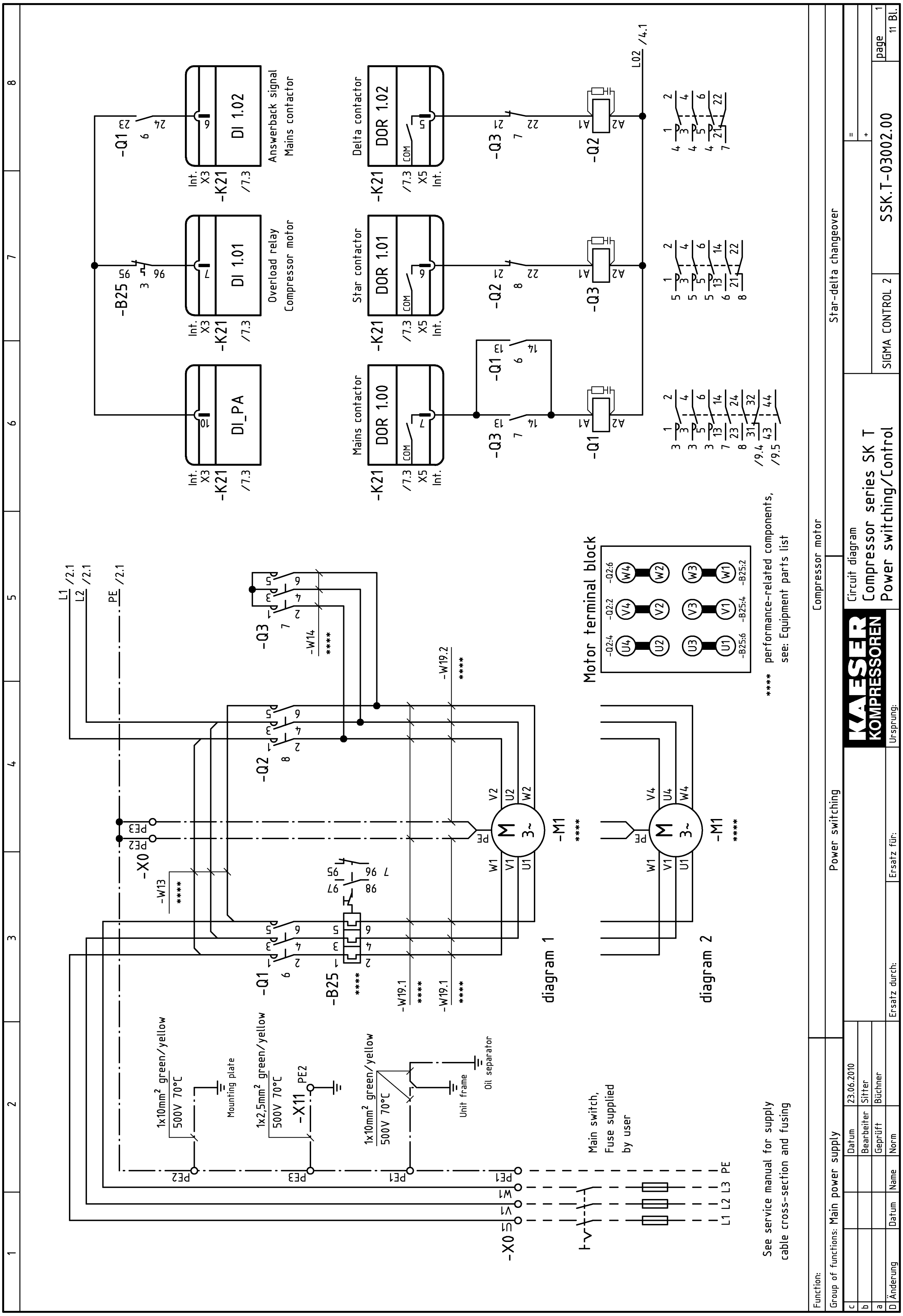
SIGMA CONTROL 2

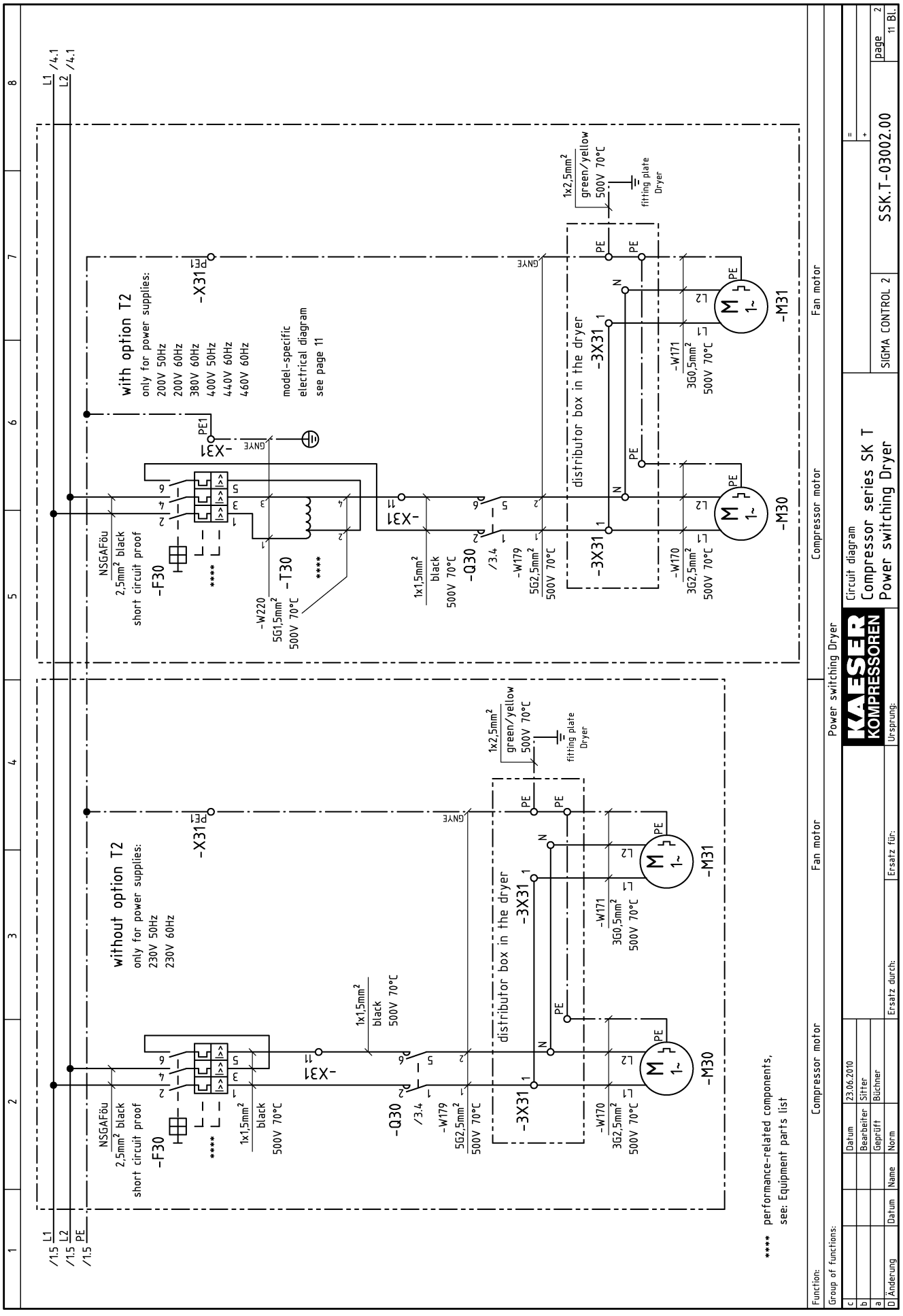
Equipment parts list
Compressor series SK T

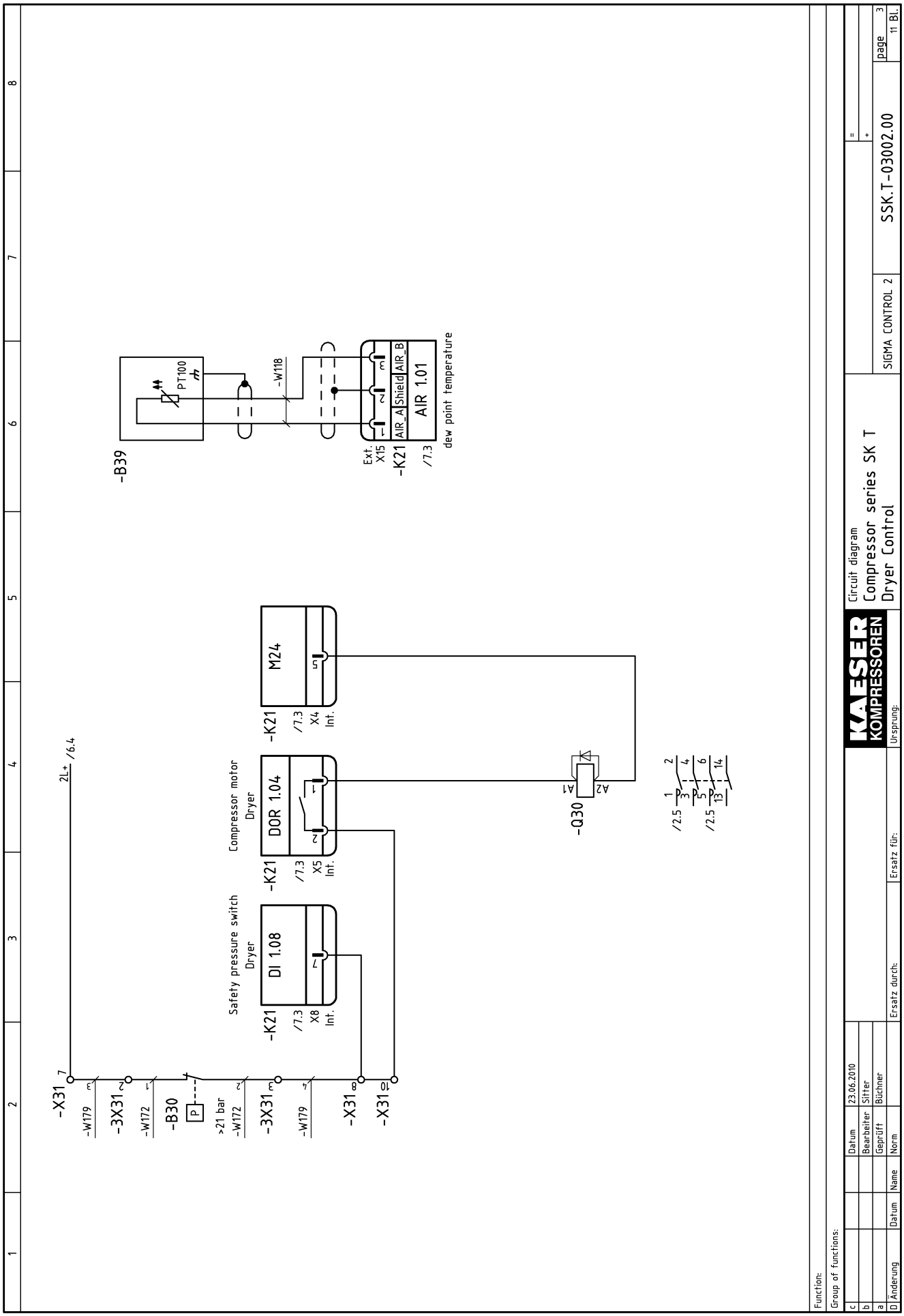
KAESER KOMPRESSOREN

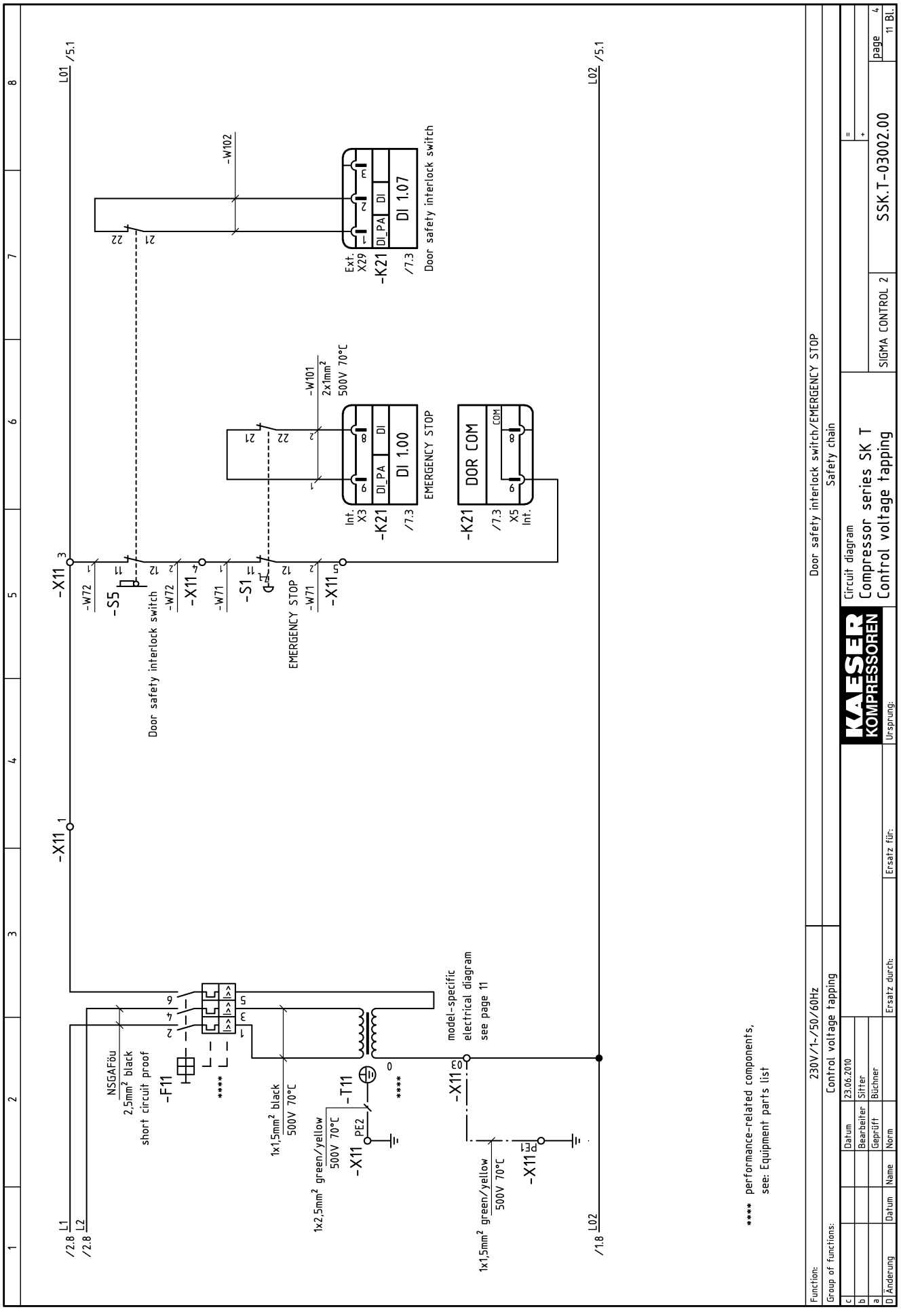
Ursprung:
Ersatz für:
Ersatz durch:

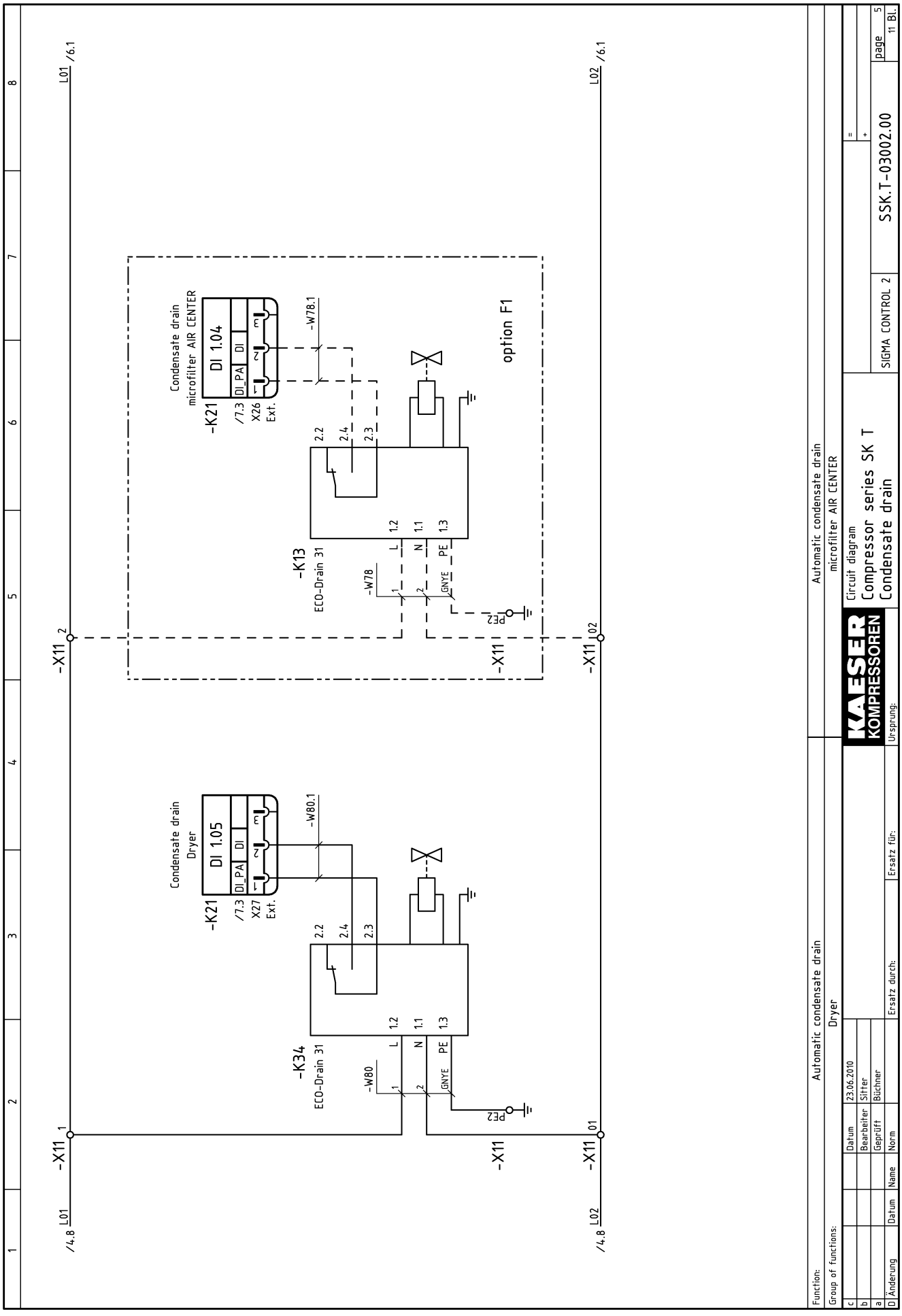
	Datum	Name
c		
b	23.06.2010	Sitter
a	Bearbeiter	Büchner
C	Geprüft	Norm
	Änderung	Datum

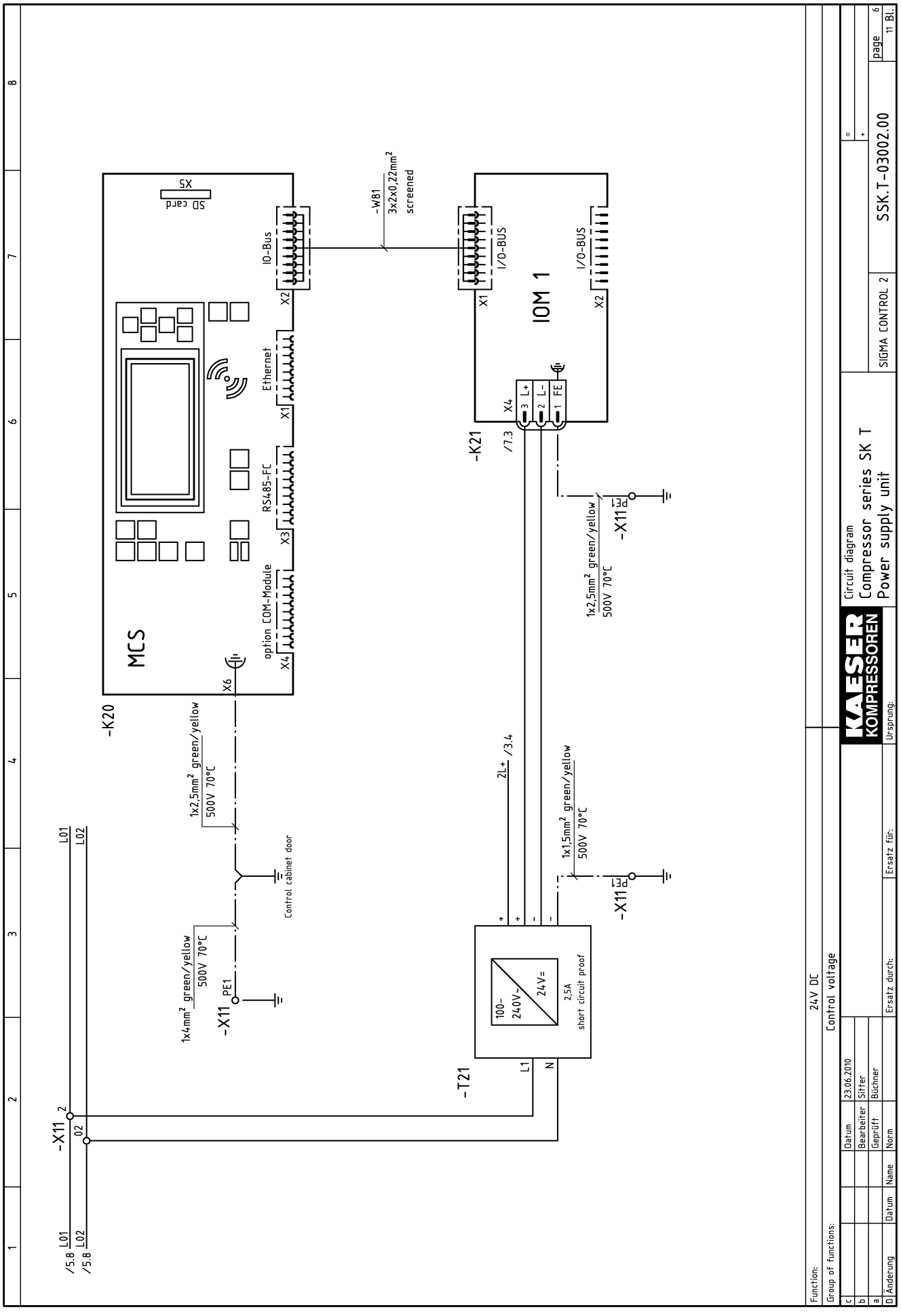

Circuit diagram
Compressor series SK T
Power switching/Control
SSK.T-03002.00
SIGMA CONTROL 2
Main power supply
Power switching
Compressor motor
Star-delta changeover
Motor terminal block
diagram 1
diagram 2
See service manual for supply cable cross-section and fusing
Main switch, Fuse supplied by user
**** performance-related components, see: Equipment parts list
Mains contactor
Star contactor
Delta contactor
Overload relay Compressor motor
Answerback signal Mains contactor
Mounting plate
Unit frame
Oil separator
23.06.2010
Sitter
Büchner

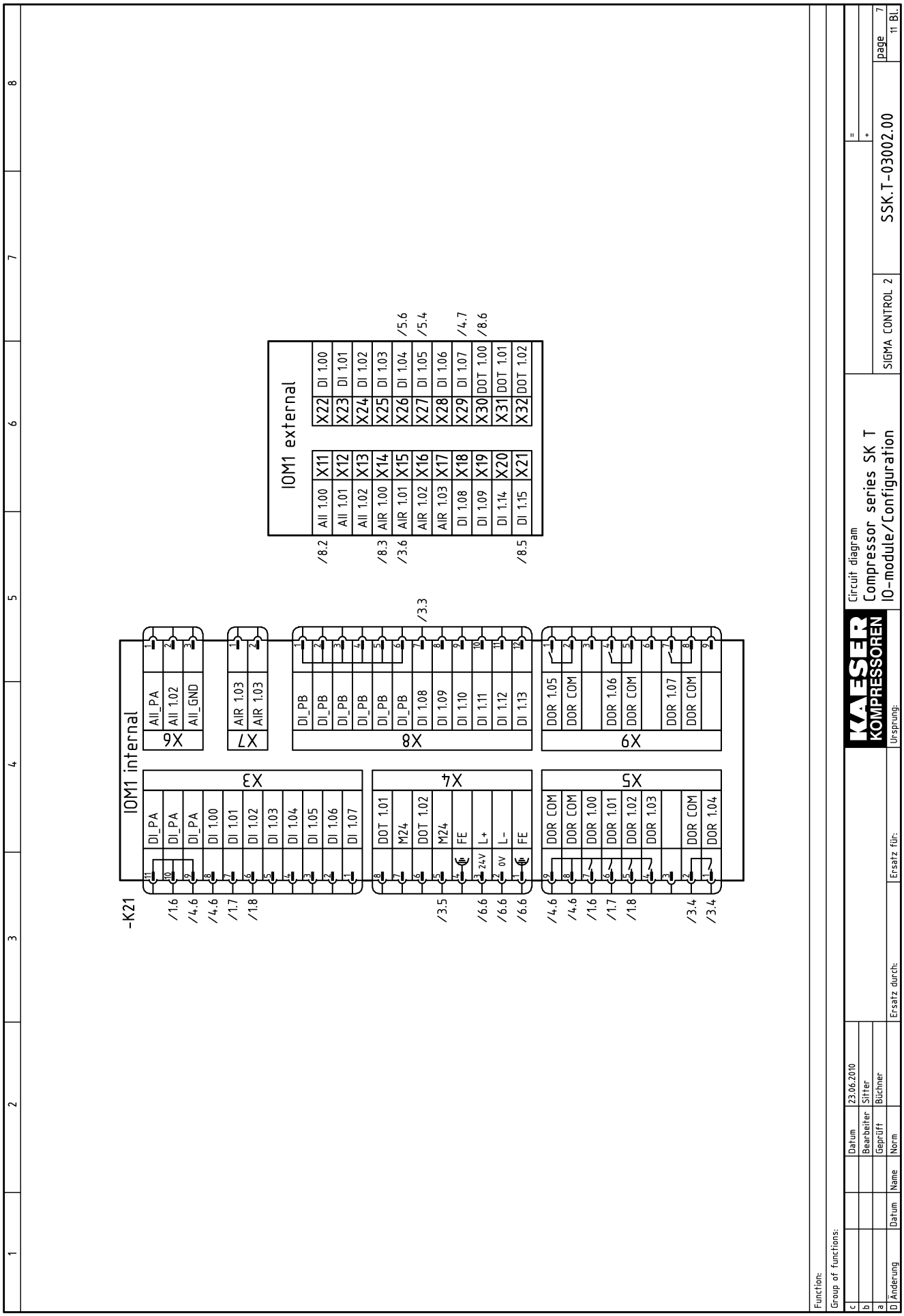

with option T2
only for power supplies:
200V 50Hz
200V 60Hz
380V 60Hz
400V 50Hz
440V 60Hz
460V 60Hz
model-specific
electrical diagram
see page 11
without option T2
only for power supplies:
230V 50Hz
230V 60Hz
distributor box in the dryer
fitting plate Dryer
Compressor motor
Fan motor
Power switching Dryer
**** performance-related components, see: Equipment parts list
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Power switching Dryer
SIGMA CONTROL 2
SSK.T-03002.00
page 2
11 Bl.

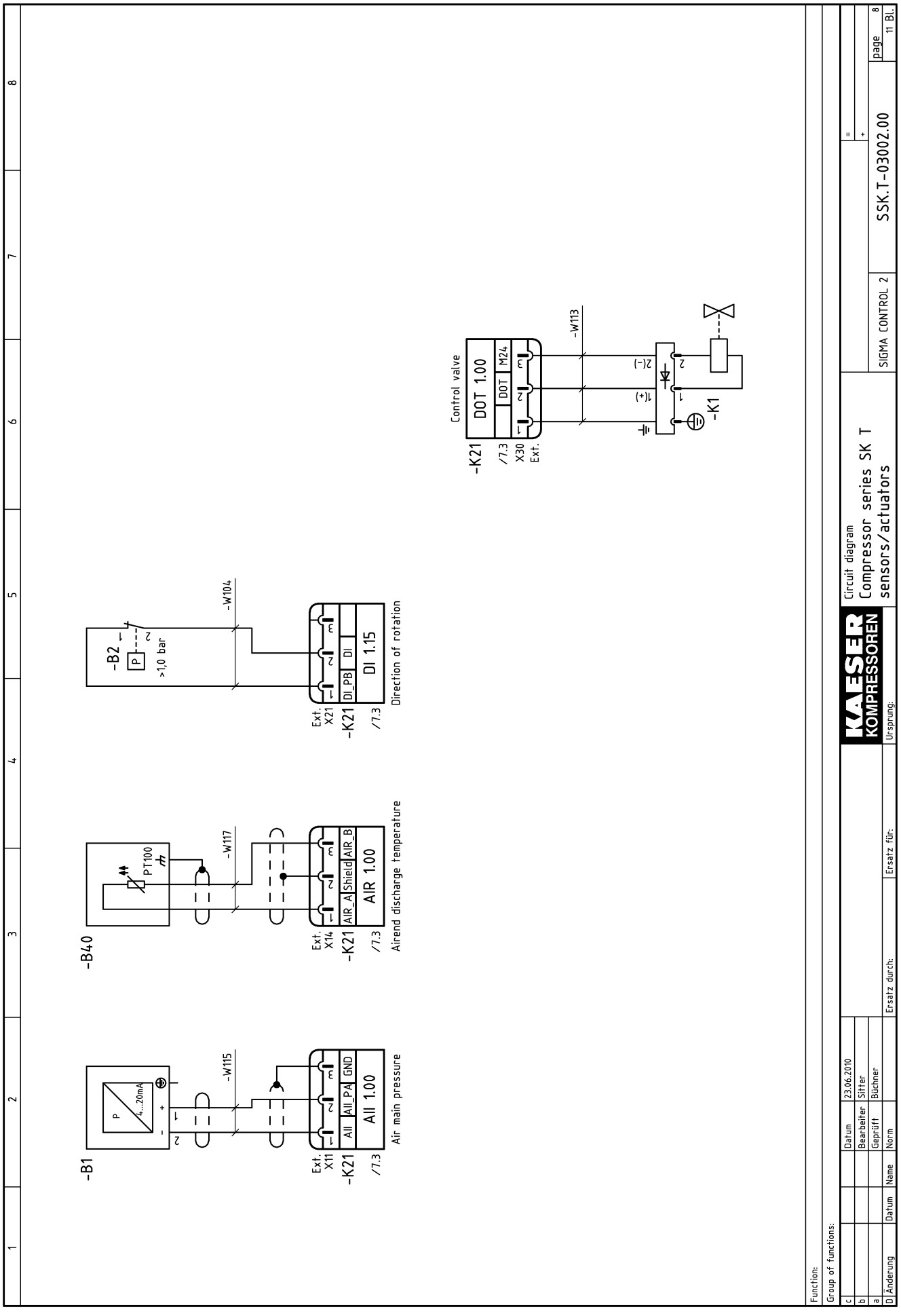

-B39
PT100
-W118
Ext. X15
-K21
AIR_A
Shield
AIR_B
AIR 1.01
/7.3
dew point temperature
-K21
M24
/7.3
X4
Int.
-K21
DOR 1.04
/7.3
X5
Int.
Compressor motor
Dryer
-K21
DI 1.04
/7.3
X8
Int.
Safety pressure switch
Dryer
-Q30
A1
A2
/2.5
/2.5
-X31
2L+
/6.4
-W179
-3X31
-W172
-B30
>21 bar
-W172
-3X31
-W179
-X31
-X31
Function:
Group of functions:
Datum
Bearbeiter
Sitter
Geprüft
Büchner
Ersatz durch:
Ersatz für:
Ursprung:
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Dryer Control
SIGMA CONTROL 2
SSK.T-03002.00
page 3
11 Bl.
Änderung
Datum
Name
Norm
23.06.2010

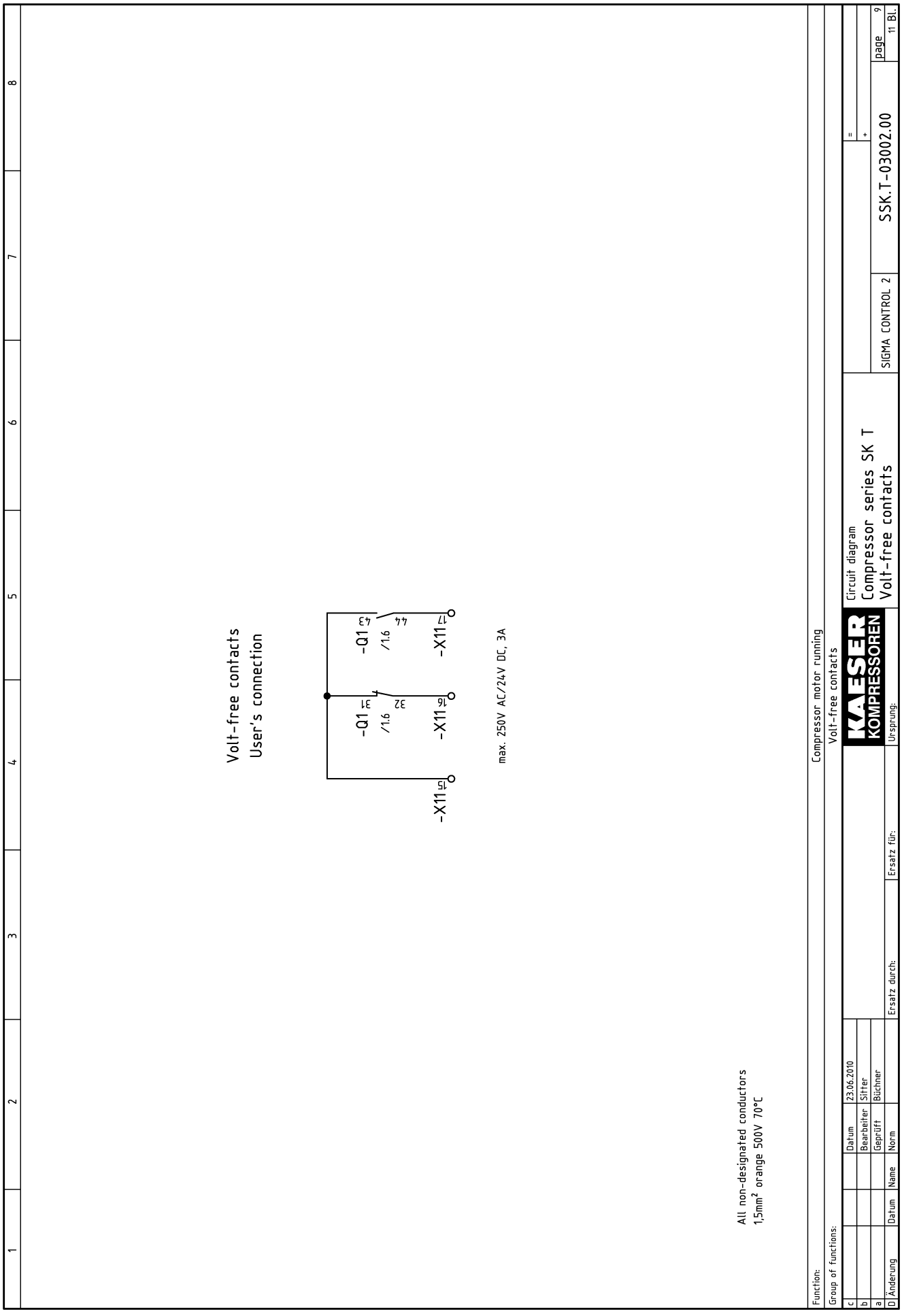

L01 /5.1
L02 /5.1
-X11
-W102
-W101 2x1mm² 500V 70°C
-W72
-W71
-S5
-S1
-K21
DI 1.07
DI 1.00
DOR COM
Ext. X29
Int. X3
Int. X5
Door safety interlock switch
EMERGENCY STOP
NSGAFöu 2,5mm² black short circuit proof
-F11
1x1,5mm² black 500V 70°C
1x2,5mm² green/yellow 500V 70°C
-T11
-X11 PE2
-X11 PE1
1x1,5mm² green/yellow 500V 70°C
model-specific electrical diagram see page 11
**** performance-related components, see: Equipment parts list
Function: 230V/1~/50/60Hz
Door safety interlock switch/EMERGENCY STOP
Group of functions: Control voltage tapping
Safety chain
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Control voltage tapping
SIGMA CONTROL 2
SSK.T-03002.00
page 4
11 Bl.
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Name Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung

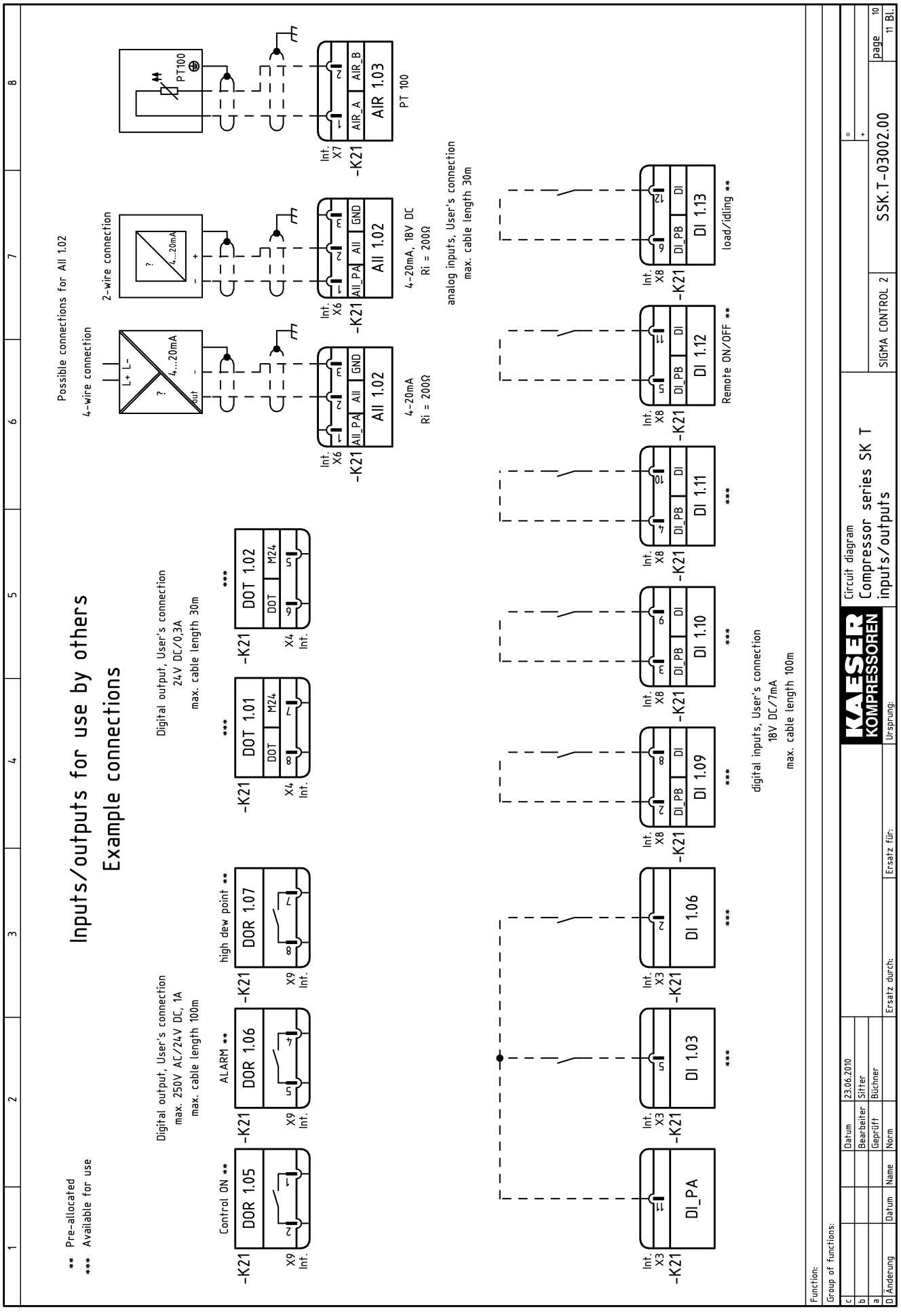

option F1
Condensate drain microfilter AIR CENTER
-K21
DI 1.04
DI_PA
DI
/7.3
X26
Ext.
-W78.1
-K13
ECO-Drain 31
-W78
L
N
PE
GNYE
PE2
Condensate drain Dryer
DI 1.05
X27
-W80.1
-K34
-W80
-X11
L01
L02
/6.1
/4.8
Automatic condensate drain
Dryer
microfilter AIR CENTER
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Condensate drain
SIGMA CONTROL 2
SSK.T-03002.00
page 5
11 Bl.
Function:
Group of functions:
Datum
Name
Bearbeiter
Sifter
Geprüft
Büchner
Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung

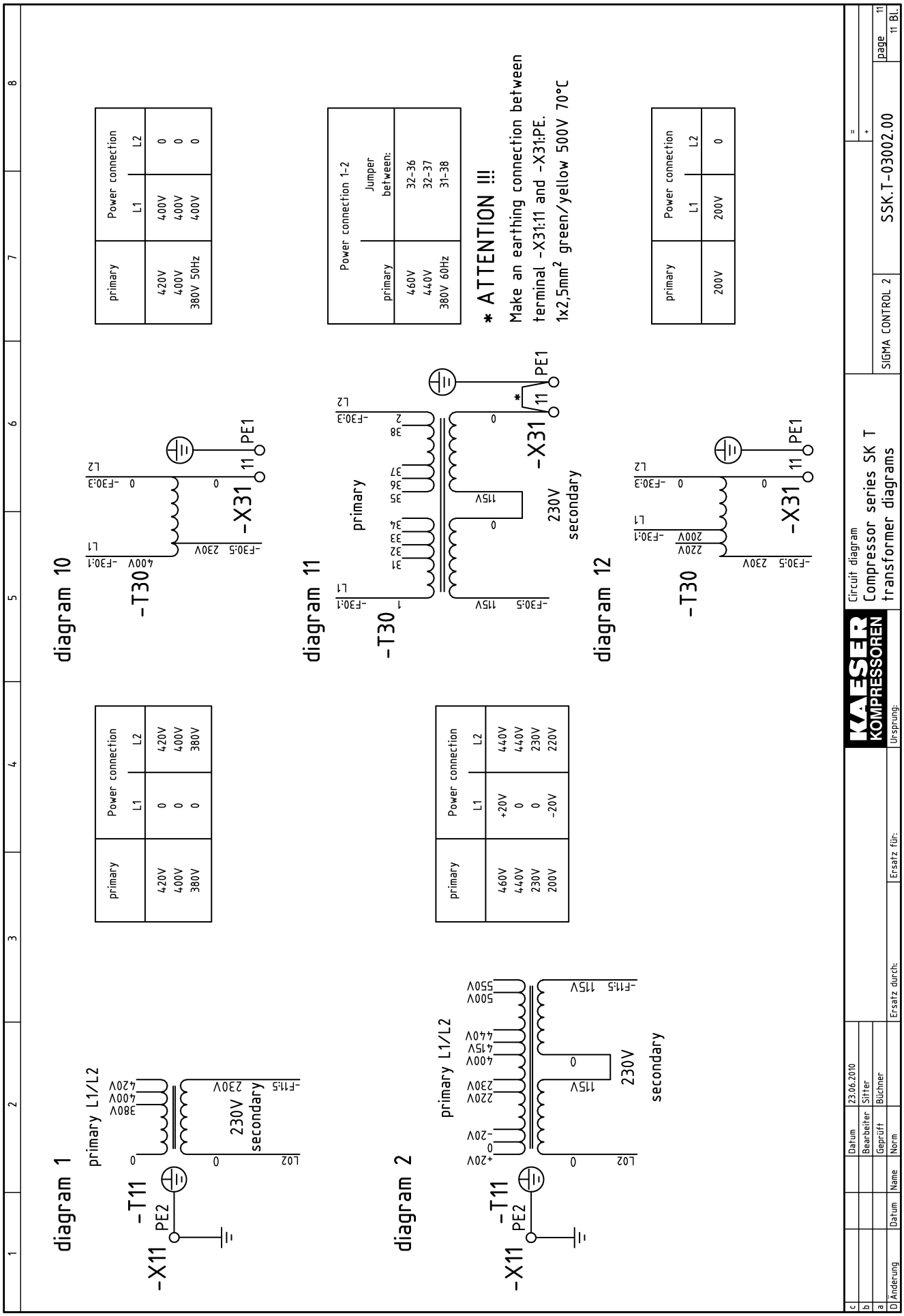

MCS
SD card
X5
X6
-K20
option COM-Module
X4
RS485-FC
X3
Ethernet
X1
IO-Bus
X2
-W81
3x2x0,22mm²
screened
-K21
IOM 1
I/O-BUS
X1
I/O-BUS
X2
X4
3 L+
2 L-
1 FE
/7.3
1x2,5mm² green/yellow
500V 70°C
-X11
PE
1x2,5mm² green/yellow
500V 70°C
-X11
PE
2L+ /3.4
1x1,5mm² green/yellow
500V 70°C
-X11
PE
1x4mm² green/yellow
500V 70°C
-X11
PE1
Control cabinet door
-T21
100-240V~
24V=
2,5A
short circuit proof
L1
N
-X11
2
02
L01
L02
/5.8 L01
/5.8 L02
24V DC
Control voltage
Function:
Group of functions:
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Name
Norm
Ersatz durch:
Ersatz für:
Ursprung:
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Power supply unit
SIGMA CONTROL 2
SSK.T-03002.00
page 6
11 Bl.
Änderung Datum Name


IOM1 external
IOM1 internal
-K21
Circuit diagram
Compressor series SK T
IO-module/Configuration
SIGMA CONTROL 2
SSK.T-03002.00
page 7
11 Bl.
KAESER KOMPRESSOREN
Function:
Group of functions:
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung Datum Name


-B1
P
4...20mA
-W115
All
All_PA
GND
All 1.00
Ext. X11
-K21
/7.3
Air main pressure
-B40
PT100
-W117
AIR_A
Shield
AIR_B
AIR 1.00
Ext. X14
-K21
/7.3
Airend discharge temperature
-B2
P
>1,0 bar
-W104
DI_PB
DI
DI 1.15
Ext. X21
-K21
/7.3
Direction of rotation
Control valve
-K21
DOT 1.00
DOT
M24
/7.3
X30
Ext.
-W113
-K1
Function:
Group of functions:
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Name
Norm
Ersatz durch:
Ersatz für:
Ursprung:
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
sensors/actuators
SIGMA CONTROL 2
SSK.T-03002.00
page 8
11 Bl.


Volt-free contacts
User's connection
-X11 15
-Q1 31 /1.6
32
-X11 16
-Q1 43 /1.6
44
-X11 17
max. 250V AC/24V DC, 3A
All non-designated conductors
1,5mm² orange 500V 70°C
Function:
Compressor motor running
Group of functions:
Volt-free contacts
KAESER KOMPRESSOREN
Circuit diagram
Compressor series SK T
Volt-free contacts
SIGMA CONTROL 2
SSK.T-03002.00
page 9
11 Bl.
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung Datum Name


Inputs/outputs for use by others
Example connections
** Pre-allocated
*** Available for use
Possible connections for AII 1.02
4-wire connection
2-wire connection
PT100
PT 100
4-20mA, 18V DC
Ri = 200Ω
4-20mA
Ri = 200Ω
analog inputs, User's connection
max. cable length 30m
Digital output, User's connection
24V DC/0,3A
max. cable length 30m
Digital output, User's connection
max. 250V AC/24V DC, 1A
max. cable length 100m
Control ON **
ALARM **
high dew point **
Remote ON/OFF **
load/idling **
digital inputs, User's connection
18V DC/7mA
max. cable length 100m
DI_PA
DI 1.03
DI 1.06
DI 1.09
DI 1.10
DI 1.11
DI 1.12
DI 1.13
AII 1.02
AIR 1.03
DOR 1.05
DOR 1.06
DOR 1.07
DOT 1.01
DOT 1.02
-K21
Int. X3
Int. X6
Int. X7
Int. X8
Int. X4
Int. X9
Circuit diagram
Compressor series SK T
inputs/outputs
SIGMA CONTROL 2
SSK.T-03002.00
page 10
11 Bl.
Function:
Group of functions:
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Name Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung Datum



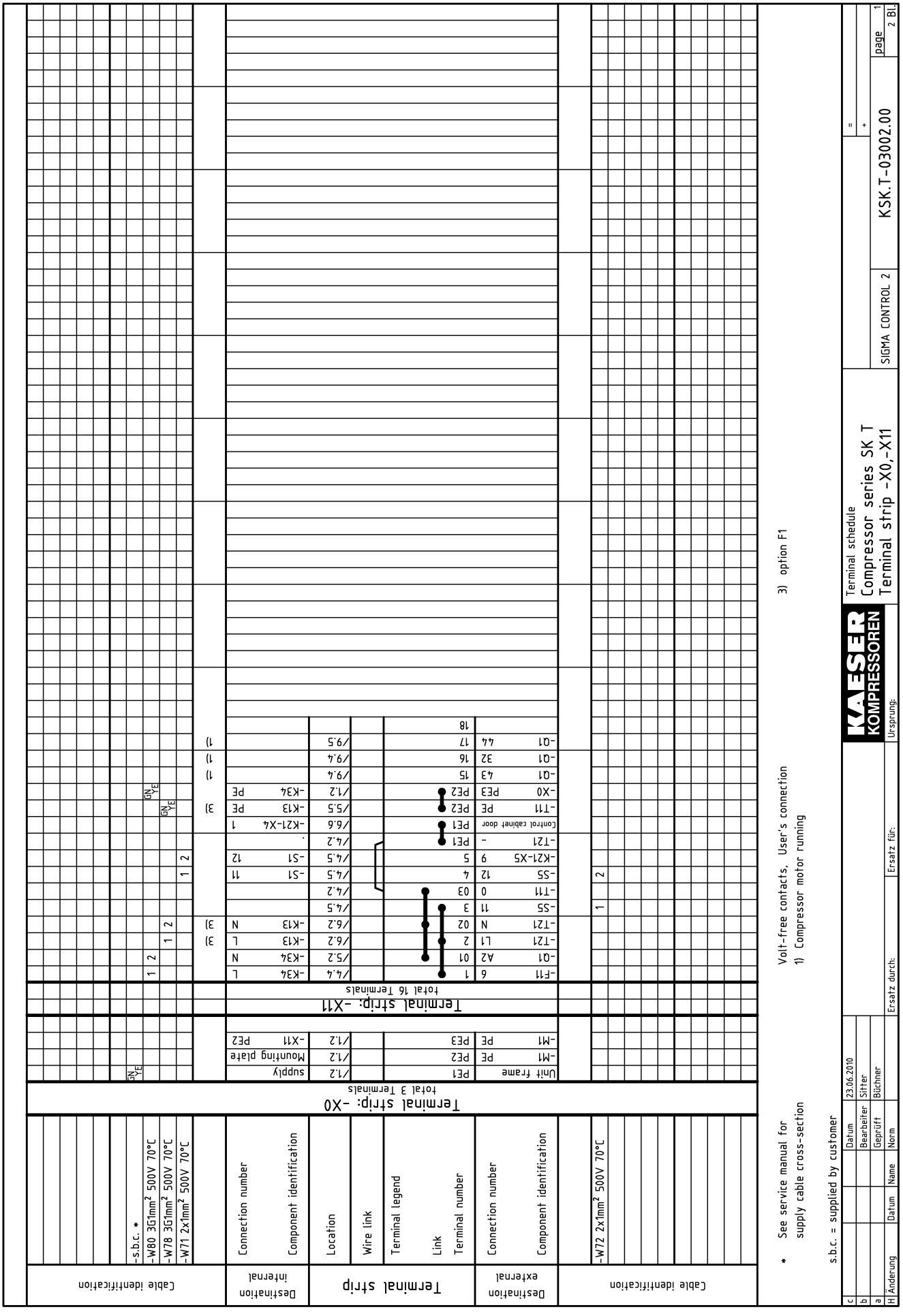
primary	Power connection L1	L2
420V 400V 380V 50Hz	400V 400V 400V	0 0 0

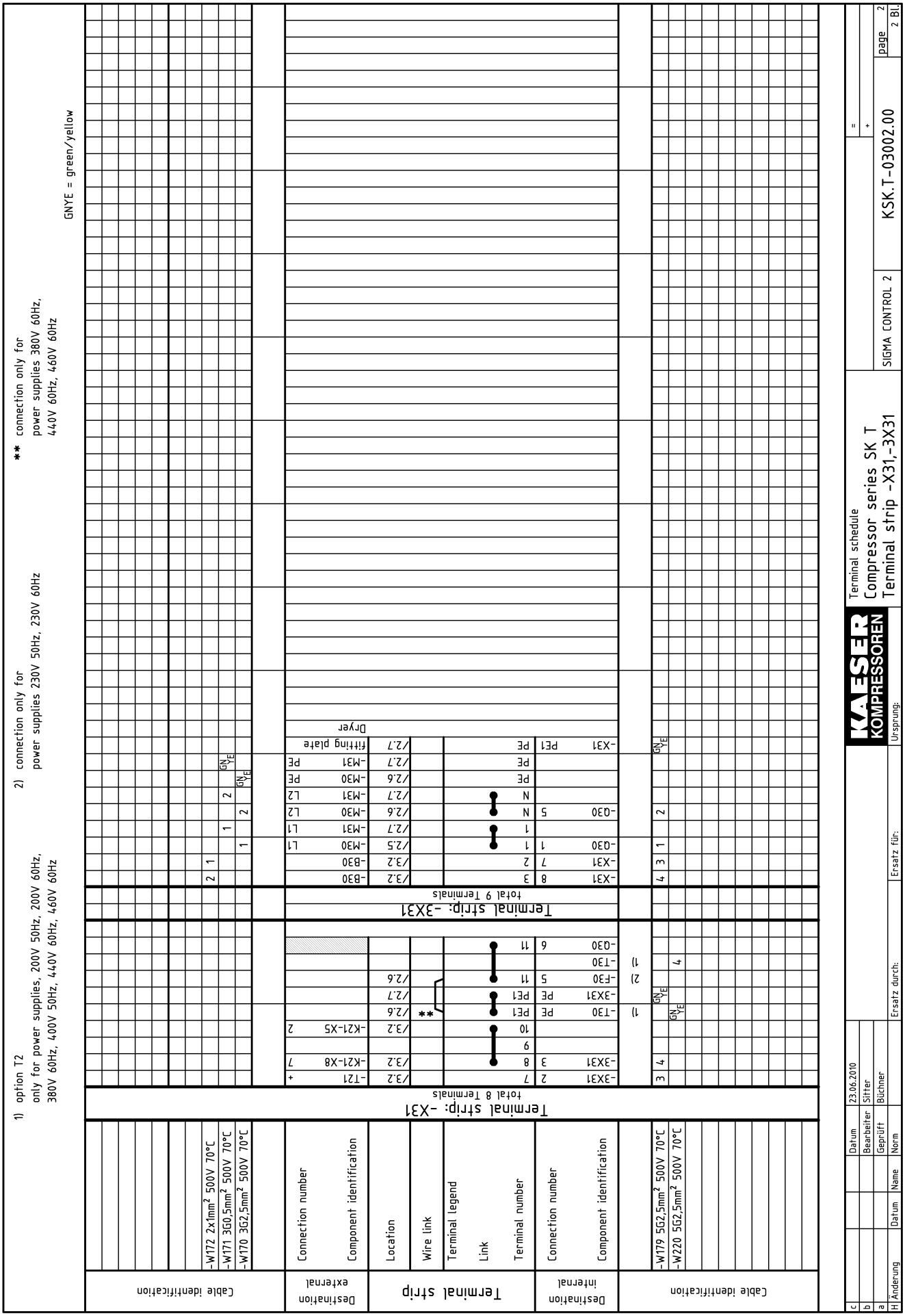
Power connection 1-2 Jumper between: primary	32-36 32-37 31-38
460V 440V 380V 60Hz	

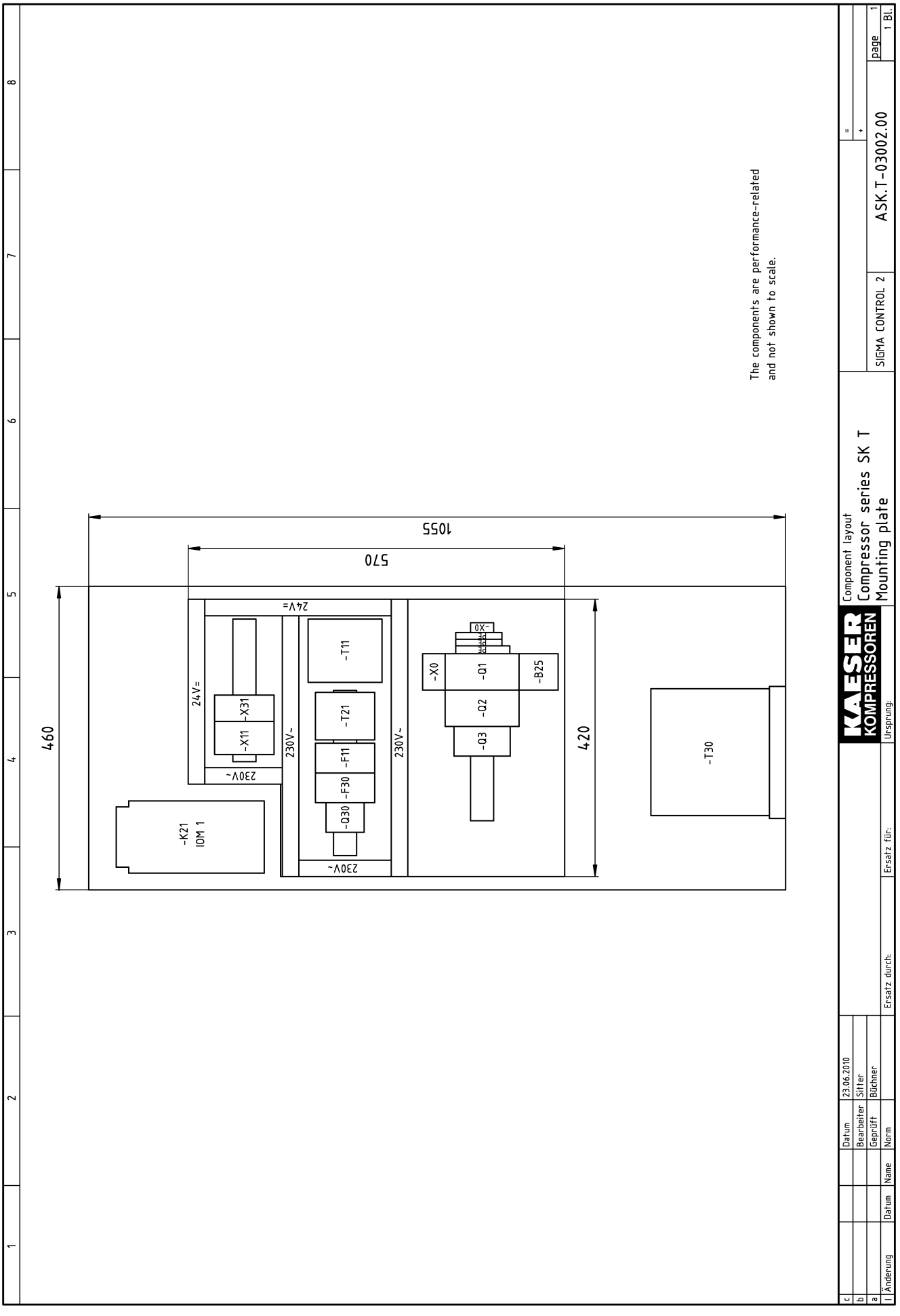
primary	Power connection L1	L2
200V	200V	0

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

primary	Power connection L1	L2
460V 440V 230V 200V	+20V 0 0 -20V	440V 440V 230V 220V


Terminal schedule
Compressor series SK T
Terminal strip -X0,-X11
SIGMA CONTROL 2
KSK.T-03002.00
page 1
2 Bl.
KAESER KOMPRESSOREN
Terminal strip -X0
total 3 Terminals
Terminal strip: -X11
total 16 Terminals
Cable identification
Destination external
Terminal strip
Destination internal
Cable identification
-s.b.c. *
-W80 3G1mm² 500V 70°C
-W78 3G1mm² 500V 70°C
-W71 2x1mm² 500V 70°C
-W72 2x1mm² 500V 70°C
Component identification
Connection number
Unit frame
-M1
-Q1
-T11
-T21
-K21-X5
-S5
-S1
-K13
-K34
-X11
-X0
Control cabinet door
supply
Mounting plate
Location
Wire link
Terminal legend
Link
Terminal number
Volt-free contacts, User's connection
Compressor motor running
option F1
See service manual for supply cable cross-section
s.b.c. = supplied by customer
Datum
Name
Norm
Ersatz durch:
Ersatz für:
Ursprung:
Änderung
23.06.2010
Bearbeiter
Sifter
Geprüft
Büchner


1) option T2
only for power supplies, 200V 50Hz, 200V 60Hz, 380V 60Hz, 400V 50Hz, 440V 60Hz, 460V 60Hz
2) connection only for power supplies 230V 50Hz, 230V 60Hz
** connection only for power supplies 380V 60Hz, 440V 60Hz, 460V 60Hz
GNYE = green/yellow
Terminal strip: -X31
total 8 Terminals
Terminal strip: -X31
total 9 Terminals
Dryer
Cable identification
Destination external
Terminal strip
Destination internal
Cable identification
Connection number
Component identification
Location
Wire link
Terminal legend
Link
Terminal number
-W172 2x1mm² 500V 70°C
-W171 3G0,5mm² 500V 70°C
-W170 3G2,5mm² 500V 70°C
-W179 5G2,5mm² 500V 70°C
-W220 5G2,5mm² 500V 70°C
Terminal schedule
Compressor series SK T
Terminal strip -X31,-3X31
SIGMA CONTROL 2
KSK.T-03002.00
page 2
2 Bl.
Datum 23.06.2010
Bearbeiter Sitter
Geprüft Büchner
Name
Norm
Datum
Änderung
Ersatz durch:
Ersatz für:
Ursprung:


The components are performance-related
and not shown to scale.
1055
570
460
420
24V=
230V~
230V~
230V~
-X31
-X11
-K21
IOM 1
-T11
-T21
-F11
-F30
-Q30
-X0
-X0
-Q1
-Q2
-Q3
-B25
-T30
Component layout
Compressor series SK T
Mounting plate
KAESER KOMPRESSOREN
SIGMA CONTROL 2
ASK.T-03002.00
page 1
1 Bl.
Datum 23.06.2010
Bearbeiter Sifter
Geprüft Büchner
Norm
Ersatz durch:
Ersatz für:
Ursprung:
Name
Datum
Änderung