

Service manual

Controller

SIGMA CONTROL BUB 82.XX

7_7000_0 11USE

Quick user guide

Controller

SIGMA CONTROL BUB 82.XX

7_7000_0 11 USE

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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,
- authorized service personnel.

2 Changing the display language

1. In the main menu, press the «UP» key until the current language appears.

```
88 psig      176 °F
→ Deutsch ←  Current language
- - - - -
```

2. Press «Enter».
3. Keep on pressing the «DOWN» or «UP» key until the required language appears.
4. Press «Enter» to accept the language.
The language is now set.
5. Press the «Escape» key as often as necessary to return to the main menu.

3 Entering and displaying passwords

The following passwords have been entered in the controller at the factory:

	Level 0	Level 4
password	00000	12EXP

Tab. 1 Passwords

1. In the main menu, keep pressing the «UP» key until *password* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176°F
password
  XXXXX L0  ↵
  XXXXX L0
```

Current level

3. Press «Enter».
 - An inverse cursor appears.
4. Keep on pressing the «DOWN» or «UP» key until the required character appears.
5. Press «Enter».
 - The cursor jumps to the next password character.
6. Set the remaining characters of the password until it is complete.
 - After entering the last character the activated password level is displayed.
7. Press the «Escape» key as often as necessary to return to the main menu.

4 Adjusting the system setpoint pressure

The information relates to settings for a compressor. Vacuum pumps or other devices should be treated accordingly.

Precondition Password level 4 is activated.

Select menu configuration > press. settings.

1. In the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press. settings appears in the display.
3. Press «Enter».
compressor appears in the display.
4. Press «Enter».

```
88 psig      176°F
setpoint press.
p1 SP: 80 psig ↵
SD: -7.3 psig
```

Current system setpoint pressure p1 (example)
Current switching differential p1 (example)

Setting system setpoint pressure and switching differential for p1

1. Press «Enter» to adjust the value for setpoint p1.
An inverse cursor appears.
2. Adjust the value with the «UP» or «DOWN» key.
3. Press the «Enter» key to accept the value.
4. Press the «DOWN» key once.

```
88 psig      176°F
p1 SP:  88 psig
SD: -7.3 psig ↵
p2 SP: 104 psig
```

Changed system pressure setpoint
Current switching differential p1
Current system setpoint pressure p2

5. Press «Enter» to adjust the value for switching differential p1.
An inverse cursor appears.
6. Adjust the value with the «UP» or «DOWN» key.
7. Press the «Enter» key to accept the value.
8. If necessary, adjust the value for p2 in the same way.

Further information See chapter 7.3 for all machine pressure parameters and their adjustment.

5 Activating the «clock» key

Precondition Password level 4 is activated.

Select the clock menu

1. From the main menu, keep pressing the «UP» key until *clock* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
clock key:       n
reset:           n ↵
- - - - -
```

Activating the clock key

1. Press the «UP» key once.

```
88 psig          176 °F
clock key:       n ↵
reset:           n
```

2. Press «Enter».
An inverse cursor appears.
3. Press the «UP» key once.
The display changes to *clock key: y*.
4. Press «Enter».
The «clock» key is activated and can be used.



The «clock» key can be deactivated in the same way.

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

6 Activating the «remote control» key



Further settings have to be made to allow the machine to be remotely controlled.
 ➤ Refer to further information in this chapter.

The «remote control» key can be activated in two menus: *< compressorstart >* or *< load control >*.

Precondition Password level 4 is activated.

Select configuration.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press. settings appears in the display.

Activating the «remote control» key in the compressor start menu

1. Keep pressing the «DOWN» key until *compressorstart* appears in the third line of the display.
2. Press «Enter».
compressor ON appears in the third line of the display.
3. Press «Enter».
4. Keep pressing the «DOWN» key until *remote key: n* appears in the second line of the display.
5. Press «Enter».
 An inverse cursor appears.
6. Press the «UP» key.
 The display changes to *remote key: y*.
7. Confirm the setting with «Enter».
 The «remote control» key is activated and can be used.
8. Press the «remote control» key to enable remote mode.



The «remote control» key can be deactivated in the same way.

Activating the «remote control» key in the load control menu

1. Keep pressing the «DOWN» key until *load control* appears in the second line of the display.
2. Press «Enter».
3. Keep pressing the «UP» or «DOWN» key until *remote mode y/n* appears in the third line of the display.
4. Press «Enter».
 An inverse cursor appears.
5. Select the value *y* with the «UP» or «DOWN» key and confirm with «Enter».
 The «remote control» key is activated and can be used.



The «remote control» key can be deactivated in the same way.

Further information See chapter 7.4 for configuration of machine starting and stopping.
 See chapter 7.7 for configuration of load changeover under master control.

7 Changing the control mode

Select menu configuration > control mode

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press. settings appears in the display.
3. Press the «DOWN» key once, then «Enter» to select *< control mode >*.
4. Press «Enter».

```
88 psig      176 °F
local mode
→ Quadro    ↵      Current control mode
control mode
```

Changing the control mode

1. Select the control mode with the «UP» or «DOWN» key.
2. Press «Enter» to accept the control mode.
3. Press the «Escape» key as often as necessary to return to the main menu.

Further information See chapter 4.8 for the functions of the control modes.

See chapter 7.5 for configuring the parameters of the control modes.

See chapter 8.15 to determine the optimum control mode.

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 DO0.3 – DO0.5. Further outputs are optionally available. Each output can be assigned only once.

Precondition Password level 4 is activated.

Select configuration > I/O periphery > DO functions.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press. settings appears in the display.
3. Press the «DOWN» key until *I/O periphery* appears.
4. Press «Enter» twice to select *< DO functions >*.

88 psig	176 °F	
controller ON		Controller ON message
→ n.a.	↵	No output assigned
group alarm		Group alarm message

Assigning a message to an output

1. Select the required message with the «UP» or «DOWN» key.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» or «DOWN» key to select a spare output and confirm with «Enter».
A message is now sent via the output assigned.
4. Press the «Escape» key as often as necessary to return to the main menu.

Further information See chapter 7.10 for configuration and use of the controller's inputs and outputs.

9 Resetting maintenance interval counters

Precondition Maintenance carried out,
warning message acknowledged,
password level 4 activated.

Select menu **maintenance > maintenance interval counter**

1. From the main menu, keep pressing the «DOWN» key until *maintenance* appears in the third line of the display.
2. Press «Enter».
3. The maintenance interval hours are shown:

```
88 psig          176 °F
oil filter
6000 h | 0150 h ↵
reset: n
```

4. Keep pressing the «UP» or «DOWN» key until the component indication appears in the second line of the display.

Resetting maintenance interval counters

1. Press the «DOWN» key.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» key to select the value *y* and confirm with «Enter».
The remaining interval hours now changes to the default interval and the reset display changes from *y* to *n*.
4. Press the «Escape» key as often as necessary to return to the main menu.

Further information See chapter 8.11 for setting the maintenance intervals.
See chapter 10 for the maintenance of the controller.

10 Displaying messages

Selecting menu status > messages

1. From the main menu, keep pressing the «DOWN» key until *status* appears in the third line of the display.
2. Press «Enter».
messages appears in the display.
3. Press «Enter».
event info appears in the display.

Displaying event information

1. Press «Enter».
The last message (event) displayed appears again in the display. The messages are displayed chronologically in the order in which they occur.
2. Scroll through past events with the «DOWN» key and back to the current message with the «UP» key.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the last alarm

Precondition Menu option < *status* > *messages* > is selected.

1. Keep pressing the «DOWN» key until *last alarm* appears in the second line of the display.
2. Press «Enter».
The last alarm message is displayed.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the last warning

Precondition Menu option < *status* > *messages* > is selected.

1. Keep pressing the «DOWN» key until *last warning* appears in the second line of the display.
2. Press «Enter».
The last warning message is displayed.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the number of current alarms or warnings

Precondition Menu option < *status* > *messages* > is selected.

1. Keep on pressing the «DOWN» key until number of current alarms and warnings appears.
2. Press the «Escape» key as often as necessary to return to the main menu.

Further information See chapter 8.2 to acknowledge alarm and warning messages.

11 Pressure relief valve checking

Overview

- Preparation for the test
- Carrying out the check
- Correct conclusion of the test



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

Depending on available measured values, the internal pressure p_i or system pressure p_N are used for the check.

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



CAUTION

Danger of injury from pressurized components

- The instructions listed below must be followed without fail.

Preparation for the test

1. Note the opening pressure (or 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. Activate password level 4 in the controller (see section 7.2.3).
5. From the main menu, keep pressing the «UP» key until *machine test* appears in the third line of the display.
6. Press «Enter».
TÜV check appears in the display.
7. Press «Enter».

```
88 psig      176 °F
TÜV check
relief valve: n ↵
pRV: 232 psig
```

activating pressure of pressure relief valve (example)

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

Carrying out the check

1. Use the «UP» key to select the value y and confirm with «Enter».
The check mode is now activated. Monitoring of internal pressure and system setpoint pressure is deactivated.
2. Press the «DOWN» key once to display the internal pressure

```
88 psig      176 °F
relief valve: y
pRV: 232 psig
pi: 36 psig
```

activating pressure of the pressure relief valve
actual internal pressure

3. Press and hold the «ON» key.
The machine switches to load, the machine's internal pressure p_i rises.
4. Observe the displayed pressure rise p_i during the check.
5. If the pressure p_i increases to more than 10 % above the correct opening pressure of the pressure relief valve, shut down the machine with the «OFF» key and change the valve.



If the alarm message $pRV \neq$ appears, the pressure relief valve is defective. The permissible internal pressure was exceeded by 29 psi.

- Have the pressure relief valve replaced by an authorized KAESER Service Technician.



Avoid oil mist:

- Release the «ON» key as soon as the pressure relief valve opens to minimize oil mist blow off.

Correct conclusion of the test

1. Press the «UP» key once.
2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key to set the value n and confirm with «Enter».
The "pressure relief valve" check mode is de-activated and the test ended.
4. Press the «Escape» key as often as necessary to return to the main menu.
5. Open the shut-off valve from the machine again.

Result The machine is ready for operation.

Further information See chapter 8.13 to test the pressure relief valve.

12 Checking the temperature sensor and overheating shutdown function

The machine should shut down if the airoend discharge temperature (ADT) reaches 230 °F. A higher temperature is simulated to check this function. For this, it is necessary to determine and enter an offset value.

During the check mode, this offset value is added to the actual airoend discharge temperature to cause the machine to shut down prematurely.

Overview

- Ascertain and enter the offset
- Shut down the machine and allow to cool down slightly
- Carrying out the check
- Correct conclusion of the test

Ascertaining offset

1. Read off the airoend discharge temperature under load (normal working temperature) (first line of the display, e.g.: 176 °F)
2. Calculate offset:
Offset = 230 °F – indicated airoend discharge temperature
(e.g.: Offset = 54 °F at 176 °F airoend discharge temperature)
3. Shut down the machine with the «OFF» key
4. Watch the first line of the display and wait until the airoend discharge temperature has dropped by about 9 °F.

Setting the offset

1. Activate password level 4 in the controller (see section 7.2.3).
2. From the main menu, keep pressing the «UP» key until *machine test* appears in the third line of the display.
3. Press «Enter».
TÜV check appears in the display.
4. Press «Enter».
5. Keep pressing the «DOWN» key until the following is displayed:

<pre>88 psig 176 °F ADT-alarm: n offset: 104 °F ↵ ADT □: 32 °F</pre>	offset value setpoint (example)
--	---------------------------------

6. Press «Enter».
An inverse cursor appears.
7. Use the «DOWN» key or the «UP» key to enter the calculated offset and confirm by pressing «Enter».

Carrying out the check

Precondition Machine cooled down by approx. 9 °F

1. In the main menu, keep pressing the «UP» key until *ADT alarm: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» key to select the value y and confirm with «Enter».
The check mode is now activated.
4. Press the «DOWN» key once to display the airend discharge temperature + offset:

88 psig	163 °F	Fallen airend discharge temperature (163 °F)
ADT-alarm: y		Overheating shutdown
offset: 86 °F	↵	offset value setpoint (example)
ADT □: 217 °F		Airend discharge temperature + offset

5. Press the «ON» key to switch the machine to LOAD.
The machine switches to LOAD and the airend discharge temperature rises again.
As soon as a value ADT of 230 °F is reached, the machine shuts down and an alarm is activated.



- 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».
2. Reset the offset to 104 °F and confirm with «Enter».
3. In the main menu, keep pressing the «UP» key until *ADT alarm: y* appears in the third line of the display.
4. Press «Enter».
5. Use the «UP» key to select the value n and confirm with «Enter».
The "overheating shutdown" check mode is de-activated and the test ended.
6. Press the «Escape» key as often as necessary to return to the main menu.

Further information See chapter 8.14 for testing the temperature sensor.

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1 Regarding this Document

1.1 Using this document

This service manual is part of the controller.

The chapter "Important settings" is a guide to making settings that are important or often needed. It can be separated from the manual by tearing along the perforated line.

- Keep the manual in a safe place throughout the life of the machine.
- Pass the manual on to the next owner/user of the machine.
- Ensure that all amendments received are entered in the manual.

1.2 Further documents

Included with these operating instructions are additional documents intended to assist in the safe operation of the machine:

- service manual of the compressor in which the controller is installed.

Missing documents can be requested from KAESER.

- Make sure all documents are complete and observe the instructions contained in them.
- Make sure you give the data from the nameplate when ordering documents.

1.3 Copyright

This service manual is protected by copyright. Any queries regarding the use or duplication of this documentation should be referred to KAESER. We would be pleased to help you in using the information to meet your unique requirements.

1.4 Symbols and markings

The following signs and symbols have been used in this service manual:

1.4.1 Warning notices

Warning notices indicate three levels of danger signified by the signal word.

- DANGER
- WARNING
- CAUTION



DANGER

These show the kind of danger and its source.

The possible consequences of ignoring a warning are shown here.

The word "DANGER" indicates that death or severe injury can result from ignoring the instruction.

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

1 Regarding this Document

1.4 Symbols and markings

- Always read and comply with warning instructions.

Signal word	Meaning	Consequences of non-observance
DANGER	Warns of an imminent threat of danger	Death or serious injury may result
WARNING	Warns of possible danger	Death or serious injury are possible
CAUTION	Warns of a possibly dangerous situation	Light injuries or material damage are possible

Tab. 2 The levels of danger and their meaning

1.4.2 Display illustration

The message is shown on the left as would appear in the display. To the right are comments or explanations (example).

- Take note of the event and supplementing comment.

6.1 bar	80 °C	1 Working temperature, airtend discharge temperature
→ 23.07.08		2 Current date
→ 16:10:31	↵	3 Actual time, entry line (↵)
...		4

1.4.3 Other notices and symbols



This symbol refers to 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.
Here conditions relevant to safety are named that will help you to avoid dangerous situations.

- This symbol is placed by lists of actions comprising one stage of a task.
In lists of actions with several stages the sequence of actions is numbered.



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

- ... and a remedy given.



This symbol refers to important information or measures concerning environmental protection.

Further information Here, your attention is drawn to further topics.

2 Technical Data

2.1 Technical specifications

2.1.1 Power supply

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

Feature	Value
Stabilized power supply [V DC]	24
Current draw [A] (standard device)	1,3
Current draw [A] (with expansion card)	2,5

Tab. 3 Power supply

2.1.2 Sensors

Pressure transducer

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

Tab. 4 Pressure transducer

Resistance thermometer

Feature	Value
Sensing resistance (to DIN IEC 751)	PT100
Connection	Twin cable

Tab. 5 Pressure transducer

2.1.3 Hardware

Industrial computer

- Internal temperature monitoring
- Internal monitoring of undercutting the 24 V

Housing protection class:

- IP 20
- IP 65 (front side)

2.1.4 Inputs and outputs



The number of inputs and outputs depends on the controller model.
 The following outputs are always unassigned and freely available: DO 0.3–DO 0.5.

Interfaces

- RS 232
- RS 485
- Profibus DP

Further information Further details concerning inputs and outputs are to be found in the electrical diagrams of the machine.

3 Safety and Responsibility

3.1 Basic instructions

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

- danger to life and limb of the operator or third parties,
- impairments to the machine and other material assets.

**DANGER**

Disregard of these instructions can result in serious injury.

- To operate the controller safely, read the service manual carefully and take notice of its contents.

- Use the controller only if it is in a technically perfect condition and only for the purpose for which it is intended; observe all safety measures and the instructions in the controller operating instructions and the compressor service manual.
- Immediately rectify (have rectified) any faults that could be detrimental to safety.

3.2 Specified use

The controller is designed exclusively for use in connection with KAESER screw compressors and vacuum pumps in an industrial environment. It may only be used in conjunction with a machine designed for SIGMA CONTROL. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result there from. The user alone is liable for any risks incurred.

- Adhere to the specifications given in these operating instructions and the machine's service manual.

3.3 Improper use

Improper use includes all applications other than in connection with KAESER screw compressors and vacuum pumps and any other machine not designed for SIGMA CONTROL.

- Do not subject the controller to direct sunlight, rain, splashing water or very dusty conditions.
- Do not operate the controller in areas in which specific requirements with regard to explosion protection are in force.

3.4 User's responsibilities

The relevant statutory legislation must be observed during installation, operation, maintenance, repair and inspection of the controller.

3.4.1 Defining personnel

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

- Ensure that personnel entrusted with operation, installation and maintenance are qualified and authorized to carry out their tasks.

This applies particularly for:

- installation and commissioning,
 - maintenance and service work,
 - repairs,
 - inspections.
- Only specialists or personnel trained to use the controller may carry out any work on it.
 - Only qualified electricians or trained personnel under the supervision of a qualified electrician may work on electrical equipment according to electrical engineering regulations.
 - Ensure that all persons working on the controller have read and understood and that they comply with the safety instructions and the passages relevant to them in the service manual.

3.5 Safely dealing with sources of danger

Information concerning the various forms of danger that can arise during controller operation are found here.

Electricity

- Allow only qualified and authorized electricians or trained personnel under the supervision of a qualified and authorized electrician to carry out work on electrical equipment according to electrical engineering regulations.
- Before commissioning or re-commissioning the machine in which the controller is installed, the user must make sure there is adequate protection against electric shock from direct or indirect contact.
- Before beginning any work on electrical equipment:
switch off the mains disconnecting device, lock it in the off position and check that the machine is free of voltage.
- Check regularly that all electrical connections are tight and in order.

Unsuitable spare parts

- Use only spare parts that have been approved by the manufacturer for this controller.
Unsuitable spare parts compromise the safety of the controller.

Safety regulations for the controller

- Pay attention to the following points to avoid damage to the controller:
 - Do not remove any controller plugs when the machine is in operation.
 - Operate the controller only when all supplies are connected.
 - Do not apply other voltages (i.e. external supplies) to the electronic outputs in the output plugs.
 - Avoid short circuits on the power supply pins in the Profibus interface.
A short circuit can cause irreversible damage to the Profibus interface.

4 Design and Function

4.1 The controller

The controller controls, regulates, monitors and protects the machine.

All parameters needed to operate KAESER rotary screw compressors and rotary vacuum pumps can be entered and displayed using the controller. The parameters are protected by passwords at various access levels.

Components

SIGMA CONTROL comprises the following components:

- Industrial computer with Intel processor
- Software with which the settings can be called up and altered
- Integrated interface software with which data can be transferred over a Profibus
- A user interface with illuminated display, keys and light-emitting diodes
- Digital and analog inputs and outputs

Function

The **control and regulating function** allows:

- automatic changeover of the machine from LOAD to IDLE or STANDSTILL,
- optimum utilization 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,
- warning and maintenance prompts in the controller's display for maintenance due.

The **protective function** allows:

- automatic machine shutdown on alarms that may lead to damage to the machine, e.g. over-current, over-pressure, over-temperature.

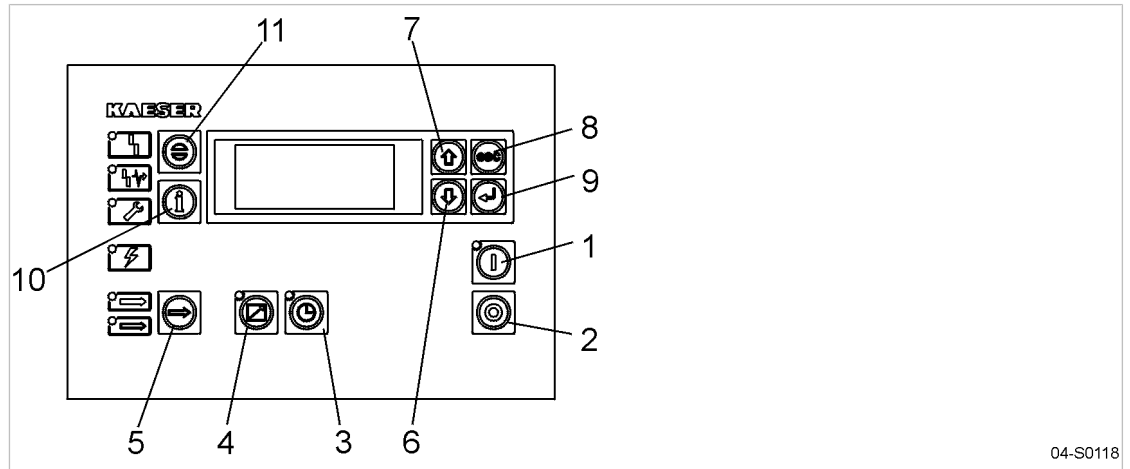
4.2 SIGMA CONTROL keys and indicators


Fig. 1 Keys

Item	Name	Function
1	«ON»	Switches the machine on. The programmed operating mode is active.
2	«OFF»	Switches the machine off.
3	«Clock»	Switches clock control on and off.
4	«Remote control»	Switches remote control on and off.
5	«LOAD/IDLE»	Toggles the compressor between LOAD and IDLE operating modes depending on operating conditions.
6	«DOWN»	Scrolls down the menu options. Reduces a parameter value.
7	«UP»	Scrolls up the menu options. Increases a parameter value.
8	«escape»	Returns to the next higher menu option level. Exits the edit mode without saving. Returns to the main menu when held down at least 10 seconds.
9	«Enter»	Only affects the value in the third line of the display. Jumps to the selected menu option. Exits the edit mode and saves.
10	«Events and information»	Displays the event memory. Selection is possible from every menu. Return with «esc» key.
11	«Acknowledgement»	Signifies recognition of alarms and warning messages. Resets the event memory when permitted (RESET).

Tab. 6 Keys

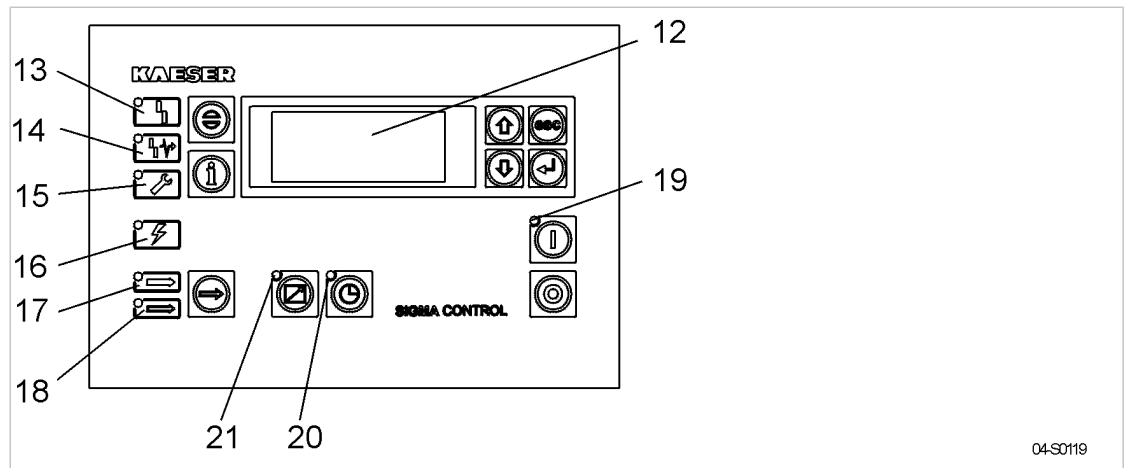


Fig. 2 Indicators

Item	Name	Function
12	Indicator field or display	Alphanumeric display with 4 lines.
13	<i>Alarm</i>	Flashes red when an alarm occurs. Lights continuously when acknowledged.
14	<i>Communication</i>	Lights red if communication via the Profibus interface is interrupted.
15	<i>Warning</i>	Flashes yellow for: <ul style="list-style-type: none"> ■ maintenance work due, ■ warning messages. Lights continuously when acknowledged.
16	<i>Controller power</i>	Lights green when the power supply is switched on.
17	<i>LOAD</i>	Lights green when the compressor is running under LOAD.
18	<i>IDLE</i>	Lights green when the compressor is running in IDLE. Flashes when the «LOAD/IDLE» toggle key is pressed.
19	<i>Machine ON</i>	Lights green when the machine switched on.
20	<i>Clock</i>	The LED lights when the machine is in clock control.
21	<i>Remote control</i>	The LED lights when the machine is in remote control.

Tab. 7 Indicators

4.3 Display

In the display level, information can be read and data entered, The display comprises 4 lines, each of 16 characters.

88 psig	176 °F	Header
load 1000 h		Menu text
status ↵		Active line
analog data		Menu text

Line 1: header

Current system pressure and airtend discharge temperature are displayed in the header. These values are shown in the following menus or setup level:

- Main menu
- In set-up levels in which parameter changes can be made even though the machine is running

The letters s and F can be displayed in the header. They indicate internal operational modes and are shown for maintenance purposes.

Letter	Operating mode
s	Controller set to <i>Stop</i> by the administrator from the programming unit
F	Program error

Tab. 8 Internal operating mode

Line 2: Machine state / menu text

Depending on settings, either the current state of the machine or menu text is shown in line 2.

Line 3: Active line

The third line shows menu or menu option text describing an action that can be carried out.



Only the actions shown in the active line can be carried out. This applies both to a jump to a menu / menu option and the alteration of values.

Character	Explanation
↵	Appears at the end of the line if it is possible to jump to a menu option or if parameters can be entered.

Tab. 9 Characters in the active line

Line 4: Menu text / navigation line

The characters below appear at the end of line 4 behind the menu option text and indicate the possible scrolling direction with the «UP» or «DOWN» keys.

Character	Explanation
↑	Only upwards scrolling is possible with the «UP» key
↓	Only downwards scrolling is possible with the «DOWN» key
↕	Scrolling in both directions is possible

Tab. 10 Characters in the navigation line

4.4 Password protection

Access to the controller is protected by password.

When the controller is switched on, the lowest level of access (level 0) is activated. In password level 0, parameters can be displayed (display level) and certain parameters, e.g. language and lamp test, can be set (setting level).

A further access level (level 4) is available to the customer. Further parameters can be displayed and set in level 4, for example, the system pressure setpoint or reset of the maintenance interval counters.



The password protected level automatically resets to level 0 three hours after the last data input.

4.5 The menu structure

4.5.1 Main menu

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

pN: 7.7000.1	Material number
SN: 00234006	Serial number
Sys: S5: HW:	System: / Software: / Hardware:
4.46 82.00 019	The version number of each

Subsequently, the software is booted and the main menu appears in the display together with the current system pressure, aircend discharge temperature and current machine state (example).

88 psig	176 °F	System pressure and aircend discharge temperature
-----	-----	
OFF		Operation display (current state of the machine)
-----	-----	

After pressing the «DOWN» key three times the operating mode of the machine, total operating hours and the hours on load appears (example).

88 psig	176 °F	Header
key- ON p1-empty		Machine operating mode (menu text).
run 000032 h		Active line
load 000031 h		Menu text

The operating mode in the second line of the display shows the following settings:

- Switching the compressor on and off
- Compressor state
- Type of load control
- The load control state

4.5.2 The two navigation levels in SIGMA CONTROL

- Scroll upwards in the main menu with the «UP» key to enter the settings level. Pre-programmed machine parameters can be displayed and changed in the setting level.
- In the main menu, scroll downwards with the «DOWN» key to enter the display level. Parameters can **only** be displayed or reset in this level.

4.6 Settings level

The settings level contains the following menu options:

Menu	Menu options	Menu option: see
password	Password entry	–

Menu	Menu options	Menu option: see
clock	<ul style="list-style-type: none"> ■ Activating the «clock» key ■ Clock program of compressor cut-in and cut-out (switching points) ■ Resetting clock program 	–
configuration	<ul style="list-style-type: none"> ■ general ■ press. settings ■ control mode ■ compressorstart ■ acknowledgement ■ I/O periphery ■ timer 	12
components	<ul style="list-style-type: none"> ■ motor ■ booster ■ AM charging ■ PD temperature 	13
machine test	<ul style="list-style-type: none"> ■ TÜV check ■ DI test ■ DO test ■ lamps test: 	14
communication	<ul style="list-style-type: none"> ■ RS232 ■ RS485 ■ ProfiBus ■ SMS 	15
Languages	Selecting the display language	–

Tab. 11 Display and setup level

4.6.1 Menu configuration

The parameters for configuration of the controller and the machine are set up in the < *configuration* > menu. The menu has the following options:

- general
- press. settings
- control mode
- compressorstart
- acknowledgement
- I/O periphery
- timer

Navigation (menu / > menu option)	Function
general	Display: <ul style="list-style-type: none"> ■ Version no. ■ Compressor model ■ PN: (material number) ■ SN: (serial number) Setting <ul style="list-style-type: none"> ■ Date ■ Time ■ Summertime/wintertime ■ Date format ■ Time format ■ Unit of pressure ■ Unit of temperature
press. settings > compressor >> system pressure	Display: <ul style="list-style-type: none"> ■ relief valve activating pressure (pRV) ■ Nominal pressure ■ Minimum cut-in pressure Setting <ul style="list-style-type: none"> ■ System pressure setpoint p1 and p2. ■ sys. press. low ■ Pressure increase pE
press. settings > vacuum pump >> system pressure	Setting <ul style="list-style-type: none"> ■ System pressure high ■ Setpoint press. ■ Pressure fall pA
press. settings > load control	Setting <ul style="list-style-type: none"> ■ Local operating mode ■ Remote mode
control mode	Setting <ul style="list-style-type: none"> ■ DUAL ■ QUADRO ■ VARIO ■ DYNAMIC ■ CONTINUOUS
control mode > settings >> Dual	Setting <ul style="list-style-type: none"> ■ Idle period
control mode > settings >> Quadro	Setting <ul style="list-style-type: none"> ■ Minimum running period ■ Unloaded period

Navigation (menu / > menu option)	Function
control mode > settings	Setting <ul style="list-style-type: none"> ■ Venting period
control mode > dryer >> timer	Setting <ul style="list-style-type: none"> ■ CONTINUOUS ■ TIMER
control mode > mod. valve	Setting <ul style="list-style-type: none"> ■ Switch points Display: <ul style="list-style-type: none"> ■ Valve control output
compressorstart > compressor ON	Setting <ul style="list-style-type: none"> ■ Local mode selection ■ Remote mode selection ■ «Clock» key ■ «Remote» key ■ Remote contact
compressorstart > compressor OFF	Setting <ul style="list-style-type: none"> ■ Venting ■ Holidays
compressorstart > restart:	Setting <ul style="list-style-type: none"> ■ Restart after power failure - yes/no ■ Delay period
compressorstart > starting temp.	Display: <ul style="list-style-type: none"> ■ Minimum temperature
acknowledgement	Setting <ul style="list-style-type: none"> ■ Remote acknowledgement selection ■ «Remote» key ■ Remote contact
I/O periphery	Setting <ul style="list-style-type: none"> ■ DO functions ■ Show quantities ■ External messages ■ Analog output parameter ■ p-switch: a pressure switching point configurable by the user ■ p-switch: a temperature switching point configurable by the user
timer	Setting <ul style="list-style-type: none"> ■ ON period ■ OFF period ■ Output for the signal.

Tab. 12 Overview of menu configuration

4.6.2 Menu components

Parameters for individual machine components are displayed and set in the *< components >* menu.

The menu comprises the following options (depending on drive motor type):

Navigation (menu / > menu option)	Function
motor > power switching	Display of motor starting configuration <ul style="list-style-type: none"> ■ Star-delta start ■ Direct online start ■ High tension ■ SFC contact ■ SFC USS MD ■ SFC USS MM ■ Soft start Setting <ul style="list-style-type: none"> ■ Star-delta start ■ SFC USS MM
booster	Setting <ul style="list-style-type: none"> ■ Pressure: switch point ■ Pressure: switching differential Display: <ul style="list-style-type: none"> ■ Switch output:
AM charging	Setting <ul style="list-style-type: none"> ■ Pressure: switch point ■ Pressure: switching differential Display: <ul style="list-style-type: none"> ■ Switch output:
PD temperature (compressed air outlet temperature)	Setting <ul style="list-style-type: none"> ■ Analog transducer input ■ Switching points for excessive or low package discharge temperature

Tab. 13 Overview of menu components

4.6.3 Menu machine test

The *< machine test >* menu contains functions for testing the machine. The menu has the following options:

Navigation (menu / > menu option)	Function
TÜV check	Setting <ul style="list-style-type: none"> ■ Test: pressure relief valve ■ Test: temperature sensor

Navigation (menu / > menu option)	Function
DI test	Display <ul style="list-style-type: none"> Binary inputs signal state
DO test	Display <ul style="list-style-type: none"> Binary outputs signal state
lamps test:	Setting <ul style="list-style-type: none"> Tests the controller's LED indicators

Tab. 14 Overview of menu machine test

4.6.4 Menu communication

Interface parameters are displayed and set in the < *communication* > menu. The menu has the following options:

Navigation (menu / > menu option)	Function
RS232	Setting <ul style="list-style-type: none"> Modem connection
RS232 > SMS	Setting <ul style="list-style-type: none"> The sending of short messages (e. g. to KAESER Service in connection with a SIGMA TELE CARE contract).
RS485	Setting <ul style="list-style-type: none"> Master-slave operation Activate the remote key
ProfiBus	Display <ul style="list-style-type: none"> Bus alarm Setting <ul style="list-style-type: none"> Incorporating the machine in master control systems (e.g.: SIGMA AIR MANAGER, control center, PLC, etc.) Slave number Activating the «remote » key.

Tab. 15 Overview of menu communication

4.7 The display level

Parameters can be displayed and reset, if required, in the display level. Once in the display level, scroll down with the «DOWN» key to sequentially display all menus. From the menus can be selected options and sub-options.

Navigation (menu / > menu option)	Function
status > messages	Display <ul style="list-style-type: none"> ■ Event memory ■ Last alarm ■ Last warning ■ Number of current alarm and warning messages.
status > statistics	Display <ul style="list-style-type: none"> ■ Overall duty cycle in percent and for the SFC with USS protocol (frequency-controlled machines). ■ Duty cycle from a certain day and for SFC with USS protocol. ■ Syspress. max ■ Syspress. min ■ Internal press. max ■ Motor starts since a defined day ■ Total number of motor starts ■ Motor starts per day ■ Motor starts per hour ■ Motor starts below min. temperature ■ Last load run ■ Last idle run ■ Last motor off Setting <ul style="list-style-type: none"> ■ Reset duty cycle and motor starts from a certain day. ■ Reset system pressure
status > press. control	<ul style="list-style-type: none"> ■ Overview of pressure settings
status > operating mode	<ul style="list-style-type: none"> ■ Overview of settings
analog data	Display <ul style="list-style-type: none"> ■ All data that are to be monitored
operating data	Display <ul style="list-style-type: none"> ■ Operating hours of the compressor, load run, motor, airend, SIGMA CONTROL, modulating valve ■ Load valve ON ■ kWh counter Setting <ul style="list-style-type: none"> ■ Reset kWh counter

Navigation (menu / > menu option)	Function
maintenance	Display <ul style="list-style-type: none"> ■ Time left (hours) to the next due maintenance Setting <ul style="list-style-type: none"> ■ Reset maintenance interval counter ■ Maintenance Intervals

Tab. 16 The display level

4.8 Operating modes and control modes

4.8.1 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 oil separator tank is vented.
A small volume of air circulates through the bleed hole in the inlet valve, through the airend and back to the inlet valve via the venting valve.
The compressor 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 oil separator tank is vented.
The drive motor is stopped.
- **MODULATING CONTROL (optional):**
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.

4.8.2 Control modes

Using the selected control mode, the controller switches the drive motor according to definite rules (the control mode) between the various operating modes in order to compensate for air being drawn off by consumers and maintain the machine's working pressure between the preset cut-in and cut-out pressures.

SIGMA CONTROL can work in the following control modes:

- DUAL
- QUADRO
- VARIO
- CONTINUOUS
- DYNAMIC

DUAL

In the DUAL control mode, the machine is switched back and forth between LOAD and IDLE to maintain pressure between the preset cut-in and cut-out values. When cut-out pressure is reached, the machine switches to IDLE. When the preset *idle period* has elapsed, the machine switches to STANDSTILL.

The shorter the *idle period* setting, the sooner (and more frequently) the motor is stopped.

QUADRO

In the QUADRO mode, the controller operates as in the DUAL mode during periods of high air demand by switching between LOAD and IDLE, but during periods of low air demand it switches directly to STANDSTILL.

This mode of control requires two preset time periods: the *running period* and the *idle/standstill period*.

The shorter these time period settings, the sooner (and more frequently) the motor is stopped.

VARIO

The VARIO mode is based on the DUAL control mode. The difference to DUAL is that the idle period is automatically lengthened or shortened to compensate for higher or lower drive motor starting frequencies.

CONTINUOUS

In the CONTINUOUS control mode, the machine is switched back and forth between LOAD and IDLE to maintain 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

The DYNAMIC mode is based on the DUAL control mode. As opposed to DUAL, this control mode switches the compressor directly to STANDSTILL when the drive motor temperature is low. At higher motor temperatures, it switches to IDLE until the motor has cooled down enough.

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

4.8.3 Variable speed with frequency converter (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 airenv 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:

Once outside the frequency convert's control range 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 without load and draws little current.

When the idle period has elapsed, the machine switches to STANDSTILL.

VARIO/QUADRO:

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

If network pressure falls below the setpoint:

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 motor varies accordingly with demand.

4.9 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 influence the machine into which the controller is installed.

**CAUTION**

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 service manual for required conditions.

6 Installation

6.1 Reporting transport damage

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

6.2 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
This machine is remotely controlled and can start automatically at any time.

Tab. 17 Remote control: Machine

- Label the starting device in the remote control center as follows (suggestion):

WARNING
Before starting, make sure that no one is working on the machine and that it can be safely started.

Tab. 18 Remote control: Control centre

Identifying the machine for clock control mode operation

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

WARNING
This machine is time-controlled and can start automatically at any time.

Tab. 19 Timer control: Machine

7 Initial Start-up

7.1 Outline

SIGMA CONTROL was designed and developed for a number of practical 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 the output for PC or MODEM.

7.9: Configuring SMS

7.10: Configuring input and output signals

7.11: Configuring the compressed air outlet temperature

7.12: Activating remote acknowledgement

7.13: Linking to an external pressure transducer

7.14: Setting the timer for condensate drainage

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

7.16: Machine commissioning

7.2 Configuring the controller



All controller settings are explained in detail in the following sections. The most common settings are summarized for experienced users in the front of this manual.

- Carry out settings as required:
 - 7.2.1: Selecting menu options (introduction)
 - 7.2.2: Changing the display language
 - 7.2.3: Entering and displaying passwords
 - 7.2.4: Setting up time and date
 - 7.2.5: Setting up display formats (date, time, units of pressure and temperature)
 - 7.2.6: Activating summer/winter time
 - 7.2.7: Activating/deactivating the «IDLE» mode

7.2.1 Selecting menu options

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

The SIGMA CONTROL menu structure is arranged in 2 levels:

- Settings level («UP» key)
- Display level («DOWN» key)

For example: Selecting menu option < configuration < general <

1. Move from the main menu to the settings level with the «UP» key.
2. Keep pressing the «UP» key until *configuration* appears in the third line of the display.
3. Press «Enter» to open the < *configuration* > menu.
With the «DOWN» or «UP» keys, you can select the menu option < *configuration* >, for example < *general* > or < *press. settings* >.
4. Keep on pressing the «UP» key until *general* appears in the third line of the display.
5. Press «Enter».
The current menu is the sub menu < *general* > in the menu < *configuration* >.
6. With the «DOWN» or «UP» keys you can select the menu option < *general* >, for example < *version no.* >.

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. 20 Language diversity

1. Keep pressing the «UP» key until the selected language appears.
2. Press «Enter».
3. Keep on pressing the «DOWN» or «UP» key until the required language appears.
4. Press «Enter» to accept the language.
5. Press the «Escape» key as often as necessary to return to the main menu.

7.2.3 Entering and displaying passwords

The following passwords have been entered in the controller at the factory:

	Level 0	Level 4
password	00000	12EXP

Tab. 21 Passwords

1. Keep pressing the «UP» key until *password* appears.

2. Press «Enter».

```
88 psig      176 °F
password
      XXXXX L0  ↵
      XXXXX L0
```

Current level

3. Press «Enter».
An inverse cursor appears.
4. Keep on pressing the «DOWN» or «UP» key until the required character appears.
5. Press «Enter».
The cursor jumps to the next password character.
6. Set the remaining characters of the password until it is complete.
After entering the last character the activated password level is displayed.
7. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the current password

1. In the main menu, keep on pressing the «UP» key until *password* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
password
      XXXXX L4  ↵
      XXXXX L4
```

Display of current level

3. Press the «DOWN» key.
4. Press «Enter».
The current password is displayed.

Changing the current password



The password entered at the factory can be changed here. However, this is not recommended.

1. Press the «Escape» key as often as necessary to return to the main menu.

7.2.4 Checking/setting time and date

Precondition Password level 4 is activated.
Menu option *< configuration > general >* is selected (see section 7.2.1).

Checking and setting time



When operating the machine with a timer program, check the accuracy of the clock at least once a year.

1. Keep pressing the «DOWN» key until the current time appears in the third line of the display.

```
88 psig      176 °F
→ 23.03.2008
→ 16:10:31  ↵
...

```

Current time

2. Press «Enter».
An inverse cursor appears in the third line.
3. Change the time with the «DOWN» or «UP» key.
4. Save the hours with the «Enter» key.
5. Repeat for the minutes and seconds.
6. Press the «Escape» key as often as necessary to return to the main menu.

Setting the date

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Keep pressing the «DOWN» key until the current date appears in the third line of the display.

88 psig	176 °F	
Friday		Current weekday
→ 23.03.2008	↵	Current date
→ 10:25:54		Current time

2. Press «Enter».
An inverse cursor appears.
3. Change the date with the «DOWN» or «UP» key.
4. Save the date with «Enter».
5. Repeat for the month and year.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.2.5 Setting display formats

Setting the date format

Format	Example
DD.MM.YY	30.08.04
YY-MM-DD	04-08-30
MM/DD/YY	08/30/04

Tab. 22 Date format

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Press the «DOWN» key until date format appears.

88 psig	176 °F	
date format		
→ DD.MM.YY	↵	Current date format
...		

2. Press «Enter» to change the format.
An inverse cursor appears.
3. Change the format with the «DOWN» or «UP» key.
4. Save the format with «Enter».
5. Press the «Escape» key as often as necessary to return to the main menu.

Setting the time format

The time can be shown in the following formats:

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. 23 Time formats

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Press the «DOWN» key until *time format* appears.

```
88 psig          176 °F
time format
→ hh:mm:ss  ←    Current time format
...

```

2. Press «Enter» to change the format.
An inverse cursor appears.
3. Change the display format with the «DOWN» or «UP» key.
4. Save the display format with «Enter».
5. Press the «Escape» key as often as necessary to return to the main menu.

Unit of pressure

Pressure can be displayed in the following units:

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. 24 Units of pressure

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Press the «DOWN» key until *unit of press.* appears.

```
88 psig          176 °F
unit of press.
→ bar  ←        Current unit of pressure
...

```

2. Press «Enter» to change the unit.
An inverse cursor appears.
3. Change the unit with the «DOWN» or «UP» key.
4. Save the selected unit with «Enter».
5. Press the «Escape» key as often as necessary to return to the main menu.

Setting the unit of temperature

Temperature can be displayed in the following units:

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

Tab. 25 Units of temperature

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Press the «DOWN» key until unit of temp. appears.



2. Press «Enter» to change the unit.
An inverse cursor appears.
3. Change the unit with the «DOWN» or «UP» key.
4. Save the selected unit with «Enter».
5. Press the «Escape» key as often as necessary to return to the main menu.

7.2.6 Setting and activating summer/winter time

The controller can automatically changeover summer and winter time.

The following steps are necessary:

- Setting the time switching points for start of summer and winter time
- Activating automatic changeover.

Setting the time switching points for summer and winter time



Note the required times of changeover on a piece of paper before changing any settings.

Precondition Password level 4 is activated.
Menu option < *configuration* > *general* > is selected (see section 7.2.1).

1. Keep pressing the «DOWN» key until *summer/winter t* appears in the third line of the display.

2. Press «Enter».

The changeover times for the start of summer time are shown one after the other.

```
88 psig          176 °F
summertime
→ March          Month of changeover
→ last           Day of changeover
```

3. Keep pressing the «DOWN» key to display further settings. The changeover times for winter are shown in the same order.

Changeover points:

- Month [January – December]
- Day in the month [1.,2.,3., last but one, last (day of the month)]
- Day in the week [Monday – Sunday]
- Time: [0:00 – 23:59]

4. Scroll to the required changeover time with the «DOWN» or «UP» keys.
5. Press «Enter» to select the required changeover time.
6. Change the settings with the «DOWN» or «UP» key.
7. Save the changeover time with «Enter».

Activating summer/winter changeover

1. Keep pressing the «DOWN» key until *act.: n* is displayed.
2. Press «Enter».
An inverse cursor appears.
3. Press the «UP» key. The display changes from *n* to *y*.

```
88 psig          176 °F
...
act.: y  ↵
```

4. Confirm automatic changeover with «Enter».
5. Press the «Escape» key as often as necessary to return to the main menu.

7.2.7 Activating/deactivating the «IDLE» key

The «IDLE» mode key on the control panel can be deactivated to prevent unauthorized use.

Precondition Password level 4 is activated.

Menu option *< configuration >* is selected (see section 7.2.1).

1. Keep pressing the «UP» or «DOWN» key until *press. settings* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «UP» or «DOWN» key until *load control* appears in the third line of the display.
4. Press «Enter».
5. Keep pressing the «UP» key until *settings* appears in the third line of the display.
6. Keep pressing the «DOWN» key until *idle key: y* appears in the third line of the display.
7. Press «Enter».

An inverse cursor appears.

8. Use the «DOWN» or «UP» key to set the required value and confirm by pressing «Enter».
9. Press the «Escape» key as often as necessary to return to the main menu.

7.3 Matching the pressure parameters of the machine and possible components

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 pressure parameters for compressors
- 7.3.3: Configuring the pressure parameters for vacuum pumps
- 7.3.4: Configuring pressure parameters for components

Different parameters are set depending on whether the machine is operated as a rotary screw compressor or rotary screw vacuum pump.

The pressure parameter for components can be used, for example, to start a booster after a certain pressure has been reached in the air network. Also, the SIGMA CONTROL can be used to control an air-main charging system.

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

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

Compressors

Parameter	Explanation
pRV	Display Relief valve: pRV: activating pressure of the pressure relief valve on the oil separator tank
pE	Pressure increase Setting <ul style="list-style-type: none"> ■ pE SP: Switching point pE; upper safety limit for machine maximum pressure; this value is used to switch the machine from LOAD to IDLE if a failure occurs in external LOAD control. ■ pE SD: Switching differential pE
dpFC:	Limiting value for machines with frequency-controlled drive (SFC). Setting <ul style="list-style-type: none"> ■ dpFC: Limit for minimum delivery. If the value is exceeded [setpoint pressure switch point + dpFC] the compressor switches from LOAD to IDLE.
nominal press.	Display The compressor is designed for this pressure (maximum setpoint pressure)

Parameter	Explanation
setpoint press.	<p>Setpoint pressure can be regulated to two values: p1 and p2</p> <p>Setting</p> <ul style="list-style-type: none"> ■ p1 SP: switching point p1, p1 SD: Switching differential p1 ■ p2 SP: switching point p2, p2 SD: Switching differential p2
sys.press. low	<p>A warning message can be displayed when the limiting value sys.press. low is reached.</p> <p>Setting</p> <ul style="list-style-type: none"> ■ SD: switching differential sys.press. low, SP: Switching point sys.press. low ■ Warning message optional: no message Warning message displayed or an additional output signal sent, e.g. to a control centre
cutin press min	<p>Display</p> <p>For design reasons, pressure can only be built up above this value.</p>

Tab. 26 Compressor pressure parameters

Vacuum pump

Parameter	Explanation
sys.press. high	<p>Minimum system pressure</p> <p>A warning message can be displayed when the limiting value for sys.press. high is reached.</p> <p>Setting</p> <ul style="list-style-type: none"> ■ SD: switching differential sys.press. high, SP: Switching point sys.press. high ■ Optional warning message: no message, warning message on the display or an additional output signal, e.g. to a control centre.
setpoint press.	<p>Setpoint pressure can be regulated to two different values: p1 and p2</p> <p>Setting</p> <ul style="list-style-type: none"> ■ p1 SP: switching point p1, p1 SD: Switching differential p1 ■ p2 SP: switching point p2, p2 SD: Switching differential p2
pA	<p>Setting</p> <ul style="list-style-type: none"> ■ pA SP: switching point pA; Lower safety limit for minimum machine pressure. <p>If a failure occurs while under external load control, the value pA pA can be used to switch from IDLE to LOAD.</p> <p>pA SD: Switching differential pA</p>

Tab. 27 Vacuum pump pressure parameters

Components

Parameter	Explanation (displayed text, setting)
booster	<ul style="list-style-type: none"> ➤ Take the minimum inlet pressure of the booster into account <p>Setting</p> <ul style="list-style-type: none"> ■ PN SP: switching point for signalling booster free to start, PN SD: switching differential for signalling booster free to start. <p>In addition:</p> <ul style="list-style-type: none"> ■ Output for the control signal to the booster
AM charging	<p>When the air main is discharged a valve can be fitted downstream of the machine that only opens when the value PN SP: is reached.</p> <p>Setting</p> <ul style="list-style-type: none"> ■ PN SP: switching point, air-main charging, PN SD: switching point, air-main charging

Tab. 28 Component pressure parameters

➤ Parameters correspond to the following specifications

7.3.1 Display pressure parameters

Precondition Password level 4 is activated.

Call up the menu for pressure parameters

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter». *press. settings* appears in the display.
3. Press «Enter».

```
88 psig      176 °F
pressure sensor
compressor ↵
vacuum pump
```

Menu option for compressors
Menu option for vacuum pumps

Display compressor parameters

1. Press «Enter».

```
88 psig      176 °F
setpoint press.
p1 SP:  80 psig ↵
SD:  -7.3 psig
```

Current system setpoint pressure p1
Current switching differential p1

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

Displaying parameters for vacuum pumps

1. Using the «DOWN» key in menu *<press. settings>*, select menu option *<vacuum pump>*.

7 Initial Start-up

7.3 Matching the pressure parameters of the machine and possible components

2. Press «Enter».

```
88 psig          176 °F
```

```
...
```

```
SD: -7.3 psig ↵
```

Current switching differential p1

```
p1 SP: 80 psig
```

Current system setpoint pressure p1

3. Display further parameters with the «UP» and «DOWN» keys.

7.3.2 Configuring the pressure parameters for compressors

7.3.2.1 Adjusting system setpoint pressure p1 and p2.

The pressure parameters can only be set within certain limits:

Nominal compressor pressure \geq system setpoint pressure \geq minimum cut-in pressure* + switching differential

Tab. 29 Setting limits for system setpoint pressure (* cutin press min)

The machine switches to LOAD under the following conditions:

System pressure \leq system setpoint pressure – switching differential

Tab. 30 Pressure conditions for LOAD

The machine switches to IDLE under the following conditions:

System pressure = setpoint pressure

Tab. 31 Pressure conditions for IDLE

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > compressor >* (see section 7.3.1).
2. Press «Enter» key to adjust the value for setpoint pressure p1.
3. Adjust the value with the «UP» or «DOWN» key.
4. Press «Enter» to accept the value.
5. Adjust the switching differential p1 in the same way.
6. If necessary, adjust the value for p2 in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.2.2 Adjusting system pressure low point

A message warning of low pressure is displayed when the value sys.press. low is reached.

The configuration of the output for the warning message is described in chapter 7.10.1.

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > compressor >* (see section 7.3.1).
2. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
```

```
sys.press. low
```

```
SD: 7.3 psig ↵
```

Current switching differential

```
SP: 58 psig
```

Current system pressure low point

3. Press «Enter» to adjust the switching differential
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Adjust the system pressure SP: in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.2.3 Adjusting pressure rise pE

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

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

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > compressor >* (see section 7.3.1).
2. Keep pressing the «DOWN» key until the following is displayed:

```

88 psig          176 °F
pressure rise
pE SP:  103 psig  ↵      Current switching point, pressure rise
pE SD: -8.7 psig                Current pressure rise switching differential

```

3. Press «Enter» to configure the pressure rise.
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Adjust the switching differential if necessary in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.2.4 Adjusting pressure rise in frequency-controlled machines

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

This value can be between 2.9 psig and 5.8 psig. The factory setting is 4.3 psig.

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

Precondition Password level 4 is activated.

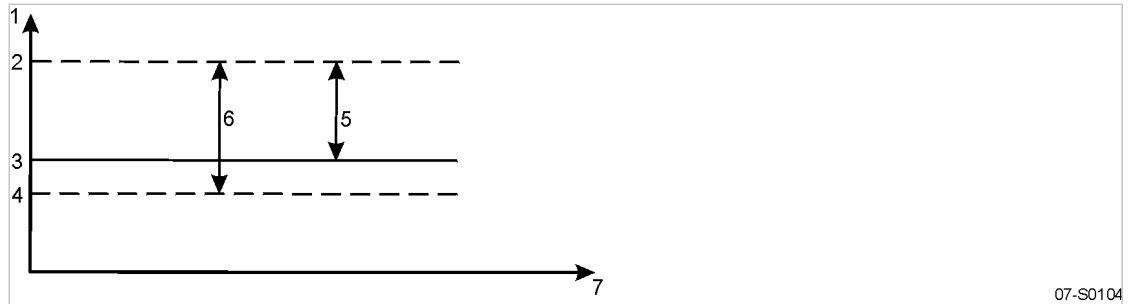


Fig. 3 Pressure rise in frequency-controlled machines

- | | |
|---|--|
| ① System pressure | ④ Switching point LOAD:
(setpoint pressure + dpFC) – switching differential |
| ② Switching point IDLE:
setpoint pressure + dpFC | ⑤ Pressure rise dpFC |
| ③ System setpoint pressure p1 or p2 | ⑥ System pressure band width |

1. Select menu *< configuration > press. settings > compressor >* (see section 7.3.1).
2. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
pE SD: -8.7 psig      Current pressure rise switching differential
dpFC:  3 psig ↵      Pressure increase
- - - - -
```

3. Press «Enter» to configure the pressure rise.
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.3.3 Configuring the pressure parameters for vacuum pumps

7.3.3.1 Adjusting the setpoint pressure for vacuum pumps

The pressure parameters can only be set within certain limits:

$$\text{System setpoint pressure switching point} \leq \text{system pressure high}$$

Tab. 32 Setting limits for system setpoint pressure (vacuum)

If system pressure rises above the value switching point + switching differential, the machine switches to LOAD.

When the system setpoint pressure is reached, the machine switches to IDLE.

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > vacuum pump >* (see section 7.3.1).
2. Press «Enter» key to adjust the value for setpoint pressure p1.
3. Adjust the value with the «UP» or «DOWN» key.
4. Press «Enter» to accept the value.
5. Adjust the switching differential p1 in the same way.
6. If necessary, adjust the value for p2 in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7 Initial Start-up

7.3 Matching the pressure parameters of the machine and possible components

7.3.3.2 Vacuum pump: adjusting sys.press. high

A message warning of high system pressure is displayed when the value sys.press. high is reached. The configuration of the output for the warning message is described in section 7.10.1.

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > vacuum pump >* (see section 7.3.1).
2. Keep pressing the «UP» key until the following is displayed:

```
2.6"Hg 176 °F
sys.press. high
SP: 2.9"Hg ↵          actual system pressure high
SD: 2.9 "Hg          Current switching differential
```

3. Press «Enter» to adjust the value.
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Adjust the switching differential in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.3.3 Vacuum pump: adjusting pressure fall pA.

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

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

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > vacuum pump >* (see section 7.3.1).
2. Keep pressing the «DOWN» key until the following is displayed:

```
2.6"Hg 176 °F
pressure fall
SP: 0.6 "Hg ↵          actual switching differential for pressure fall
SD: 0.6"Hg          actual switching point for pressure fall
```

3. Press the «Enter» key to configure the switching point SP for pressure fall
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Adjust the switching differential in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.4 Adjusting pressure parameters for components

7.3.4.1 Calling the component menu

1. Select menu *< configuration > press. settings > vacuum pump >* (see section 7.3.1).

2. Keep pressing the «DOWN» key until the following is displayed:

```
2.6"Hg 176 °F
pressure fall
  SD: 0.6 "Hg ↵      actual switching differential for pressure fall
pA SP: 0.6 "Hg      actual switching point for pressure fall
```

3. Press the «Enter» key to configure the switching point SP for pressure fall
4. Adjust the value with the «UP» or «DOWN» key.
5. Press «Enter» to accept the value.
6. Adjust the switching differential in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.3.5 Adjusting pressure parameters for booster and air main charging system

Depending on the type of compressor, pressure parameters for further components can be configured. The settings for components are made in the menu *< components >*.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *components* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
motor ↵          Menu option for drive motor settings
booster          Menu option for the booster settings
```

3. Further menu options can be selected with the «DOWN» key.

```
88 psig          176 °F
booster          Menu option for the booster settings
AM charging ↵   Menu option for air main charging settings
PD temperature   Menu option for compressed air discharge temperature settings
```

7.3.5.1 Adjusting booster pressure parameters

Boosters may only be started when a defined inlet pressure has been built up. The controller provides an output signal that enables a booster start. The switching point and switching differential for the output signal are set as follows:

Precondition Password level 4 is activated.

1. Select menu *< components > booster >* (see section 7.3.4).

```
88 psig          176 °F
booster ON
pN SP: 94 psig ↵      Current switching point for booster ON
  SD:-29 psig        Current switching differential
```

2. Press «Enter» to adjust the value.
3. Adjust the value with the «UP» or «DOWN» key.
4. Press «Enter» to accept the value.

7 Initial Start-up

7.4 Configuring machine start and stop

5. Adjust the switching differential in the same way.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.3.5.2 Adjusting the pressure parameters for air main charging

An air main charging system is only used for rotary screw compressors. The controller provides an output signal for an air main charging valve upstream of the air main. The switching point and switching differential for the output signal to the valve are set as follows:



Contact KAESER Service for advice.

1. Select menu *<components > AM charging>* (see section 7.3.4).

88 psig	176 °F	
valve open		
PN SP: 65 psig ↵		Current switching point for air main charging
SD: -7.3 psig		Current switching differential

2. Press «Enter» to adjust the value.
3. Adjust the value with the «UP» or «DOWN» key.
4. Press «Enter» to accept the value.
5. Adjust the switching differential in the same way.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.4 Configuring machine start and stop

➤ The following settings can be made to start the machine:

Function	State on delivery / setting	See
Manual start with the «ON» key.	Always possible	–
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
IDLING (venting)	Deactivated	7.4.4
Automatic restart after power failure (after delay period).	Activated	7.4.5
Minimum starting temperature of the airend.	set to 35.6 °F	–
Drive motor starting mode (depending on type).	Set	7.4.6

Tab. 33 Settings for machine start and stop.

7.4.1 Automatic start/stop in programmed clock mode

Overview

- If not activated, enter password for level 4.
- Select the clock menu
- Activating the «clock» key
- Set up the clock program if this has not already been done.

7.4.1.1 Select the clock menu

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *clock* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
clock key:  n
reset: n  ↵
- - - - -
```

7.4.1.2 Activating the «clock» key

1. Press the «UP» key once.

```
88 psig          176 °F
clock key:  n  ↵
reset: n
```

2. Press «Enter».

An inverse cursor appears in the third line.
3. Press the «UP» key once. The display changes to *clock key: y*.
4. Press «Enter».

The «clock» key is activated.
5. Press the «clock» key to enable clock mode.

7.4.1.3 Setting the clock program (example)



When setting up a clock program, note the switching times on a sheet of paper first. As well as individual weekdays, the following cycles are also available: Mon – Thu, Mon – Fri, Mon – Sat, Mon – Sun, Sat – Thu. As well as these fixed cycles an OFF period (works shutdown) can also be programmed (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. 34 Example of a machine ON/OFF clock program

Precondition Password level 4 is activated,
«clock» key is activated,
clock menu is selected.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
-----
01: n.a. ↵
```

Switching point 01: not active

2. Press «Enter».
3. Press the «UP» key until *01:Mon-Fri* appears and confirm with «Enter».
4. Press the «DOWN» key.
5. Press the «Enter» key to set the time.

```
88 psig      176 °F
01 Mon-Fri
00:00 ↵
```

First switching point hh:mm

comp. OFF

6. First set 6 hours and then 30 minutes with the «DOWN» or «UP» keys, confirming each entry with the «Enter» key.
7. Press the «DOWN» key.
8. Press «Enter».

```
88 psig      176 °F
06:30
comp. OFF ↵
```

Switching point setting
Current action

9. Press the «UP» key and select *< comp. ON >* with the «Enter» key.
The first ON cycle from Mon – Fri is programmed.
10. Select further switching points in the same way.
11. Press the «Escape» key as often as necessary to return to the main menu.
12. Press the «clock» key to enable clock mode.

7.4.2 Setting up the holiday period

As well as the fixed cycles of a clock program or a timer, a longer standstill period can be set for company holidays, for example.

Overview

- If not activated, enter password for level 4.
- Select *< configuration > compressorstart > compressor OFF >*.
- Activate the holidays function
- Set up the holiday period, if this has not already been done.

Select configuration > compressorstart > compressor OFF.

Precondition Password level 4 is activated,
menu *< configuration >* is selected.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *compressorstart* appears in the third line of the display.
4. Press «Enter».

```
88 psig          176 °F
compressor ON ↵
compressor OFF
```

5. Press the «DOWN» key.
6. Press «Enter» to select *< compressor OFF >*.

Activating/deactivating the holidays function

1. Keep pressing the «DOWN» key until *holidays: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Press the «UP» key.
The display changes to *holidays: y*.
4. Confirm the setting with «Enter».



The holidays function can be deactivated in the same way.

The holidays function is activated and can be used.

5. Configure the holiday period if this has not already been done

Setting the holiday period

1. Press the «DOWN» key. The set date and time of the holiday period appears in the display.

```
88 psig          176 °F
holidays: y
→ 01.01 ↵
          00:00
```

The holiday period is activated.
Start of holiday dd.mm
Time of holiday start hh:mm .

2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key or the «UP» key to set the required day, then the month and confirm each setting by pressing «Enter».
4. Press the «DOWN» key to change to the time setting and configure the remaining switching points in the same way.
5. Press the «Escape» key as often as necessary to return to the main menu.

7.4.3 Starting the machine remotely from a control center (remote ON/OFF)

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

Overview

- Make the electrical connection (a spare input for the remote contact is to be found in the electrical wiring diagram for the machine, DI1.0 being preferred).
- Switch machine start to remote mode.
- Press the «remote» key.
- If necessary, activate the «clock » key and configure the clock program (see section 7.4.1.3).
- If required, assign the remote contact to another input.
- Press the «remote » key.

7.4.3.1 Switch machine start to remote mode

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

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

Precondition The electrical connection has been made, password level 4 is activated, menu < configuration > is selected.

1. Keep pressing the «DOWN» key until *compressorstart* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
compressor ON ↵
compressor OFF
```

3. Press «Enter» again.
4. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
remote mode
→ key ↵
remote key: n
```

Actual setting (example)
Remote key not activated.

5. Press «Enter».
6. For version **A**, press «DOWN» until > *key+RC* appears, or for version **B** press «DOWN» until > *key+clock/RC* appears.
7. Save the setting with «Enter».

7.4.3.2 Activating/deactivating the «remote»key

1. Press the «DOWN» key once.

```
88 psig      176 °F
> key+RC
remote key: n ↵
clock key: n
```

Compressor start via the remote contact activated.
Remote key not activated.
The clockkey is not activated.

2. Press «Enter».
An inverse cursor appears.
3. Press the «UP» key.
The display changes to *remote key: y*.
4. Confirm the setting with «Enter».



The «remote control» key can be deactivated in the same way.

The remote control function is activated and can be used.

5. If the method with the clock program is selected, the «clock» key must be activated in the same way.

7.4.3.3 Assigning another input



Inputs already assigned cannot be further assigned.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
* comp. ON
RC → DI0.0 ←
```

Remote contact DI0.0 (default)

2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key to select another input and confirm with the «Enter» key.
The input has now been assigned.
4. Press the «Remote» key to enable the machine to be started from the remote control center.
If an input is rejected it means it is already assigned.

7.4.4 Activating/deactivating the idle phase (unloading function)

After receiving the OFF signal from the remote control center an additional idling (unloading) 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 4 is activated,
menu < *compressor OFF* > is selected (see section 7.4.2).

1. Press the «DOWN» key.
2. Press «Enter» to select < *compressor OFF* >.

```
88 psig      176 °F
* compressor OFF
venting: n ←
...
```

actual setting: venting deactivated

3. Press «Enter» again.
An inverse cursor appears.
4. Press the «UP» key.
The display changes to *venting: y*.

5. Confirm the setting with «Enter».



The venting function can be deactivated in the same way.

The venting function is activated.

7.4.5 Activating/deactivating and setting up automatic restart after a power failure

'Auto start' is activated as standard.

To avoid overloading the main 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 4.
- Select menu `< configuration> compressorstart> compressor ON >`.
- Activate/deactivate the restart function
or
set the restart delay.

Precondition Password level 4 is activated,
menu `< configuration >` is selected.

1. From the main menu, keep pressing the «DOWN» key until `compressorstart` appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
compressor ON
compressor OFF
```

Deactivating/activating automatic restart

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
...
restart:  y
10.0 s | 0.0 s
```

Automatic restart activated.
Entered |expiring delay period.

2. Press «Enter».
An inverse cursor appears.
3. Press the «DOWN» key.
The display changes to `n`.
4. Press «Enter» to accept the setting.



The function can be activated in the same way.

Automatic restart after a power failure is now deactivated.

5. Press the «Escape» key as often as necessary to return to the main menu.

Setting up the automatic restart delay period



If several machines are in operation, set them up for a staggered start. Orientate the automatic restart delay period to the IDLE to LOAD periods set on the other machines.

Precondition Password level 4 is activated, menu `< compressorstart >` is selected (see above).

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
restart:  y      automatic restart is activated
10.0 s | 0.00 s  ↵  Entered |expiring delay period.
...

```

2. Press «Enter».
3. Use the «DOWN» key or «UP» key to set the delay period and confirm with the «Enter» key.
4. Press the «Escape» key as often as necessary to return to the main menu.

7.4.6 Setting up the star-delta starting configuration

If the machine is started in star-delta configuration, adjustments to the switchover times can be made in the menu `< components > motor >`.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until `components` appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
motor ↵      Menu option for drive motor settings.
booster

```

3. Press «Enter» to select `< motor >`.
The menu option power switching module appears.
4. Press «Enter» again.
The motor start configuration appears.
5. Keep pressing the «DOWN» key until `< settings >` appears.
6. The switchover times for star-delta starting can be set up in this menu option.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.5 Activating and setting up the control modes

The controller is provided with various control modes that can bring about different capacity utilization depending on machine application.

7.5.1 Selecting a control mode

The following control modes are possible:

- DUAL

- QUADRO
- VARIO
- DYNAMIC
- CONTINUOUS

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *control mode* appears in the third line of the display.
4. Press «Enter».

```
88 psig      176 °F
local mode
→ Dual ↵
control mode
```

Operating mode
Current control mode

5. Press «Enter» again.
An inverse cursor appears.
6. Use the «UP» or «DOWN» key to select the required control mode and confirm with «Enter».
7. Press the «Escape» key as often as necessary to return to the main menu.

7.5.2 Adjusting the idle period for DUAL control mode

When the idle period has elapsed, the machine comes to a STANDSTILL. The shorter the period, the more often the machine will switch from IDLE to STANDSTILL. In this respect the maximum motor starting frequency must also be taken into account.

Precondition Password level 4 is activated, menu < *configuration* > *control mode* > is selected (see section 7.5.1).

1. Keep pressing the «DOWN» key until < *settings* > appears.

```
88 psig      176 °F
- - - - -
* Dual ↵
* Quadro
```

2. Press «Enter» to select menu option < *Dual* >.
The current idle period is displayed.
3. Press «Enter» again.
An inverse cursor appears.
4. Set the required idle period with the «UP» or «DOWN» keys.
5. Press «Enter» again to accept the value.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.5.3 Adjusting the unloaded and minimum running period in QUADRO control mode

When the minimum running period has elapsed, the machine switches from IDLE to STANDSTILL. Depending on the setting for the unloaded period, the machine switches first from LOAD to IDLE or directly to STANDSTILL.

Precondition Password level 4 is activated,
menu *< configuration > control mode >* is selected (see section 7.5.1).

1. Keep pressing the «DOWN» key until *< settings >* appears.

```
88 psig          176 °F
* Dual
* Quadro ↵
...
```

2. Press «Enter» to select menu option *< * Quadro >*.

```
88 psig          176 °F
min run period
400s | 400s      ↵      Current minimum running period
unloaded period
```

3. Press «Enter» again.
An inverse cursor appears.
4. Set the required running period with the «UP» or «DOWN» keys.
5. Press «Enter» again to accept the value.
6. Set up the unloaded period in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

7.5.4 Setting the control pressure valve for MODULATING mode

In the MODULATING control mode, the inlet valve is continuously opened and closed by means of a regulating valve (proportional controller) to match delivery to air demand. Depending on system pressure, a modulation valve switches between internal and external control pressure. The modulation valve switching point and switching differential can be set.

Precondition Password level 4 is activated,
menu *< configuration > control mode >* is selected (see section 7.5.1).

1. Keep pressing the «DOWN» key until *mod. valve* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
mod. valve
SD: -7.3 psig   ↵      Switching differential
PN SP:80 psig   Modulating valve changeover point
```

3. Press «Enter» again.
An inverse cursor appears.
4. Set the required switching point with the «UP» or «DOWN» keys.
5. Press the «Enter» key to accept the value.
6. Set the value for the switching differential in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

Further information A list of control modes is given in chapter 4.8.

7.6 Configuring the machine for local mode

In local mode the machine is regulated with the system setpoint pressure p1 or p2. The controller is provided with the following modes of operation:

Operating mode	Description	See section
p1	The machine is regulated by system setpoint pressure p1.	7.6.3.3
p2	The machine is regulated by system setpoint pressure p2.	
p1/p2 clock	The changeover between p1 and p2 is regulated by a clock program.	7.6.2
p1/p2 cycle	The changeover between p1 and p2 is regulated by a programmed time pulse.	7.6.3

Tab. 35 Local operating mode (local mode)

- Adjust the setpoint pressure as described in section 7.3.

Overview

- If not activated, enter password for level 4.
- Select *< configuration > press. settings > load control >*.
- Set/adjust the clock program (see section 7.6.2)
or
the timer (see section 7.6.3).
- Local mode

7.6.1 Select *< configuration > press. settings > load control >*.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press. settings appears in the display.
3. Press «Enter».
4. Press the «DOWN» key until *load control* appears.
5. Press «Enter».
The menu *< load control >* is selected.

7.6.2 Configuring the system pressure setpoint changeover using the clock.



Keep to the order of the configuration!

- First set up the clock program and then the operating mode.

Overview

- If not activated, enter password for level 4.
- Set the day of the week for the first switching point (delete any existing clock program).
- Enter the time of the first switching point.
- Set the first switching point p1 or p2 for setpoint pressure.
- Set up any further switching points.
- Select operating mode p1/p2 clock (see section 7.6.3.3).



When setting up a clock program, note the switching times on a sheet of paper first. As well as individual weekdays, the following cycles are also available: 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 (10 switching points available):

No.	Weekday	Time	System setpoint pressure
01	Mon - Fri	06:30	p1 ON
02	Mon - Fri	12:00	p2 ON
03	Mon - Fri	13:00	p1 ON
04	Mon - Thu	17:00	p2 ON
05	Fri	16:00	p2 ON

Tab. 36 Example of system pressure changeover switching points

Setting the day of the week for the first switching point

Precondition Password level 4 is activated, menu *< configuration > press. settings > load control >* is selected (see section 7.6.1).

1. Keep pressing the «DOWN» key until *settings* appears.

```
88 psig      176 °F
...
settings
- - - - -
```

Start of the settings.

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

```
88 psig      176 °F
- - - - -
* p1/p2 clock ↵
...
```

3. Press «Enter».

```
88 psig      176 °F
* p1/p2 clock
reset: n ↵
...
```

Deleting the existing clock program

Take the following steps to delete an existing clock program:

1. Press «Enter» then «UP».

The display changes to *reset: y*.
2. Press «Enter».

The display changes to *reset: n*. The clock program is now deleted.

3. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
- - - - -
01 n.a.  ↵
00:00
```

The first switching point is not active.
Start time for the first switching point.

4. Press «Enter».
5. Press the «UP» key until *01 Mon-Fri* appears and confirm with «Enter».

Setting the time for the first switching point

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

```
88 psig          176 °F
01 Mon-Fri
00:00           ↵
p1 ON
```

Weekday setting.
Precise start time.

3. First set the hours and then the minutes with the «DOWN» or «UP» keys, confirming each setting with the «Enter» key.

Setting the pressure for the first switching point

1. Press the «DOWN» key.
2. Press the «Enter» key and select p1 or p2 with the «UP» or «DOWN» keys (not necessary in this example).
3. Set up the remaining switching points in the same way.
The clock program is now finished.
4. Select operating mode p1/p2 clock (see section 7.6.3.3)
5. Press the «Escape» key as often as necessary to return to the main menu.

7.6.3 Configuring the system pressure setpoint changeover using the timer

Overview

- If not activated, enter password for level 4.
- Delete the old timer configuration, if necessary
- Set timer periods p1 and p2.
- Select starting time for p1 or p2.
- Select operating mode p1/p2 cycle (see section 7.6.3.3).

7.6.3.1 Set timer periods p1 and p2.



Keep to the order of the configuration. The operating mode p1/p2 cycle must not be activated when configuring the timer period.

- Configure the timer first and then select the operating mode or select another operating mode first.

Precondition Password level 4 is activated,
menu *< configuration > press. settings > load control >* is selected.

1. Keep pressing the «DOWN» key until *settings* appears.

```
88 psig          176 °F
...
settings
- - - - -
```

Start of the settings.

2. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
p1/p2 cycle
p1: 10h | 10h ↵
p2: 18h | 18h
```

Timer period p1 | expiring period (example).

Timer period p2 | expiring period (example).

3. Press «Enter».
4. Use the «DOWN» or «UP» keys to set the timer period p1 and confirm with «Enter».
5. Press the «DOWN» key.
6. Press «Enter» and set timer period p2 with the «DOWN» or «UP» key.
7. Confirm with «Enter».

7.6.3.2 Set starting time for p1 or p2.

1. Press the «DOWN» key.

```
88 psig          176 °F
p2: 7h ! 7h
→ 1. start p1 ↵
09:00
```

Start with p1 (example)

Start time.

2. If the timer period is to start with p2, press «Enter» and set start p2 with the «UP».
3. Press «Enter».
4. Press the «DOWN» key.
5. Press «Enter» and set the timer period starting time with the «UP» key.
6. Confirm with «Enter».

Result The timer is now configured.

7.6.3.3 Selecting local mode

Precondition Password level 4 is activated,
menu < *configuration* > *press. settings* > *load control* > is selected.
The clock program or timer is set up.

1. Press «Enter».
2. Press the «DOWN» key.
3. Press «Enter».
An inverse cursor appears.
4. Press «UP» or «DOWN» to select the required operating mode (p1, p2, p1/p2 clock or p1/p2 cycle).
5. Press the «Enter» key to accept the operating mode.
The actual operating mode is displayed.
6. Press the «Escape» key as often as necessary to return to the main menu.

7.7 Configuring the machine for master control

7.7.1 List of the various master controllers

➤ The machine controller is provided with several methods of working under other controllers.

Method	Description	Section
Master control via Profibus	The controller (and therefore the compressor) receives the instruction LOAD, IDLE or local operation via the Profibus master (e.g. SIGMA AIR MANAGER or VESIS). The system setpoint pressure p1 and p2 have no relevance to the LOAD/IDLE signals.	7.7.2.1
Master control via the RS 485 interface.	Two SIGMA CONTROL controllers are working in master-slave mode. The slave receives the instruction from master via the RS 485 interface to change between system pressures p1 or p2.	7.7.4
Master control via remote contact. Master control via a remote contact is another method of controlling the machine externally. There are 2 possibilities:	Remote LOAD contact The machine is switched to LOAD or IDLE mode by an input signal from a master controller (e.g. a MIC 4000). The setpoint pressure settings p1 and p2 have no relevance.	7.7.5
	Local/remote LOAD contact: The machine is switched via 2 inputs from a master controller (e.g. MIC 8000) to LOAD/IDLE mode or local mode.	7.7.6
Setpoint pressure pre-selection	p1/p2 Remote contact: The signal for the change from setpoint pressure p1 to p2 initiated by an input contact.	7.7.7
Link to machines regulated by pressure switch (no SIGMA CONTROL). There are two possibilities of linking to a machine regulated by pressure switch:	On machines with the same FAD, SIGMA CONTROL controls the pressure switch via a floating relay output.	7.7.8.1
	On machines supplying an unequal FAD, the pressure ranges are matched to each other. To finalize, some examples of clock programs for equal loading of the machines are given.	7.7.8.2

Tab. 37 Table of controllers working in sequence

Further information Examples of clock programs for equal machine loading are given in section 7.7.9.

7.7.2 Configuring Profibus mode (SIGMA AIR MANAGER or VESIS)

Overview

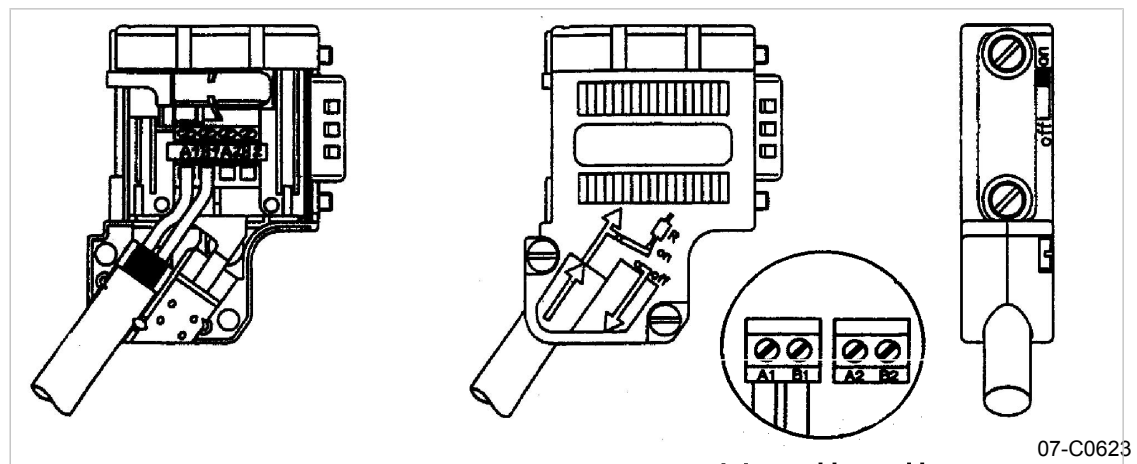
- Making the electrical connections
- Set the remote operating mode p2.
- Configure the Profibus interface
- Activate the «remote control» key

Making the electrical connections

Pin	Connections
1	Spare
2	Spare
3	Profibus connection B
4	TTL signal RTS
5	Earth
6	+5 V for interface P5
7	Spare
8	Profibus connection A
9	Spare

Tab. 38 Profibus DP pin connection

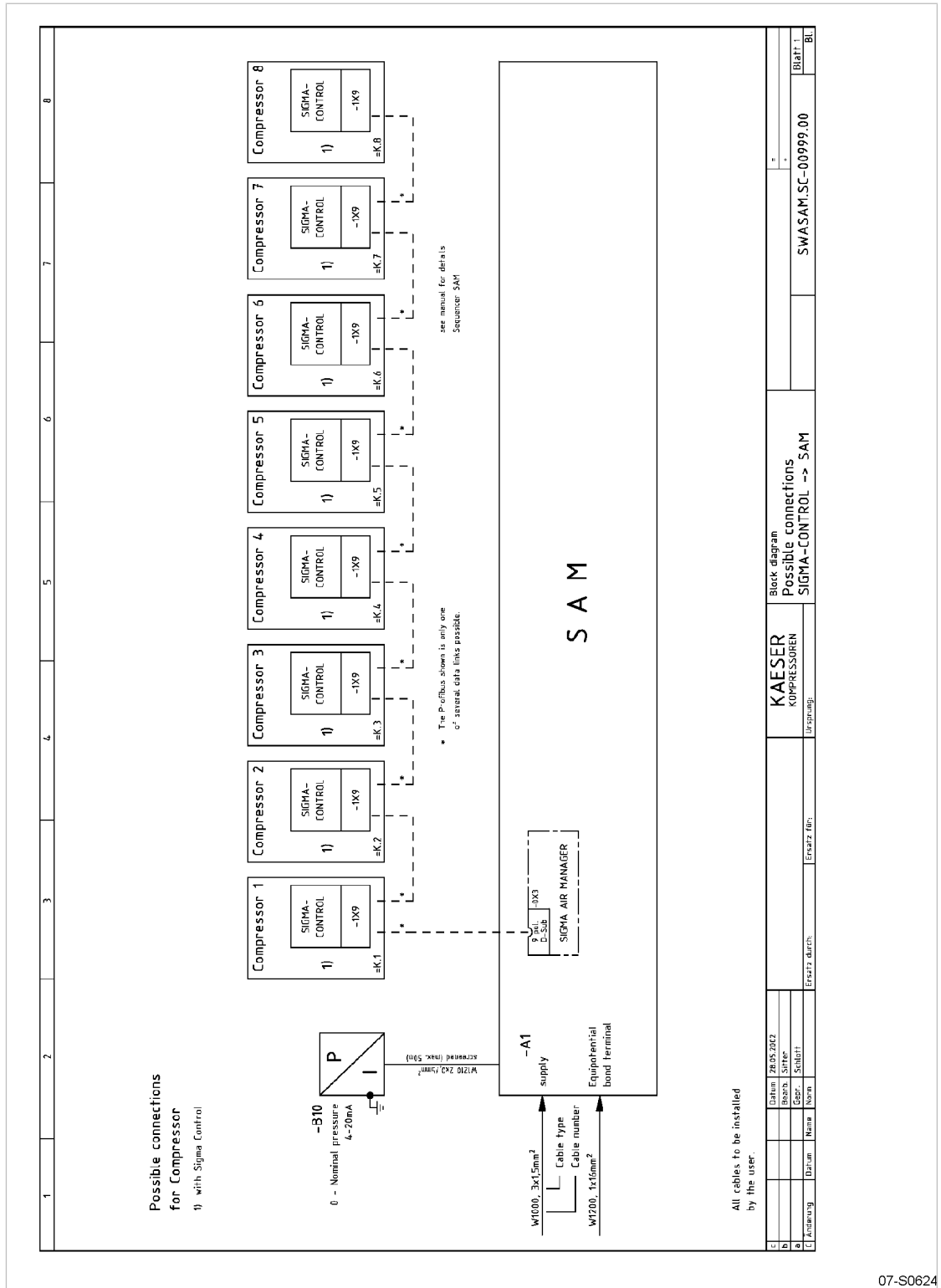
Interface plug wiring



07-C0623

Fig. 4 Profibus plug wiring

Wiring possibilities for master control (excerpt)



07-S0624

Fig. 5 Electrical diagram example with SIGMA AIR MANAGER

1. Connect the bus subscribers one after the other according to the pin assignment below.

2. Connect the screening to the plug housings at both ends.
3. Switch in the terminating resistor in the plugs of the first and last subscribers to the Profibus.

Set the remote operating mode p2.


When automatic mode is changed to manual mode at the bus controller, SIGMA CONTROL changes into the set remote mode. In such a case it is preferable to set the operating mode to "remote mode p2".

- Where more than one machine is involved, make sure that the system setpoint pressure p2 is set for local operation.

Precondition Password level 4 is activated.
 Menu option *< configuration > press. settings > load control >* is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote mode* appears in the second line of the display.
2. Press «Enter».
 An inverse cursor appears.
3. Set operating mode p2 with the «UP» or «DOWN» key.
4. Press the «Enter» key to accept the operating mode.
5. Adjust the setpoint pressure p2 if necessary.

Further information See chapter 7.3 for setpoint pressure adjustment.

7.7.2.1 Configuring Profibus mode (SIGMA AIR MANAGER or VESIS)
Overview

Configuration takes place in the following steps:

- Selecting a Profibus interface
- Assign the slave address
- If required, set reaction should a bus alarm (bus timeout) occur
- Assign an output contact for the bus alarm message (take a spare contact from the electrical diagram)
- Restart the controller

Precondition Password level 4 is activated.
 The electrical connection to the bus master is made.

Selecting a Profibus interface

Choice of "send" or "send/receive".

- 'Send' is equivalent to: read data
- 'Send/receive' is equivalent to: read data and control machine.

1. From the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *Profibus* appears in the third line of the display.

4. Press «Enter».

```
ProfiBus
→ n.a. ↵
Run # # #|F 0
```

Profibus is inactive

5. Press «Enter» again.
6. Keep pressing the «UP» key until *Send+Receive* appears.
7. Press «Enter» or «Send+Receive».

If no electrical connection to the bus has been made up to this point the message *bus alarm* appears briefly.
8. Acknowledge the message and check the electrical connections.

Assign the slave address



When connected to a SIGMA AIR MANAGER, the slave address is determined as follows:
 The compressor number + 2. is used in SIGMA AIR MANAGER
 The permissible address range is 3 to 126.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
...
slave no.: 3 ↵
...
```

Current slave address assigned

2. Press «Enter».

An inverse cursor appears.
3. Select the required slave address with the «UP» or «DOWN» keys and confirm with the «Enter» key.

Setting reaction if a bus alarm (bus timeout) occurs



The controller can react in two ways when a bus alarm occurs:

- *auto.* :
The controller remains in remote mode and tries to connect to the bus.
- *man.* :
The controller changes to the preset local mode. Master control is started again by pressing the «remote control» key.

Exchange of data with a Profibus connection takes place in three fixed cycles. The Profibus connection can be monitored with the help of the cycle time:
 The bus connection is considered to be interrupted if no data is exchanged between the bus master and the controller (as bus subscriber) after expiration of a set time period (timeout). If the period for bus timeout is set to zero then the monitoring is inactive.

1. Keep pressing the «DOWN» key until the following is displayed:



After switching on the power supply, the bus alarm can be suppressed for the period *start td.* :

```
88 psig          176 °F
* bus alarm
start td: 15.0s ↵
timeout: 5.0s
```

Delay period
Current bus timeout setting

2. Keep pressing the «DOWN» key until *timeout:* appears in the third line of the display.
3. Press «Enter».
4. Change the setting for bus timeout with the «DOWN» or «UP» key.



To deactivate bus monitoring, set the *< timeout: >* to 0.00 s.

5. Save the settings with the «Enter» key.

Setting the output contact for the bus alarm

The bus alarm signal can be sent to a remote control center via a floating relay contact.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
restart: auto.
→ n.a. ↵
...
```

Reaction during a bus alarm
Output for bus alarm inactive

2. Press «Enter».
An inverse cursor appears.
3. Choose a spare output with the «UP» key.
4. Press the «Enter» key to confirm the output.
5. Save the settings with the «Enter» key.

Result The settings are automatically saved in a voltage independent EEPROM. The settings are still available even if the buffer battery discharges completely.

Activate the «remote control» key

Precondition Password level 4 is activated,
menu *< communication > ProfiBus >* is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote key:* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» or «DOWN» key to set "y" and confirm by pressing «Enter».
The remote control function is activated and can be used.
4. Press the «remote control» key to enable remote mode.
5. Restart the controller

7.7.3 Configuring the Profibus interface without SIGMA AIR MANAGER / VESIS



Contact KAESER Service for information on configuring the interface if Profibus is to be used..

Overview

- Selecting a Profibus interface
- Assign the slave address
- If required, set reaction should a bus alarm (bus timeout) occur

- Assign an output contact for the bus alarm message (take a spare contact from the electrical diagram)
- Restart with the power «OFF/ON» key.

Precondition Password level 4 is activated,
electrical connection with the Bus-Master is made.
the files required from KAESER are available.

Selecting a Profibus interface

1. From the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *ProfiBus* appears in the third line of the display.
4. Press «Enter».

```
Profibus
→ n.a. ↵
Run # # #|F 0
```

Profibus is inactive

5. Press «Enter» again.
6. Keep pressing the «UP» key until *Send* appears.
7. Press «Enter».
If no electrical connection to the bus has been made up to this point the message *bus alarm* appears briefly.
8. Acknowledge the message and check the electrical connections.

Assign the slave address

1. Keep pressing the «DOWN» key until the following is displayed:

```
Profibus
...
slave no.: 2 ↵
...
```

Current slave address assigned

2. Press «Enter».
An inverse cursor appears.
3. Select the required slave address with the «UP» or «DOWN» keys and confirm with the «Enter» key.

Further steps

Carry out further configuration as outlined in section 7.7.2.1:

- If required, set reaction should a bus alarm (bus timeout) occur
- Assign an output contact for the bus alarm message (take a spare contact from the electrical diagram)
- Restart the controller

7.7.4 Master control via the RS 485 interface.
Configuration procedure

Controller	Procedure	Section
Both	Making the electrical connections	7.7.4.2
Both	Set up the appropriate system pressure setpoints p1 and p2 taking air losses in the air main into account.	7.7.4.3
Master	Setting the time target for a controller mode:	
	Clock program	7.7.4.4
	Timer	7.7.4.5
Master	Set the type of LOAD control (clock program or timer) in local mode.	7.7.4.6
Slave	Set remote mode p1/p2 RS485.	7.7.4.7
Slave	Activate the remote key	7.7.4.8
Both	Activate master or slave	7.7.4.9

Tab. 39 Master-slave configuration procedure

- Configuration is carried out in the following steps.

7.7.4.1 Example of master control via the RS 485 interface.

Two SIGMA CONTROL controllers work as master/slave in the same air network. The master controls the machine configured as a slave and provides the signal for the system pressure setpoint.

Example: two machines with differing air deliveries

Local operating mod of the master p1/p2 clock:

- Toggled between setpoints p1 and p2 by a clock program.
- At peak load times (high air demand) pressure is regulated to setpoint pressure p1. During periods of low air demand, e.g. at weekends, pressure is regulated to setpoint p2.
- The machine with the lesser air delivery is the slave. At peak load times the machine is only cut in under conditions of high air demand. During periods of low air demand the machine with the lesser air delivery is cut in more often.

Example: two machines with equal air deliveries

- Local operating mode of the master p1/p2 cycle: (Toggled between setpoints p1 and p2 by a timer). The timer ensures even loading of both machines. The system pressure setpoints are set the same for both machines.
- During timer period 1, the master regulates to p1 and signals the slave for p2. During timer period 2, the master regulates to p2 and signals the slave for p1.



If 2 SIGMA CONTROL controllers are to work in master-slave mode via interface RS 485, they must have the same software version.

- Configure master/slave operation via interface RS 485 as follows.

7.7.4.2 Making the electrical connections

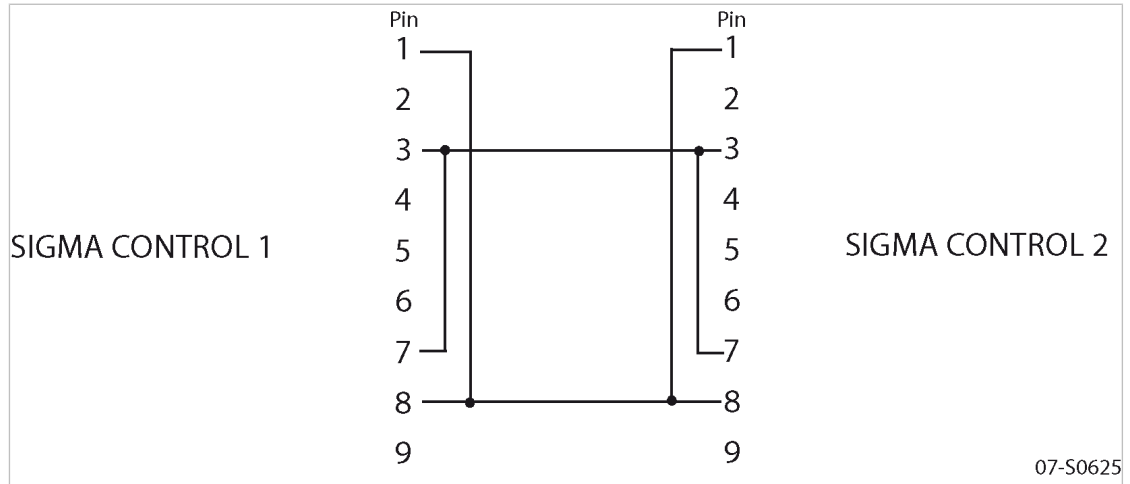


Fig. 6 Electrical connections between the two controllers

1. Make the electrical connections as shown in the table below.
2. Connect the screening to the plug housings at both ends.
3. Make the electrical connections between the two controllers.

RS 485 pin assignment

Pin	Connections	Remarks
1	Terminating resistor RA	(integrated in the controller)
2	Reserved	
3	Difference signal B	
4	Reserved	
5	Reserved	
6	Reserved	
7	Terminating resistor RA	(integrated in the controller)
8	difference signal A	
9	Reserved	

Tab. 40 RS 485 pin assignment

7.7.4.3 Adjust both system pressure setpoints p1 and p2.

Precondition Password level 4 is activated,
menu *< configuration > press. settings > compressor >* is selected.

1. Press «Enter» key to adjust the value for setpoint p1.
2. Adjust the value with the «UP» or «DOWN» key.
3. Press «Enter» to accept the value.
4. Adjust the switching differential p1 in the same way.

5. If necessary, adjust the value for p2 in the same way.
6. Press the «Escape» key as often as necessary to return to the main menu.

Further information Further information on setting up the pressure parameters is found in section 7.3.

7.7.4.4 Master: configuring the setpoint changeover using a clock program



Keep to the order of the configuration!

- First set up the clock program and then select the operating mode.

When a clock program is first set up, note the start times for the system pressure setpoints on a sheet of paper first.

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

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

The example given in section 7.6.2 describes the settings for a clock program in more detail.

Overview

- Entering the weekday for the first switching point
- Enter the time of the first switching point.
- Set the first pressure switching point
- Set up any further switching points.
- Select operating mode p1/p2 clock (see section 7.7.4.6).

Precondition Password level 4 is activated,
 menu *< configuration > press. settings > load control >* is selected.

Entering the weekday for the first switching point

1. Keep pressing the «DOWN» key until ** p1/p2 clock* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176°F
* p1/p2 clock
reset: n  ↵
...
```

3. If at first an existing clock program is to be deleted, press the «Enter» key again and then the «UP» key.
 The display changes to *reset: y*.
4. Press «Enter».
 The display changes to *reset: n*. The clock program is now deleted.

- Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
...
01 n.a.  ↵      first switching point for the weekday
00:00          Start time for the first switching point.
```

- Press «Enter».
- Press the «UP» key to set the weekday for the first switching point and confirm with the «Enter» key.

Setting the time for the first switching point

- Press the «DOWN» key.
- Press «Enter».

```
88 psig          176 °F
01 Mon-Fri      Weekday settings (example)
00:00          ↵      Precise start time.
p1 ON
```

- First set the hours and then the minutes with the «DOWN» or «UP» keys, confirming each setting with the «Enter» key.

Setting the system pressure for the first switching point

- Press the «DOWN» key.
- Press «Enter» and select p1 or p2 with the «UP» or «DOWN» keys.
- Set up the remaining switching points in the same way.
The clock program is now finished.
- Select operating mode p1/p2 clock (see section 7.7.4.6)
- Press the «Escape» key as often as necessary to return to the main menu.

7.7.4.5 Master: Configuring the setpoint changeover using a timer



Keep to the order of the configuration!
➤ First set up the timer and then select the operating mode.

Overview

- Set timer periods p1 and p2.
- Select starting time for p1 or p2.
- Select operating mode p1/p2 cycle (see section 7.7.4.6).

Set timer periods p1 and p2.

Precondition Password level 4 is activated,
menu < configuration > press. settings > load control > is selected.

- Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
* p1/p2 cycle
p1: 10h | 10h  ↵      Timer period p1 | expired timer period (example)
p2: 18h | 18h
```

2. Confirm the setting with the «Enter» key.
3. Use the «DOWN» or «UP» keys to set the timer period p1 and confirm with «Enter».
4. Press the «DOWN» key.
5. Press «Enter» and set timer period p2 with the «DOWN» or «UP» key.
6. Confirm the setting with the «Enter» key.

Set starting time for p1 or p2.

1. Press the «DOWN» key.

```
88 psig          176 °F
p2: 7h | 7h
→ 1. start p1  ↵
09:00
```

Current setting: start with p1 (example)
Current start time setting

2. If the timer period is to start with p2, press «Enter» and set start p2 with the «UP» or «DOWN» keys.
3. Press «Enter».
4. Press the «DOWN» key.
5. Press «Enter» and set the timer period starting time with the «DOWN» or «UP» key.
6. Confirm the setting with the «Enter» key.
The timer is now configured.
7. Select operating mode p1/p2 cycle (see section 7.7.4.6).
8. Press the «Escape» key as often as necessary to return to the main menu.



Resetting the timer period!

- Do not switch the machine on and off with the main switch, otherwise the timer period will always be reset to zero.

7.7.4.6 Master: Selecting local mode

Precondition Password level 4 is activated, menu < configuration > press. settings > load control > is selected, clock program or timer is set.

1. Press «Enter».

```
88 psig          176 °F
local mode
→ p1  ↵
...
```

Local operating mode (local mode)

2. Press «Enter».
An inverse cursor appears.
3. Press «UP» or «DOWN» to select the required operating mode (p1, p2, p1/p2 clock or p1/p2 cycle).
4. Press the «Enter» key to accept the operating mode.
The current operating mode is displayed.

7.7.4.7 Slave: Setting remote mode RS485

Precondition Password level 4 is activated, menu < configuration > press. settings > load control > is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote mode* appears in the second line of the display.
2. Press «Enter».
An inverse cursor appears.

```
88 psig      176 °F
remote mode
→ p1 ←      Current operating mode
remote key: n
```

3. Use the «UP» or «DOWN» key to select operating mode p1/p2 RS485 and confirm with «Enter».

7.7.4.8 Slave: activating/deactivating the «remote» key



► To deactivate the «Remote» key, change remote key: y to remote key: n.

Precondition Password level 4 is activated,
menu < *configuration* > *press. settings* > *load control* > is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote key: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Select the value *y* with the «UP» or «DOWN» key and confirm with «Enter».
The remote key function is activated and can be used.
4. Press the «remote» key to enable remote mode.

7.7.4.9 Both: Configuring the RS485 interface

Overview

- Selecting the communication menu option
- Determine master and slave
- Saving the settings

Precondition Password level 4 is activated.

Select communication.

1. From the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *RS485* appears in the third line of the display.

```
88 psig      176 °F
RS232
RS485 ←
ProfiBus
```

4. Press «Enter».

```
RS485
→ n.a.  ↵
Run # # # | F 0
```

Interface is not active

Setting the controller as master or slave

1. Press the «UP» or «DOWN» key until → *n.a.* appears in the third line of the display.
2. Press «Enter».

An inverse cursor appears.
3. Press the «UP» key once or twice to select *PP Slave* or *PP Master* and confirm with «Enter».

The controller now starts the interface test. After *Run*, there appears a 0-256 counter; if a zero (0) appears after the F, the machine is OK.
4. If no zero appears, check the cable connections or the settings on the Master and Slave controllers.

```
RS485
→ n.a.  ↵
Run 0 | F 0
```

Interface test counter

5. Restart the controller

Result The settings are automatically saved in a voltage independent EEPROM. The settings are still available even if the buffer battery discharges completely.

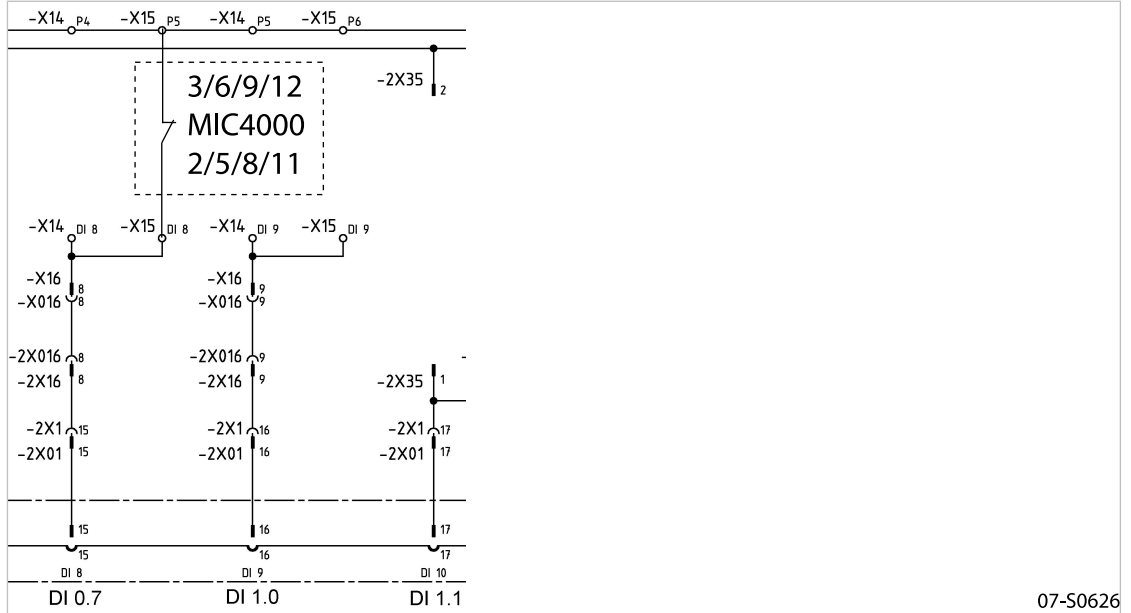
7.7.5 Configuring master control using the LOAD remote contact (e.g. MIC 4000)

Overview

- Making the electrical connection for LOAD remote contact
 - Setting the LOAD remote contact operating mode and assigning the input
 - Adjusting the pressure increase pE, if necessary.
 - Activate the «remote control» key
- Configure master control as previously described.

7.7.5.1 Making the electrical connection for remote LOAD contact (excerpt)

Machine with transfer module (example)



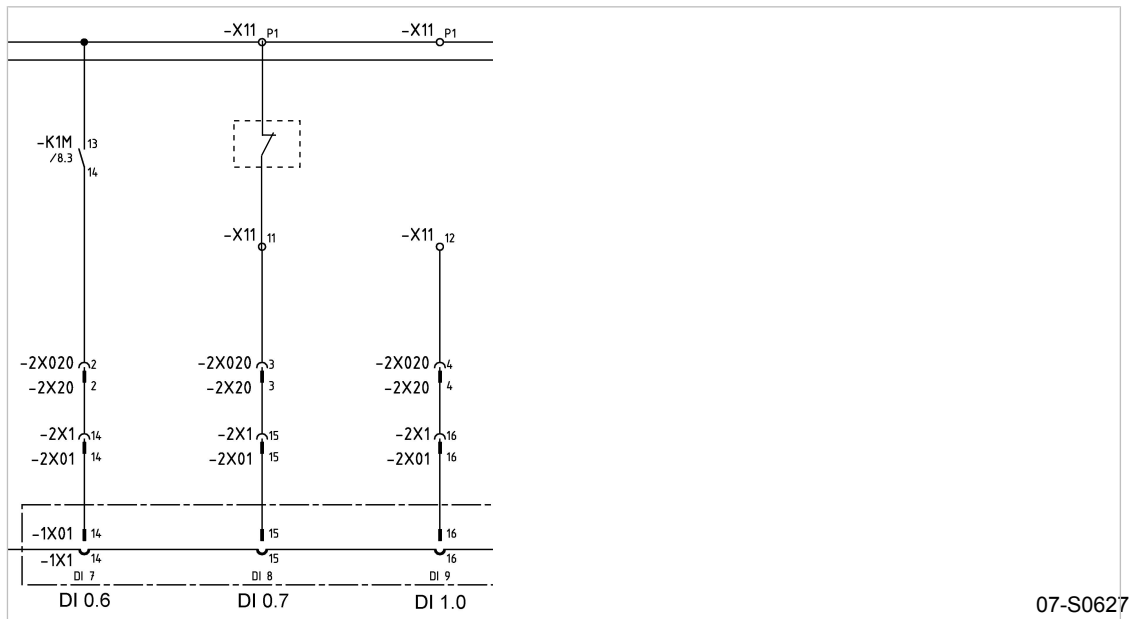
07-S0626

Fig. 7 Remote LOAD contact with transfer module.

- Make the electrical connection with DI0.7 according to the diagram.

Machine without transfer module (example)

Applicable to series SX, SM and SK prior to spring terminals.



07-S0627

Fig. 8 Remote LOAD contact without transfer module.

- Make the electrical connection according to the diagram.

7.7.5.2 Setting the remote LOAD contact operating mode and assigning the remote contact input

Precondition Password level 4 is activated,
menu *< configuration > press. settings > load control >* is selected.

Setting the remote LOAD contact operating mode

1. Keep pressing the «UP» or «DOWN» key until *remote mode* appears in the second line of the display.
2. Press «Enter».
An inverse cursor appears.

```
88 psig      176 °F
remote mode
→ p1 ←      Current operating mode
remote key: n
```

3. Use the «UP» or «DOWN» key to select operating mode load RC and confirm with «Enter».

Assigning the remote contact input

The input for the remote contact is already assigned. Setting is only necessary if you deliberately want to use a different input.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
* idle - load
RC → DI0.7 ← Standard: DI0.7
...
```

2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» or «DOWN» key to select an input for the remote contact and confirm with «Enter».

Result The operating mode is now configured.

7.7.5.3 Adjust pressure increase pE.

- Adjust the pressure increase pE as described in section 7.3.2.3.

Further information Detailed information on this pressure parameter is found in section 7.3.2.

7.7.5.4 Activate the «remote control» key

Precondition Password level 4 is activated,
menu *< configuration > press. settings > load control >* is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote key: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.

3. Select the value γ with the «UP» or «DOWN» key and confirm with «Enter».
The «remote control» key is activated and can be used.
4. Press the «remote control» key to enable remote mode.

7.7.6 Configuring master control using the local/remote contact (e.g. MIC 8000)

Overview

- Making the electrical connections
 - Setting the local/remote contact operating mode and assigning the input
 - Configure the local operating mode if necessary
 - Activate the «remote control» key
- Configure master control as previously described.

7.7.6.1 Making the electrical connections



Use output "controller on" (DO0.3) for the "alarm machine X" message to the MIC 8000 to ensure open circuit protection.

- Wire the "motor running" (DO0.5) and "control on" (DO0.3) messages from the compressor to the MIC 8000.

- Contact A open: SIGMA CONTROL regulates to setpoint pressure p2.
- Contact A closed: SIGMA CONTROL controls via an external contact.
- External DI0.7: LOAD/IDLE
- DI1.3: LOAD control — switchover local/remote LOAD contact.

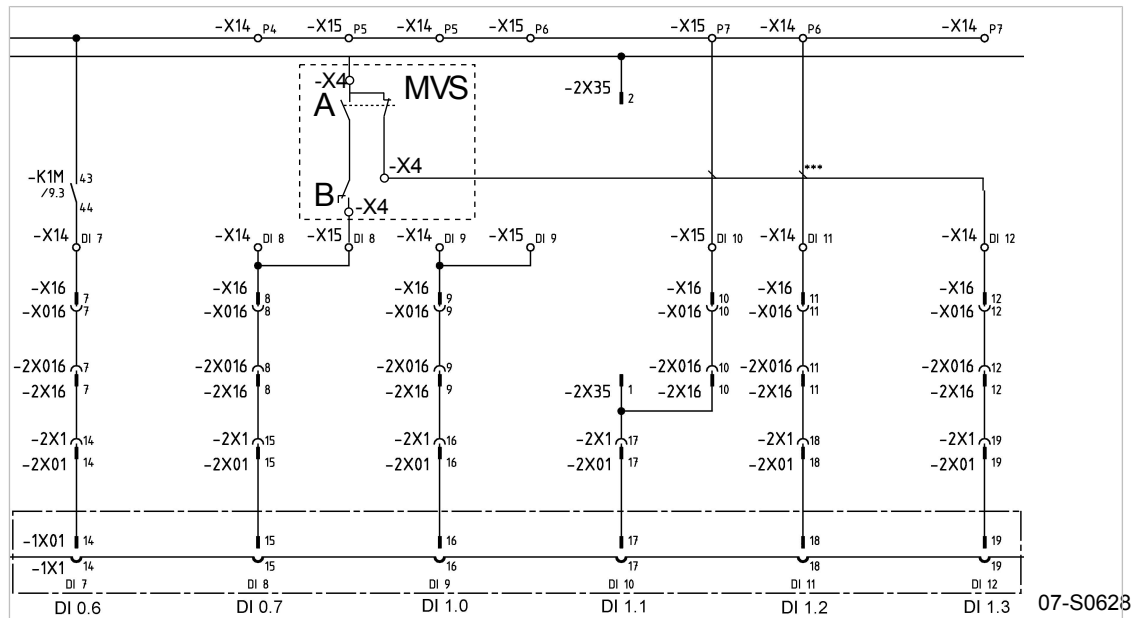


Fig. 9 Wiring diagram for local/remote contact

- (A) Changeover between automatic and manual modes
- (B) LOAD/IDLE contact MVS

- Make the electrical connection according to the diagram.

7.7.6.2 Activate the «remote control» key

Precondition Password level 4 is activated,
menu *< configuration > press. settings > load control >* is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote key: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Select the value *y* with the «UP» or «DOWN» key and confirm with «Enter».
The «remote control» key is activated and can be used.
4. Press the «remote control» key to enable remote mode.

7.7.6.3 Setting the local/remote contact operating mode and assigning the input

Precondition Password level 4 is activated,
menu *< configuration > press. settings > load control >* is selected.

Setting the local/remote contact operating mode

1. Keep pressing the «UP» or «DOWN» key until *remote mode* appears in the second line of the display.
2. Press «Enter».
An inverse cursor appears.

```
88 psig          176 °F
remote mode
→ p1 ↵          Current operating mode
remote key: n
```

3. Use the «UP» or «DOWN» key to select operating mode *loc.-loadRC* and confirm with «Enter».

Assigning an input for the remote contact for switching over pressure control

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
loc.-loadRC → n.a. ↵  No input assigned
...
```

2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» or «DOWN» key to select an input for the remote contact and confirm with «Enter».

Result The operating mode is now configured.

7.7.6.4 Setting local operating mode p2



Setpoint pressure p2 is normally set for local operation.

- When setting the setpoint pressure p2, bear in mind that, under certain circumstances, more than one compressor may be operating in local mode (see section 7.3 for adjusting setpoint pressure).

Precondition Password level 4 is activated,
menu < *configuration* > *press. settings* > *load control* > is selected.

1. Keep pressing the «UP» or «DOWN» key until *local mode* appears in the second line of the display.

```
88 psig          176 °F
local mode
→ p1 ↵
...
```

Current local operating mode

2. Press «Enter».
An inverse cursor appears.
3. Set operating mode p2 with the «UP» or «DOWN» key.
4. Press the «Enter» key to accept the operating mode.
5. Adjust setpoint pressure p2 if necessary (see section 7.3).

7.7.7 Configuring setpoint pressure pre-selection via remote contact

The signal to changeover from setpoint pressure p1 to p2 comes from an input contact. If there is a signal at the input then system pressure is regulated on setpoint pressure p2.

Overview

- Set remote contact operating mode p1/p2 RC.
 - Assigning the remote contact input
 - Activate the «remote control» key
- Configure the setpoint pressure pre-selection as described.

7.7.7.1 Set remote contact operating mode p1/p2 RC.

Precondition Password level 4 is activated,
electrical connection made,
menu option < *configuration* > *press. settings* > *load control* > is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote mode* appears in the second line of the display.
2. Press «Enter».
An inverse cursor appears.

```
88 psig          176 °F
remote mode
→ p1 ↵
remote key: n
```

Current operating mode

3. Use the «UP» or «DOWN» key to select operating mode p1/p2 RC and confirm with «Enter».

7.7.7.2 Assigning the remote contact input

A spare input can be found in the machine circuit diagram.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
* p1/p2 RC
RC → n.a. ↵      No input assigned
...

```

2. Press «Enter».

An inverse cursor appears.
3. Use the «UP» or «DOWN» key to select an input for the remote contact and confirm with «Enter».

Result The operating mode is now configured.

7.7.7.3 Activate the «remote control» key

Precondition Password level 4 is activated,
 menu < configuration > press. settings > load control > is selected.

1. Keep pressing the «UP» or «DOWN» key until *remote key: n* appears in the third line of the display.
2. Press «Enter».

An inverse cursor appears.
3. Select the value *y* with the «UP» or «DOWN» key and confirm with «Enter».

The «remote control» key is activated and can be used.
4. Press the «remote control» key to enable remote mode.

Result The operating mode is now configured.

7.7.8 Configuring master control of compressors regulated by pressure switch

- Configure master control as previously described.

7.7.8.1 Configuring master control via floating relay contact

Requirement:

A machine with SIGMA CONTROL (e.g. series BSD) and a conventional machine **without** SIGMA CONTROL of the same capacity are to run in sequence as base load or peak load machines.

Proposal:

- Set/adjust the clock program or timer on SIGMA CONTROL.
- Select local mode p1/p2 clock or p1/p2 cycle.
- Set system setpoint pressures p1 and p2 in the same way. They must be identical to the pressure switch settings on the machine without SIGMA CONTROL.
- To make the pA/pB setpoint changeover between the two machines possible, the local operating mode selected has to be assigned a floating relay contact. An auxiliary contactor can be energized via this contact to activate the pressure switches for p1 and p2 on the compressor without SIGMA CONTROL. See example wiring diagram below.

Overview

- Making the electrical connections
- Set pressure setpoints p1 and p2.

Assigning the floating relay contact

Precondition Password level 4 is activated, electrical connection made (select spare contact from the machine's electrical diagram).

1. Select *< configuration > press. settings > load control >*.
2. Press «Enter».
3. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
* p1/p2 DO
n.a. ↵      No output assigned
...
```

4. Press «Enter».
5. Use the «DOWN» or «UP» key to select the required output (DO) and confirm with «Enter». This output can now be used for the changeover between the two pressure switches.

Setting local mode

Precondition Password level 4 is activated.

1. Select *< configuration > press. settings > load control >*.
2. Press «Enter».

```
88 psig      176 °F
local mode
→ p1 ↵      Current local operating mode
...
```

3. Press «Enter». An inverse cursor appears.
4. Set operating mode p1/p2 clock or p1/p2 cycle with the «UP» or «DOWN» key.
5. Press the «Enter» key to accept the operating mode. The actual operating mode is displayed.

7.7.8.2 Configuring sequencing mode without an electrical connection

Requirement:

A high FAD machine with SIGMA CONTROL (e.g. BSD) is to work as a base load machine. A second machine (e.g. SK) **without** SIGMA CONTROL should supply air in times of low demand.

Proposal:

- Select the setpoint pressures p1 and p2 for the BSD machine such that the pressure switch switching points of the SK machine are in between. When p2 is activated for the periods of low demand, the SK machine automatically functions as the base load machine.
- Set up the required values for a clock program on SIGMA CONTROL.
- Select local mode p1/p2 clock.
- Activate the clock

Function diagram:

Period t1–t7: high air demand	Period t8–t14: low air demand
t1 Demand rises. System pressure falls.	t8: Air demand rises. System pressure falls.
t2 BSD switches to LOAD.	t9: SK switches to LOAD.
t3: Setpoint pressure p1 reached. BSD switches to IDLE.	t10: Setpoint pressure p2 reached. SK switches to IDLE.
t4: BSD switches to LOAD. Air demand not covered.	t11: BSD switches to LOAD. Air demand not covered.
t5: SK also switches to LOAD. System pressure begins to rise.	t12: SK switches to LOAD. System pressure begins to rise.
t6: SK switches to IDLE.	t13: SK switches to IDLE.
t7: BSD switches to IDLE.	t14: BSD switches to IDLE.

Tab. 41 Function diagram

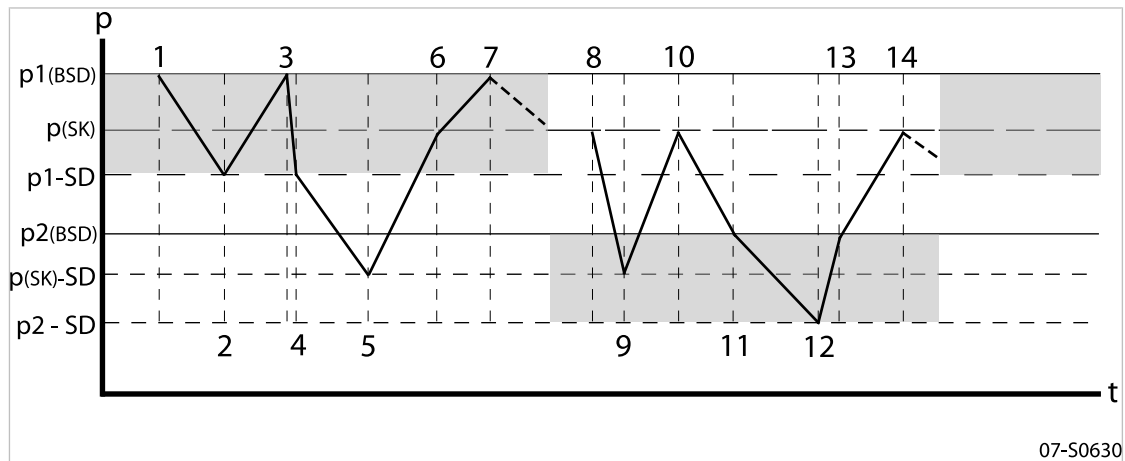


Fig. 11 Function diagram

- SD Switching differential
- p Pressure
- t Time

Set setpoint pressures p1 and p2.

Precondition Password level 4 is activated.

1. Select menu *< configuration > press. settings > compressor >* (see section 7.3.1).
2. Press «Enter» key to adjust the value for setpoint p1.

3. Adjust the value with the «UP» or «DOWN» key.
4. Press «Enter» to accept the value.
5. Adjust the switching differential p1 in the same way.
6. If necessary, adjust the value for p2 in the same way.
7. Press the «Escape» key as often as necessary to return to the main menu.

Configuring the clock program

The clock program for the example is set up using the following switching points: (a maximum of 10 switching points are available):

No.	Weekday	Time	System setpoint pressure
01	Mon – Fri	06:30	p1 On
02	Mon – Fri	17:00	p2 On

Tab. 42 Example switching points

Overview

- Set the day of the week for the first switching point.
- Setting the time for the first switching point
- Setting the system pressure for the first switching point
- Set up any further switching points.

Precondition Password level 4 is activated,
menu < configuration > press. settings > load control > is selected.

- Configure the switching program as previously described.

Entering the weekday for the first switching point

1. Keep pressing the «DOWN» key until *p1/p2 clock appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
* p1/p2 clock
reset: n ↵
...
```

3. If at first an existing clock program is to be deleted, press the «Enter» key again and then the «UP» key.

The display changes to *reset: y*.

4. Press «Enter». The display changes to *reset: n*.

The clock program is now deleted.

5. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
- - - - -
01 n.a. ↵
00:00
```

the first weekday switching point is inactive
Start time of the first switching point

6. Press «Enter».
7. Press the «UP» key to set the weekday and confirm with the «Enter» key.

Enter the time of the first switching point.

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

```
88 psig          176 °F
01 Mon-Fri      Weekday setting.
00:00           ↵ Precise start time.
p1 ON
```

3. First set the hours and then the minutes with the «DOWN» or «UP» keys, confirming each setting with the «Enter» key.

Select setpoint pressure p1 or p2 for the first switching point.

1. Press the «DOWN» key.
2. Press «Enter» and select p1 or p2 with the «UP» or «DOWN» keys.
3. Set up the remaining switching points in the same way.
4. Press the «Escape» key as often as necessary to return to the main menu.

Setting local mode

Precondition Password level 4 is activated.

1. Select *< configuration > press. settings > load control >*.
2. Press «Enter».

```
88 psig          176 °F
local mode
→ p1 ↵          Current local operating mode
...
```

3. Press «Enter».

An inverse cursor appears.
4. Select operating mode p1/p2 clock with the «UP» or «DOWN» key.
5. Press the «Enter» key to accept the operating mode.

The actual operating mode is displayed.

7.7.9 Example of time settings for even loading

Requirement:

Two machines of the same capacity are to be equally loaded. Versions A, B and C describe the different possibilities of achieving this requirement.



A detailed description for configuring a clock or timer program can be found in section 7.6.

Method A: Daily cycling between p1 and p2 after 24 hours.

The compressors start with system pressure p2 at 24:00. Changeover p1/p2 is by timer (local operating mode p1/p2 cycle).

Precondition The setpoint pressure p1/p2 is configured the same for both machines.

- Establish a cycle with the following switching points:
 - Cycling period p1: 24 h
 - Cycling period p2: 24 h
 - Start p2: 24:00

Method B: Equal duty cycle during the day

Changeover p1/p2 is by time program (local operating mode p1/p2 clock).

Precondition The setpoint pressure p1/p2 is configured the same for both machines.

- The clock program is set up using the following switching points:

No.	Weekday	Time	System setpoint pressure
01	Mon – Sun	00:00	p1 On
02	Mon – Sun	06:00	p2 On
03	Mon – Sun	12:00	p1 On
04	Mon – Sun	18:00	p2 On

Tab. 43 Example clock program for equal duty cycling during the day

Method C: Equal duty cycling during the week

Changeover p1/p2 is by time program (local operating mode p1/p2 clock).

Precondition The setpoint pressure p1/p2 is configured the same for both machines.

- The clock program is set up using the following switching points:

No.	Weekday	Time	System setpoint pressure
01	Mon	00:00	p1 On
02	Mon	21:00	p2 On
03	Tue	18:00	p1 On
04	Wed	15:00	p2 On
05	Thu	12:00	p1 On
06	Fri	09:00	p2 On
07	Sat	06:00	p1 On
08	Sun	03:00	p2 On

Tab. 44 Example clock program for equal duty cycling during the week

7.8 Configuring the output for PC and MODEM

The controller is provided with an RS232 interface that can be used for connection to a PC or a modem.

Configure the interface as follows:

- Make the electrical connection (see electrical diagram for the machine)
- Setting the type of output

7.8.1 Pin connections RS232

Pin	Connections
1	Spare
2	Receive data RxD
3	Receive data RxD
4	Reserved
5	Earth
6	Spare
7	Request to send RTS
8	Clear to send CTS
9	Spare

Tab. 45 Pin connections RS232

1. Make the electrical connection as described in the machine's service manual.
2. Connect the screening to the plug housings at both ends.

7.8.2 Configuring the RS232 interface

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
RS232 ↵
RS485
```

3. Press «Enter» to select *RS232*.

```
88 psig          176 °F
→ n.a. ↵
...
```

Interface is not active

4. Press «Enter».
5. Press «UP» once or twice to select *modem* or *data → PC*.
6. Press «Enter» to accept the type of output.
7. Restart the controller

Result The settings are automatically saved in a voltage independent EEPROM. The settings are still available even if the buffer battery discharges completely.

7.9 SMS configuration

If, for example, a SIGMA TELE-CARE agreement has been signed, the controller can send information to KAESER Service in SMS form to make remote diagnosis possible. A modem must be fitted that can be connected to the phone network.

Overview

Configure the SMS option as follows:

- Activating the SMS function
- Suppressing repeat messages (filter)
- Entering the modem's phone number (modem)
- Entering company data (site location)
- Selecting the Call Centers (channel 1(2))
- Saving the settings

7.9.1 Activating the SMS function

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *SMS* appears in the third line of the display.
4. Press «Enter».

```
88 psig      176 °F
mode: n.a.
buffer: idle ↵
channel 1
```

SMS inactive

5. Press the «UP» key once.

```
88 psig      176 °F
* SMS status
mode: n.a. ↵
buffer: idle
```

6. Press «Enter».
7. Press «UP» once or twice to select *SMS 1x* or *SMS 5x*.
8. Save the setting with «Enter».



If *SMS 1x* is set, the current warning or alarm message will be sent per SMS.
If *SMS 5x* is set, a current process image in binary format will be sent in addition to any warning or alarm message. Four further SMS are needed for this function.

7.9.2 Suppressing repeat messages (filter)

To suppress messages repeating at short intervals, a period of 0 – 3.600 seconds can be set during which a repeat of the same message is suppressed, i.e. is not sent.

Precondition Password level 4 is activated,
menu < *configuration* > *SMS* > is selected.

1. Keep pressing the «DOWN» key until *filter* appears in the third line of the display.

2. Press «Enter».
3. Use the «DOWN» or «UP» key to set the required period of suppression and confirm with «Enter».

7.9.3 Entering the modem's phone number (MODEM)



Detailed information on standard settings and initialization are given in the service manual for SIGMA AIR MANAGER short message service (SMS).

The modem configuration is completed by entering its phone number and initialization.

Precondition Password level 4 is activated, menu < configuration > SMS > is selected.

1. Keep pressing the «DOWN» key until *modem* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
tel. modem
-> ***** ↵
-> *****
```

The first six numerals (not entered)
Further 12 numerals (not entered)

3. Use the «UP» or «DOWN» key to initially enter the first six numerals and confirm each one with «Enter».
4. Scroll to the next line with the «DOWN» key and enter the remaining numerals in the same way.
5. Scroll with the «DOWN» key until the following is displayed:

```
88 psig          176 °F
initialization
-> ATX3DTCO ↵
- - - - -
```

Current initialization

6. If required, adjust the initialization in the same way.

7.9.4 Entering company data (site location)

The following information is entered in the location menu option:

- (For customers with SIGMA TELE CARE contract) *subsidiary*: Name of the KAESER subsidiary (already set)
- *customer*: Name of the company
- *tel. customer*: Telephone number at which KAESER Service can call back.
- *SMS language*: Language of the SMS (select for each KAESER subsidiary).

Precondition Password level 4 is activated, menu < configuration > SMS > is selected.

1. Keep pressing the «DOWN» key until *location* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
- - - - -
subsidiary
-> CBG
```

Name of the KAESER subsidiary

3. Keep pressing the «DOWN» key until *customer* appears in the second line of the display.

4. Press «Enter».
5. Enter the company name with the «UP» or «DOWN» key and confirm with «Enter», using the next line if necessary.
6. Enter the phone number in the menu option *< tel. customer >* in the same way.
7. Keep pressing the «DOWN» key until *SMS language* appears in the second line of the display.
8. Use the «UP» or «DOWN» key to select the SMS language and confirm with «Enter».

7.9.5 Configuring selection of the Call Center (channel)

Overview

The preset data entered by KAESER are displayed in menu option *< channel 1 >*:

- Telephone number of the responsible Call Centre
- Phone number of the SMS messages
- Choice of the SMS transmission protocol
- Number of auto re-dials
- Duration of the interval between two calls



Ask your network provider for the number of the Call Center.

Precondition Password level 4 is activated,
menu *< configuration > SMS >* is selected.

1. Keep pressing the «DOWN» key until *channel 1* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
tel. CallCenter
→ 017125
→ 21002
```

Call Center number (first numerals)

Call Center number (following numerals)

3. Scroll «DOWN» until *auto re-dial* appears in the second line.
4. Press «Enter».
5. Use the «DOWN» or «UP» key to set as required and confirm with «Enter».
6. Set up the duration of the interval in the same way.
7. The same settings can be made in the *< channel 2 >* menu option.
8. Restart the controller

Result The settings are automatically saved in a voltage independent EEPROM. The settings are still available even if the buffer battery discharges completely.

7.10 Configuring input and output signals

The controller's binary and analog inputs and outputs can be used for other requirements.

This chapter deals with the various options in the following sections:

- 7.10.1: Outputting important operational states of the compressors.
- 7.10.2: Display of analog input values
- 7.10.3: Displaying additional binary input signals

- 7.10.4: Using machine pressure and temperature values as switches
- 7.10.5: Configuring analog outputs



The controller only allows assignment of spare inputs and outputs. If an occupied input or output is already assigned this will be rejected by the controller (the display returns to *n.a.* when «Enter» is pressed).

When delivered from the factory, the outputs DO0.3 to DO0.5 are available for assignment. Further spare outputs can be found in the machine circuit diagram.

- Configure the inputs and outputs as described in the following.

7.10.1 Outputting important operational states of the machine.

Important operational machine states can be made available as a binary signal via volt-free contacts. Each output can be assigned only once.

The following messages can be outputted:

Message	Explanation	Output
controller ON	Controller is powered up	
group alarm	Alarm is activated	
motor running	Drive motor running	
compressor ON	The machine is switched on.	
group warning	Warning message has appeared	
remote mode	Remote mode is activated	
idle	The machine is running in IDLE mode	
load	The machine is running in LOAD mode	
clock active	The clock is activated	
clock contact	The clock contact is closed.	
EMERGENCY STOP	The «EMERGENCY STOP» button has been pressed.	

Tab. 46 Assigned output signals

Overview

Configuration is done in the menu *< I/O periphery > DO functions >*.

- Enter password for level 4.
- Select *< configuration > I/O periphery > DO functions >*.
- Assigning a message to an output

7.10.1.1 Select menu configuration > I/O periphery.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *I/O periphery* appears in the third line of the display.

4. Press «Enter».

```
88 psig          176 °F
```

```
DO functions ↵
```

```
show quantities
```

menu option for binary output functions

Menu option for showing quantities

5. Press «Enter» again.

A list of available messages and their assigned outputs is displayed.

```
88 psig          176 °F
```

```
controller ON
```

```
→ n.a. ↵
```

```
group alarm
```

Message controller ON

No output assigned

7.10.1.2 Assigning a message to an output

1. Select the required message with the «DOWN» key.
2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key or the «UP» key to select a spare output and confirm by pressing «Enter».
A message is now sent via the output assigned.
4. For clarity, enter the output in the table above

7.10.2 Display analog input values

Up to 6 values for pressure, temperature, etc. from various sensors/transducers can be displayed at display level in the analog data menu.

Of these, 2 are assigned to pressure transducers; 2 further inputs can be assigned to freely selectable sensor types. A list of standard analog data that can be displayed is found in chapter 8.5.

Overview

Configuration is done in the menu *< I/O periphery > show quantities >*.

- Enter password for level 4.
- Select *< configuration > I/O periphery > show quantities >*.
- Select display (display 1 – 6)
- Assigning the analog input
- Selecting the type of signal (4–20 mA / 0–20 mA)
- Allocating a value range to the measurement signal (calibration).
- Editing sensor designation and unit of measure

Example

The configuration is explained with the following example:

- The signal value from a flow measuring device is to be displayed in the measured data menu.
- The sensor has a measuring range of 0–29.4 cfm and is operated with 4–20 mA.
- The sensor is connected to analog input AI5.

7.10.2.1 Select menushow quantities.

Precondition Password level 4 is activated, electrical connection is made, menu *< configuration > I/O periphery >* is selected (see section 7.10).

1. Keep pressing the «DOWN» key until *show quantities* appears in the third line of the display.
2. Press «Enter».

88 psig	176 °F	
display1 (p) ←		Pressure display 1
display1 (p)		Pressure display 2

7.10.2.2 Select display (display 1–6)

- Press the «DOWN» key until *display5 (I)* appears in the third line and confirm with «Enter».

88 psig	176 °F	
Mmmmmmmmmmmmmmmmm		Line for sensor designation
# # # # #		Line for unit designation
# mmmmm ←		
→ n.a.		No input assigned

7.10.2.3 Assigning the analog input

1. Press the «DOWN» key once to scroll *n.a.* into the third line of the display and then press «Enter».
 - An inverse cursor appears.
2. Use the «UP» key to select *A/5* and confirm with «Enter».
 - If the sensor was previously connected to the controller, a quantity is displayed.

7.10.2.4 Determining the type of analog signal (0/4–20 mA)

- Press the «DOWN» key once to select the input signal strength.
 - As 4 -20 mA is preset, no further setting is needed.

7.10.2.5 Allocating a value range to the measurement (calibration)

The factory setting is a range from 0-10,000 that represents a signal current between 4–20 mA. This quantity range has to be adapted to represent the measurement range of the sensor of 0–29.4 cfm.

1. Keep pressing the «DOWN» key until the following is displayed:

88 psig	176 °F	
scale		
20mA: 10000	←	Top of the signal range
4mA: 0		Bottom of the signal range

2. Press «Enter».
3. Press and hold the «DOWN» key and to set the top of the range to 50.
 - The quantity reduces initially in steps of units, then tens, hundreds and finally in thousands.
4. Using this method, reduce the quantity to 100 and then set to 50 with the «DOWN» key.

5. Confirm the setting with the «Enter» key.
6. Set the bottom quantity for 4 mA in the same way.

7.10.2.6 Editing sensor designation and unit of measure

1. Scroll up the display to the line for sensor designation with the «UP» key.
2. Press the «Enter» key and select characters from the character set with the «UP» and «DOWN» keys to give the sensor signal a designation. There are 15 characters to choose from.
3. Confirm the entry with «Enter».
4. Enter the unit of measure in the line below in the same way.
The signal value from the sensor can now be displayed in the *< analog data >* menu (see chapter 8.5).

7.10.3 Displaying additional binary input signals

As well as the defined alarm and warning messages there are 6 further freely selectable input signals that can be used to display messages. A list of the defined alarm and warning messages is given in chapters 9.2 and 9.3. Information on spare inputs is given in the machine circuit diagram.

An input signal can be classified as either an alarm, service or operational message. To suppress any possible contact chatter or similar problems the input signal can be delayed by an adjustable period. This ensures that the signal must be apparent for a minimum period before it can be processed as a message.



If an input signal is classified as an alarm the controller goes into the alarm state and shuts down the machine.

Overview

Configuration is done in the menu *< I/O periphery > ext. messages >*.

- Enter password for level 4.
- Select *< configuration > I/O periphery > ext. messages >*.
- Selecting the message number (0 – 5)
- Selecting the message type (operational, alarm, warning)
- Set logic
- Assigning an input.
- Setting the time delay
- Entering the message text

7.10.3.1 Select ext. messages.

Precondition Password level 4 is activated, menu *< configuration > I/O periphery >* is selected (see section 7.10.1.1).

1. Keep pressing the «DOWN» key until *ext. messages* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
ext. message 0 ↵
ext. message 1
```

External message number 0

7.10.3.2 Selecting the message number (0 – 5)

1. Use the «DOWN» key to select a spare message number and confirm with the «Enter» key.

88 psig 176 °F	
ext. message 0	line for the message text
→ warning ↵	selected message type
→ n.a.	No input assigned

7.10.3.3 Selecting the message type (operational, alarm, warning)

1. Press «Enter» again.
2. Use the «UP» key to select the message type and confirm with the «Enter» key.

7.10.3.4 Assigning an input.

1. Press the «DOWN» key once, then «Enter».
An inverse cursor appears.
2. Use the «UP» key to select the input concerned and confirm with the «Enter» key.

7.10.3.5 Set logic

1. Press the «DOWN» key once, then «Enter».
An inverse cursor appears.
2. Use the «UP» key to set the required behavior and confirm with «Enter».
Possible settings:
 - +: message triggered by 24 V
 - —: message triggered by 0 V

7.10.3.6 Setting the time delay



The delay can be set between 0.01 and 600 seconds. The delay is counted down from 600 with the «DOWN» key and counted upwards from zero in 0.01 second steps with the «UP» key.

1. Press the «DOWN» key twice, then «Enter».
An inverse cursor appears.

88 psig 176 °F	
→ DI2.0	selected input
td: 0.00s ↵	set time delay

2. Press the «DOWN» key to set a long time delay.
or
Press the «UP» key to set a short time delay.
3. Confirm the time delay setting with «Enter».

7.10.3.7 Entering the message text

1. Using the «UP» key, scroll up the display to the line for the message text.

2. Press «Enter» and select characters from the character set with the «UP» and «DOWN» keys to enter the message text.



There are 15 characters to choose from.

3. Confirm the entry with «Enter».
The input signal is now available as a message.

7.10.4 Using machine pressure and temperature values as switches

The pressure transducers and temperature sensors connected to the controller (both in the machine and on the user's premises) can be also be used as switches.

- If a set switching point is reached, a message can be triggered and/or a binary output signal set until pressure falls below the switching differential again.
- The message can be defined as an operational, warning or alarm message.
- A delay period can be set to suppress constant on/off switching caused by fluctuations around a switching point.

The following sensors can be used for the switching function:

- pressure transducers:
 - Local pressure transducer (pNloc)
 - External pressure transducer (pNext)
 - Internal pressure transducer (pi)
 - Two further pressure transducers (dis1 and dis2)
- Temperature sensors
 - Airend discharge temperature (ADT)
 - Package discharge temperature (PD T)
 - Motor temperature (mot T)
 - Cooling water temperature (WC)
 - Two further temperature sensors (dis3 and dis4)
- Oil separator tank temperature (OS T)

Overview

Configuration is done in the menu *< I/O periphery > switch >*.

- Enter password for level 4.
- Select *< configuration > I/O periphery > switch >*.
- Selecting the type of sensor
- Selecting the sensor
- Setting the switching point and switching differential
- Entering the message text
- Selecting the message type
- Setting the delay period
- Assigning the switch to a binary output

7.10.4.1 Select menu I/O periphery > switch.

Precondition Password level 4 is activated,
menu *< configuration > I/O periphery >* is selected (see section 7.10.1.1).

1. Keep pressing the «DOWN» key until *switch* appears in the third line of the display.
2. Press «Enter».

```
88 psig          176 °F
p-switch ↵
T-switch
```

menu option for the pressure switch
Menu option for the temperature switch

7.10.4.2 Selecting the type of sensor

1. Press «Enter» to select the pressure switch
or
the «DOWN» key once to select the temperature switch.
2. Confirm with «Enter».

7.10.4.3 Selecting the sensor

1. Display

```
88 psig          176 °F
p-switch
→ n.a. # # ↵
SP: 0.0 psig
```

Menu text
No switch selected
Switching point

2. Press «Enter».
3. Use the «UP» key to select the required reference value and confirm with «Enter».

7.10.4.4 Entering the message text

1. Press the «UP» key once, then «Enter».
2. Enter the message text by selecting characters from the character set with the «UP» and «DOWN» keys.



There are 15 characters to choose from.

3. Save the text with the «Enter» key.

7.10.4.5 Setting the switching point and switching differential

1. Press the «DOWN» key twice, then «Enter».
2. Use the «UP» key or the «DOWN» key to set the value for the switching point as concerned and confirm with «Enter».
3. Set the switching differential in the same way.

7.10.4.6 Selecting the message type



The machine shuts down when an alarm message is triggered.

1. Press the «DOWN» key once, then «Enter».
2. Use the «UP» key to select the message type (operational, warning, alarm) and confirm with the «Enter» key.

7.10.4.7 Setting the delay period



The delay can be set between 0.01 and 3,600 seconds. The delay is counted down from 3,600 with the «DOWN» key and counted upwards from zero in 0.01 second steps with the «UP» key.

1. Press the «DOWN» key once, then «Enter».
An inverse cursor appears.

88 psig	176 °F	
operation		Selected message type
td: 0.00s ←		Current time delay
→ n.a.		Assigned output

2. Press «DOWN» to lengthen the delay
or
«UP» to shorten it.
3. Confirm the time delay setting with «Enter».

7.10.4.8 Assigning the switch to a binary output

1. Press the «DOWN» key once, then «Enter».
2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key or the «UP» key to select a spare output and confirm by pressing «Enter».

Result Configuration of the switch is now complete.

7.10.5 Configuring analog outputs



A configurable analog output is only possible on a SIGMA CONTROL fitted with an expander card. If the machine is fitted with variable frequency drive (frequency converter) this output is possibly assigned.

The controller makes an analog output available under the address AO1. An existing analog input pressure or temperature signal can be connected to this output and calibrated for further processing.

The following input signals are available:

- Network pressure (PN)
- Pressure (pi) in the oil separator
- Airend discharge temperature (ADT)
- Further signals specific to the machine are on inputs AI2–AI8.

In addition, 2 current machine parameters can be connected to the output:

- Current setpoint pressure (p1 or p2)
or
- rate of rise of the airend discharge temperature (dT/dt ADT).

It is not necessary to scale these values.

Overview

Configuration is done in the menu *< I/O periphery > AO parameter >*.

- Enter password for level 4.
 - Select *< configuration > I/O periphery > AO parameter >*.
 - Selecting the analog input signal
 - Selecting the type of signal (4–20 mA / 0–20 mA)
 - Assign the quantity range (calibration, if required)
- Configure analog output as follows.

7.10.5.1 Select menu ext. messages.

Precondition Password level 4 is activated,
menu *< configuration > I/O periphery >* is selected (see section 7.10.1.1).

1. Keep pressing the «DOWN» key until *AO parameter* appears in the third line of the display.
2. Press «Enter».

88 psig	176 °F	
AO1 → n.a.		no signal set
→ 4–20mA ←		set signal type
0.0mA		actual value

7.10.5.2 Selecting the analog input signal

1. Press the «UP» key once to scroll *n.a.* into the third line of the display and then press «Enter».
An inverse cursor appears.
2. Use the «UP» key to select required input signal and confirm with «Enter».

7.10.5.3 Determining the type of analog signal (0/4–20 mA)

If the sensor concerned has a signal range of 4–20 mA then move on to the next instruction.

1. To alter the signal strength, press the «DOWN» key once and confirm with «Enter».
2. Use the «UP» key to change the value to 0–20 mA and confirm with «Enter».

7.10.6 Allocating a value range to the measurement (scaling)

The following steps are dependent on the analog signal to be sent.

- Current setpoint values for the machine: no settings required
- Input signal of a temperature sensor: see temperature value scaling
- Input signal of a pressure sensor: see pressure value scaling.

Temperature value scaling

A range of 0 °C – 248 °F is factory selected for signal strength from (0) 4–20 mA.
If the sensor covers another temperature range then it must be scaled.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
→ Pt100
20 mA: 248 °F ↵    maximum value
4 mA:   32 °F      minimum value
```

2. Press the «Enter» key to set the upper value.
3. Press and hold the «DOWN» key or the «UP» key to set the maximum value and confirm by pressing «Enter».
4. Set the minimum value in the same way.

Pressure value scaling

A range of 0 – 232 psig is factory set for signal strength from 0–20 mA or 4–20 mA. If the sensor covers another pressure range then it must be scaled.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
p1 (2)
20 mA: 232 psig ↵    maximum value
4 mA:   0.0 psig     minimum value
```

2. Press the «Enter» key to set the upper value.
3. Press and hold the «DOWN» key or the «UP» key to set the maximum value and confirm by pressing «Enter».
4. Set the minimum value in the same way.

Result Configuration of the outputs is now complete.

7.11 Configuring the compressed air outlet temperature (PD temperature)



In order to monitor the air discharge temperature from the compressor, e.g. downstream of the air cooler, an appropriate sensor (PT100) must be installed there. Further information is given in the wiring diagram.

- Configure the compressed air outlet temperature as described.

7.11.1 Compensating for line resistance

To compensate for the increased line resistance of the temperature sensor caused by long cable run, it is possible to correct (reduce) the temperature value displayed.

Overview

Correction is done in the menu *< components > PD temperature >*.

- Enter password for level 4.
- Select menu *< components > PD temperature >*.
- Entering the correction value

Select menu components > PD temperature.

Precondition Password level 4 is activated.

7 Initial Start-up

7.11 Configuring the compressed air outlet temperature (PD temperature)

1. From the main menu, keep pressing the «UP» key until *components* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *PD temperature* appears in the third line of the display.
4. Press «Enter».

```
88 psig      176 °F
PD temperature
→ AI8 131 °F ↵
corr. 31 °F
```

Analog input of actual temperature
Resistance compensation

7.11.2 Entering the correction value

1. Keep on pressing the «DOWN» key until *corr. 31 °F* appears in the third line of the display.
2. Press «Enter».
A cursor appears inverse over the temperature value.
3. Select the correction value with the «UP» key or «DOWN»key and confirm with «Enter».
The compressed air outlet temperature is compensated by the correction value.

7.11.3 Switching levels for the package discharge temperature

The compressed air outlet temperature is monitored at five levels:

- Maximum temperature: alarm message
- High temperature: warning message
- Low temperature: warning message
- Minimum temperature: alarm message

The temperatures for these monitoring levels can be set. Likewise the analog input to which the temperature sensor is connected.

A delay period can be set to suppress constant on/off switching caused by fluctuations around a switching point.

Overview

Configuration is done in the menu *< components > PD temperature >*.

- Enter password for level 4.
- Select menu *< components > PD temperature >*.
- Selecting the analog input
- Set the switching points and switching differentials for the 4 temperature levels.
- Setting the delay period

7.11.3.1 Selecting the analog input

Precondition Password level 4 is activated.

1. Select menu *< components > PD temperature >*.
This section can be skipped if an input has already been assigned.

```
88 psig      176 °F
PD temperature
→ AI8 131 °F ↵
corr. 31 °F
```

Analog input of actual temperature
Resistance compensation

2. Press «Enter».
The cursor flashes under *n.a.* (or the assigned input).
3. Use the «DOWN» key or the «UP» key to select a spare input and confirm by pressing «Enter».

7.11.3.2 Setting the switching point and switching differential

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
□ >122 °F    Maximum temperature
↑ >113 °F    High temperature
↓ <37 °F     Low temperature
```

2. Press «Enter».
3. Select the correction value with the «UP» key or «DOWN»key and confirm with «Enter».
4. Set the values for high, low and minimum temperatures in the same way.

7.11.3.3 Setting the delay period



The delay can be set between 0.01 and 300 seconds. The delay is counted down from 300 with the «DOWN» key and counted upwards from zero in 0.01 second steps with the «UP» key.

1. Keep pressing the «DOWN» key until *td: 0.00s* appears in the third line of the display.
2. Press «Enter».
The cursor appears inverse over the set time delay.

```
88 psig      176 °F
...
td: 0.00 s   ↵    Current time delay
```

3. Press «DOWN» to lengthen the delay
or
«UP» to shorten it.
4. Confirm the time delay setting with the «Enter» key.

Result The settings for package discharge temperature monitoring are now configured.

7.12 Activating remote acknowledgement

When warning or alarm messages are routed to a remote control center via an output it makes sense to have these messages acknowledged by the control center.

Acknowledging the message without correcting the cause, however, can lead to machine damage.

Example:

The cause of the message *ADT #* , can be insufficient cooling oil. If the message is regularly acknowledged without topping up the oil, the airend can be damaged.

The following conditions must be fulfilled:

- The remote acknowledgement and «remote» key are activated.
- A controller input has been assigned for the acknowledgement signal.

Overview

- Enter password for level 4.
- Select *< configuration > acknowledgement >*.
- Setting the remote acknowledgement function.
- Activating the «remote » key.
- Assigning an input.
- Press the «remote » key.



CAUTION

Machine damage can result from acknowledging a fault message without remedying its cause!

- Find the fault and then decide to acknowledge or not.

7.12.1 Select menu *<configuration > acknowledgement>*.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *acknowledgement* appears in the third line of the display.
4. Press «Enter».

```
88 psig          176 °F
remote mode
→ key ↵
remote key: n
```

Acknowledgement by key only
Remote key deactivated

7.12.2 Setting the remote acknowledgement function.

1. Press «Enter».
2. Press the «UP» key.
key+RC appears in the display.
3. Press «Enter» to accept the setting.

7.12.3 Activating the «remote control» key

1. Press the «DOWN» key once.
2. Press «Enter».
An inverse cursor appears.
3. Select the value *y* with the «UP» or «DOWN» key and confirm with «Enter».
The remote key is now activated.

7.12.4 Assigning an input.

1. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig          176 °F
- - - - -
RC → n.a.  ↵
```

No remote contact input has been assigned

2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» key to select the required input and confirm with «Enter».
The input has now been assigned.
4. Press the «remote» key to enable remote acknowledgement.

Result Should a warning message occur, it can now be acknowledged from a control centre.

7.13 Linking to an external pressure transducer

If the air system is operated with an air receiver, the pressure in the receiver can be regulated by an external pressure transducer.

The sensor output can be linked in the following ways:

- via a Profibus link (from a master controller). An input does not have to be assigned.
- Via the USS protocol (from a pressure transducer linked to the frequency converter), assigned to input FC USS .
- Via a pressure transducer connected to SIGMA CONTROL (assignment of an analog input required).
Characteristics:
 - 4-20 mA
 - 0-232 psig
 - 0–29.5 "HgV (for vacuum)

The controller processes the options in the following sequence:

- Profibus value
- Pressure according to the assigned external transducer
- Local system pressure, the local system pressure transducer remains activated

Overview

- Enter password for level 4.
- Select *< configuration > press. settings > press.act.value >*.
- Assigning an input.

7.13.1 Select menu < configuration>press. settings >.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.

7 Initial Start-up

7.14 Setting the timer for condensate drainage

2. Press «Enter».
press.settings appears in the third line of the display.
3. Press «Enter» again.
4. Keep pressing the «DOWN» key until *press.act.value* appears in the third line of the display.
5. Press «Enter».

```
88 psig          176 °F
press.act.value
→ pNloc 88 psig  ↵      Local transducer
→ 4-20 mA
```

7.13.2 Assigning an input.

1. Press «Enter» again.
An inverse cursor appears.
2. Select the input with the «UP» key or the «DOWN» key. For measured values via the frequency controller select *FC USS*.
3. Confirm with «Enter».

Result The input for the external transducer is now activated.

7.14 Setting the timer for condensate drainage

A solenoid valve can be activated at regular intervals for the drainage of condensate.

Overview

- Enter password for level 4.
- Select menu *< configuration > timer >*.
- Setting the timer OFF and timer ON periods
- Assigning an output to the solenoid valve

7.14.1 Select menu *configuration > timer*.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».
press.settings appears in the third line of the display.
3. Keep pressing the «DOWN» key until *timer* appears in the third line of the display.
4. Press «Enter».

```
88 psig          176 °F
timer
OFF 300 s  ↵      timer menu option
ON 5.00          timer off period of 300 seconds
                  timer on period of 5 seconds
```

7.14.2 Setting the timer OFF and timer ON periods

1. Press «Enter» to change the OFF period.
An inverse cursor appears in the third line. The delay can be set between 0.01 and 3,600 seconds.
2. Change the OFF period with the «DOWN» or «UP» keys.
3. Confirm the setting with the «Enter» key.
4. Set the ON period for the drain valve in the same way.

7.14.3 Assigning an output to the solenoid valve

1. Press the «DOWN» key once, then «Enter».
An inverse cursor appears.
2. Use the «UP» key to select the required output and confirm with the «Enter» key.

Result The timer is now configured.

7.15 Activating the energy-saving mode for the refrigeration dryer

CONTINUOUS or TIMER modes can be activated for control of the refrigeration dryer. Using the menu option TIMER the dryer can be shut down under time control whenever no compressed air is required.

The operating temperature in the refrigeration dryer is kept constant within narrow limits under this method of control by cycling the refrigerant circulation.

Precondition Password level 4 is activated.

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Keep pressing the «DOWN» key until *control mode* appears in the third line of the display.
3. Press «Enter».

88 psig 176 °F	
local mode	Current operating mode
→ Dual ←	
control mode	

4. Keep pressing the «DOWN» key until the following is displayed:

88 psig 176 °F	
dryer	
→ Continuous ←	continuous mode is activated
...	

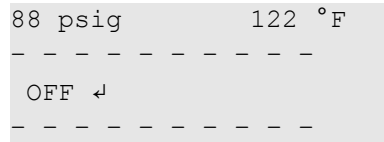
5. Press «Enter».
An inverse cursor appears.
6. Set the required control mode with the «UP» or «DOWN» keys.
7. Press the «Enter» key to accept the operating mode.
8. Press the «Escape» key as often as necessary to return to the main menu.

7.16 Commissioning the machine

Checking the controller settings	Section	Confirmed?
➤ Language correctly set?	7.2.2	
➤ Date and time correct?	7.2.4	
➤ Display format correctly set?	7.2.5	
➤ System pressure setpoint correctly set?	7.3	

Tab. 47 Checklist of installation conditions

1. Check and confirm all the items in the checklist before starting the machine.
When power is applied to the machine the controller boots and carries out a self test. The display and LED *controller power* light up.
The current system pressure and the airend discharge temperature are displayed in the first line of the display.



System pressure and airend discharge temperature

2. Press the «LOAD/IDLE» key.



CAUTION
Run-up time too short.
A run-up time that is too short can damage the machine.

- Press the <ON>key and let the machine run for at least 1 minute in IDLE to allow sufficient oil to enter the pressure system.

3. Press the «ON» key.
4. Press the «LOAD/IDLE» key.

Result The machine switches to LOAD.

8 Operation

8.1 Switching the machine on and off

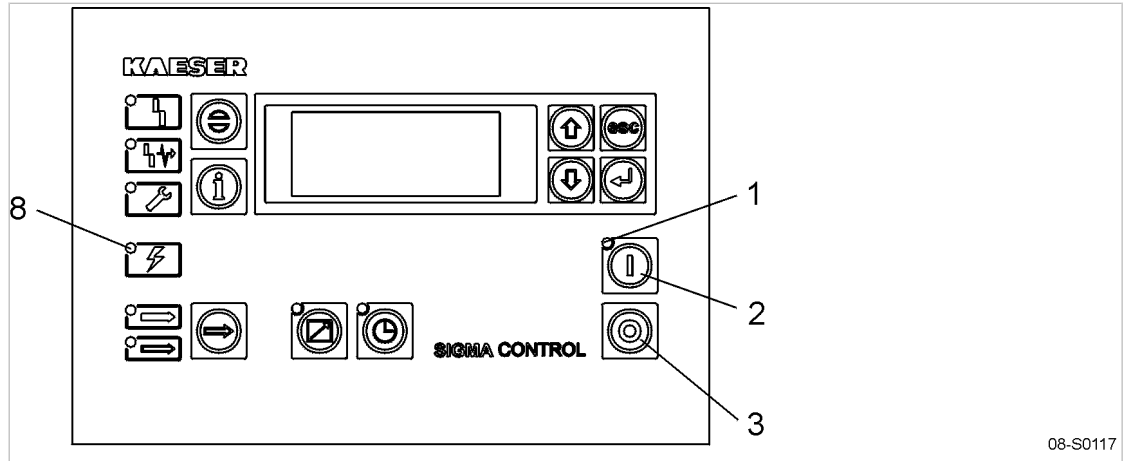


Fig. 12 Switching on and off

- | | |
|---------------------------------|------------------------------------|
| ① LED <i>Machine ON</i> (green) | ③ «OFF» key |
| ② «ON» key | ⑧ LED <i>Controller ON</i> (green) |



The power supply disconnecting device cuts power abruptly from the machine. It is not suitable for normal on and off switching.

- Follow the described procedure for on and off switching.

8.1.1 Switching the machine on locally



CAUTION

Damage can occur by switching on and off too frequently.

- Take the permissible motor starting frequency into account when switching the machine on and off.

Ensuring operational readiness

- Check the following before switching on:
 - No personnel are working on the machine
 - all access doors and panels are closed and secure,
 - the machine temperature is not less than 37 °F.

Switching the machine on

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



WARNING

Compressed air can cause injury!

- Ensure operational readiness.

1. Switch on the power supply disconnecting device.
After the controller has carried out a self-test, the green *controller ON* LED lights continuously.

2. Press the «ON» key.

The green *Machine ON* LED lights continuously. The compressor motor starts as soon as system pressure is lower than the setpoint pressure (cut-out pressure).

Automatic restart

The automatic restart is activated at the factory. If the current system pressure is lower than the setpoint, the machine starts automatically after a power failure.

**WARNING**

Automatic starting!

There is danger of injury from the machine starting automatically or by remote start command.

- Switch off and lock out the main isolating devices and check that no voltage is present before opening any machine enclosure or guard.

- Label the machine if necessary.

Further information See chapter 7.4.5 for instructions on deactivating the automatic restart.

8.1.2 Switching the machine off locally

1. Press the «LOAD/IDLE» key.

The machine switches to IDLE and the *IDLE* LED flashes.

2. After 20 s in IDLE:
Press the «OFFS» key.

The *Machine ON* LED extinguishes.

The machine is ready for further operation. The machine can be started again.

3. Switch off and lock out the power supply disconnecting device.

The machine is switched off and disconnected from the main power supply. The *Controller ON* LED extinguishes.

Switching off in an emergency

- Press the «EMERGENCY STOP» button.

The «EMERGENCY STOP» pushbutton remains latched in.

The compressor is vented and prevented from re-starting.

Starting again after an emergency stop

1. Turn the «EMERGENCY STOP» button in the direction of the arrow to unlatch it.
2. Acknowledge any existing alarm messages.
3. Switches the machine on.

8.1.3 Switching Off in an Emergency and Switching On again

The EMERGENCY STOP pushbutton is located below the control panel.

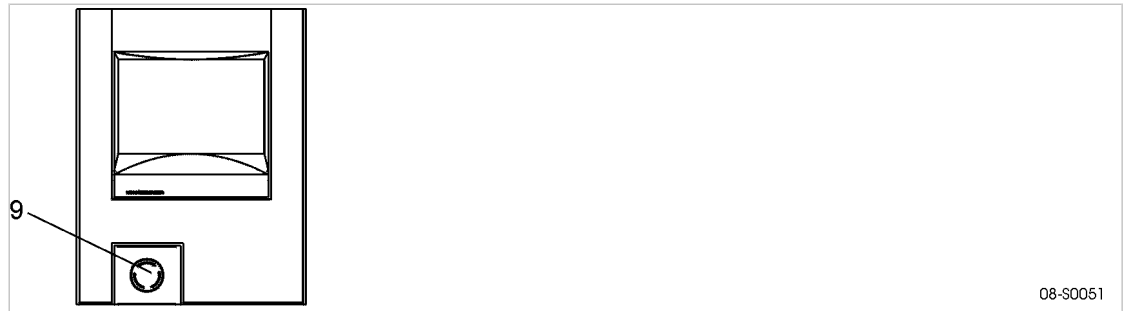


Fig. 13 Switching off in an emergency

⑨ EMERGENCY STOP pushbutton

Shutdown

- Press the EMERGENCY STOP pushbutton.
The pushbutton remains latched in.
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 pushbutton in the direction of the arrow to unlatch it.
2. Press the reset key to reset any alarm messages.
The machine can now be started again.

8.1.4 Switching on and off from a remote control center

When remote control is activated, the machine can be switched on and off from a remote point. However, the «OFF» key has always priority.

The machine can be locally controlled even though remote control is activated.

- The machine can be switched off locally.
- If the machine is switched off locally with the «OFF» key, it cannot be remotely restarted.
- The «ON» key reactivates remote control.

Precondition A link to the remote control center exists.
The «remote control» key is activated.

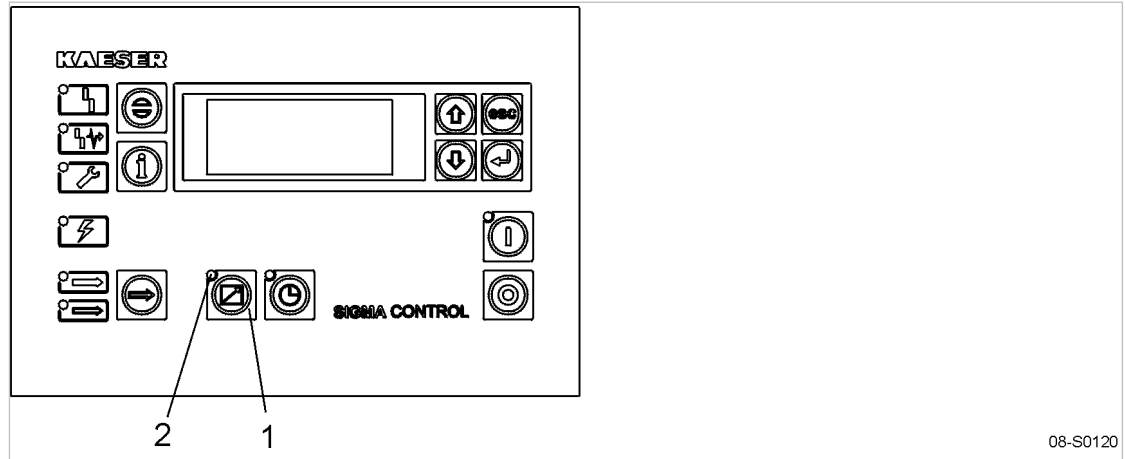


Fig. 14 Switching on and off from a remote control center

- ① «Remote control» key
- ② *Remote control*/LED

➤ Press the «remote control» key.

Result The *remote control*/LED lights. The machine can be remotely controlled.

Further information Further information on activating remote control can be found in chapter 7.4.3..

8.1.5 Switching on and off with the clock

When the clock is activated, the machine can be switched on and off on a time basis. However, the «OFF» key has always priority.

The machine can be locally controlled even though a clock program is running.

- The machine can be switched off locally.
- If the machine is switched off locally with the «OFF» key, it cannot be restarted by the clock program.
- The «ON» key reactivates the clock program.

Precondition The clock is programmed.
The «clock» key is activated.

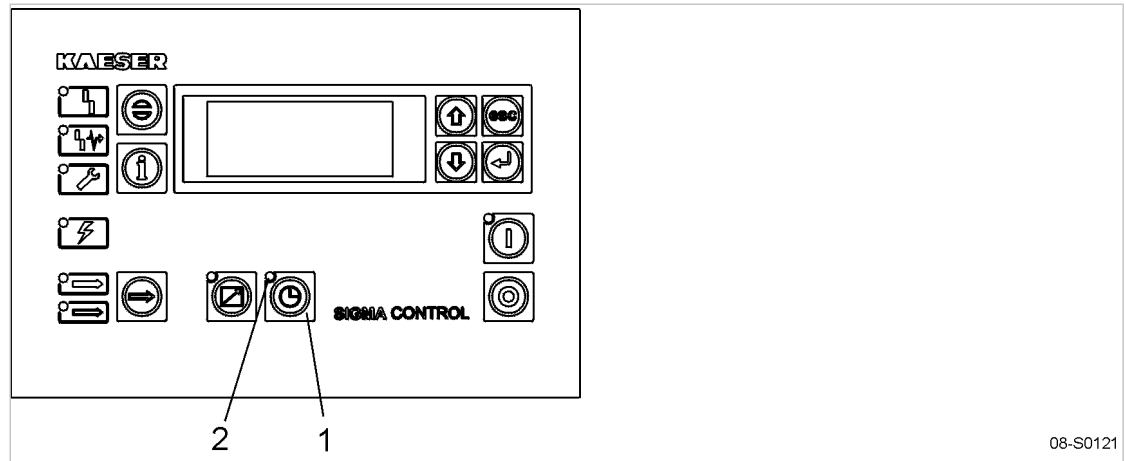


Fig. 15 Switching on and off with the clock

- ① «Clock» key
- ② *clock* LED

➤ Press the «clock» key.

Result The *clock* LED lights. The machine is switched on and off by the clock.

Further information Further information on activating the clock can be found in chapter 7.4.1..

8.2 Acknowledging alarm and warning messages

Messages are displayed on the "new value" principle:

- Message received: LED flashes
- Message acknowledged: LED lights
- Message gone: LED extinguished

or

- Message received: LED flashes
- Message gone: LED flashes
- Message reset: LED extinguished

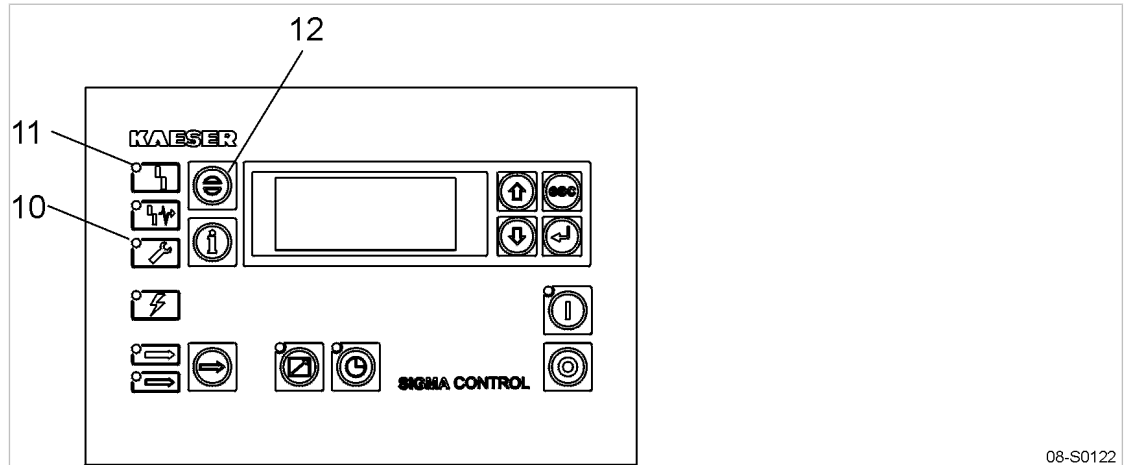


Fig. 16 Acknowledging messages

- 10 Warning LED (yellow)
- 11 Alarm LED (red)
- 12 «Acknowledge» key

Alarm message

An alarm shuts the machine down automatically. The red LED *alarm* flashes. The last line in the display shows the actual fault causing the alarm.

Precondition The fault has been rectified

- Acknowledge the message with the «acknowledge» key. *alarm* LED extinguishes. The machine is ready for operation again.



- If the machine has been shut down with the «EMERGENCY STOP» pushbutton:
 - Unlatch the «EMERGENCY STOP» pushbutton (turn in direction of the arrow) before acknowledging the alarm message.

Further information A list of possible alarm messages occurring during operation are shown in section 9.2.

Warning message

If maintenance work is to be carried out or if the warning is displayed before an alarm, the yellow *warning* LED flashes. The last line in the display shows the warning message.

Precondition The danger of an alarm is passed, maintenance has been carried out.

- Acknowledge the message with the «acknowledge» key. The *warning* LED extinguishes.

Further information A list of possible warning messages occurring during operation are shown in section 9.3.

8.3 Displaying the current operating mode

The operating mode is displayed in 4 segments (example):

On/off switching via	Machine state	LOAD control via	State of the LOAD control
key	ON	p1	empty

Tab. 48 Operating mode display

- Press the «DOWN» key once to display the current operating mode.

```
88 psig      176 °F
idle
- - - - -
key- ON|p1-empty
```

ON key pressed; system setpoint pressure p1 ; machine in idle.

Abbreviation of operating modes

Segment	Indication	Meaning
On/off switching via	key	«ON» key on the control panel
	clk	Internal clock
	RC	Remote contact (external LOAD signal)
	RB	Remote bus (external bus signal)
	cRC	Clock or remote contact (external LOAD signal)
	hdy	Holidays (see chapter 7.4.2)
Machine state	ON	Switched on
	OFF	Switched off
	alm	Alarm There is a fault registered
LOAD control via	p1	System setpoint pressure p1
	p2	System setpoint pressure p2
	pE	Raised system pressure pE (at a dubious LOAD signal)
	RC	Remote contact (external LOAD signal)
	RB	Remote bus (external bus signal)
State of the LOAD control	empty	IDLE
	load	LOAD
	hdy	Drive motor off and machine ready to operate Drive motor started with air demand
	OFF	Drive motor is off

Tab. 49 Displaying possible operating modes

8.4 Adjusting working pressure

- Adjust the pressure parameter to suit the compressor and application.

Further information A detailed explanation of all pressure parameter settings is given in chapter 7.3.

8.5 Displaying messages

The following information can be called up in the *< status > messages >* menu option:

- The event information memory stores the last 100 events, these include alarm and warning messages.
- Last alarm
- Last warning
- Number of currently registered alarms

The information (message) is shown in three lines of the display.

- Line 2:
message type — message status — time of message
- Line 3:
date of the message
- Line 4:
message text

Message type and status are shown abbreviated.

Segment	Indication	Meaning
Time	16:10:31 (example)	Time
Message status	c	Message has come
	g	Message gone
	a	Message acknowledged (reset)
Type of message	W	Warning/service message
	S	Alarm message

Tab. 50 Message abbreviations

8.5.1 Selecting menu status > messages

1. In the main menu, keep on pressing the «DOWN» key until *status* appears in the third line of the display.
2. Press «Enter».
messages appears in the display.
3. Press «Enter».
event info (event memory) appears in the display.

Displaying event information

1. Press «Enter».
The last registered message is displayed. The messages are displayed chronologically in the order in which they occur.
2. Scroll through past events with the «DOWN» key and back to the current message with the «UP» key.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the last alarm

Precondition Menu *<status > messages>* is selected.

1. Keep pressing the «DOWN» key until *last alarm* appears in the third line of the display.
2. Press «Enter».
The last alarm message is displayed.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the last warning

Precondition Menu *<status > messages>* is selected.

1. Keep pressing the «DOWN» key until *last warning* appears in the third line of the display.
2. Press «Enter».
The last warning message is displayed.
3. Press the «Escape» key as often as necessary to return to the main menu.

Displaying the number of current alarms or warnings

Precondition Menu option *< status > messages >* is selected.

1. Keep on pressing the «DOWN» key until the number of current alarms and warnings appears.
2. Press the «Escape» key as often as necessary to return to the main menu.

8.6 Status data displaying, resetting and printing

The following information can be called up in the *< status > statistics >* menu option:

- Machine duty cycle (relationship between load hours and overall operating hours) as a percentage and from a defined day and in the case of SFC machines, depending on frequency.
- Maximum and minimum network pressure and internal pressure.
- Motor starts as from a defined day and the total number of starts.
- Motor starts per day and per hour.
- Last run under load, last run in idle, last motor stop

The status data can be displayed with the «DOWN» and «UP» keys.

Resetting status data

Some status data can be reset. The value displayed is deleted and evaluated anew from the time of the reset.

- Machine duty cycle as from a defined day
- Maximum and minimum network pressure and internal pressure.
- Motor starts as from a specified day.

8.6.1 Displaying and resetting machine duty cycle

1. In the main menu, keep on pressing the «DOWN» key until *status* appears in the third line of the display.
2. Press «Enter».
3. Press the «DOWN» key once.

4. Press «Enter».

Status data are displayed, starting with machine duty cycle.

```
88 psig      176 °F
duty cycle
* total 85.2%
load # # # %
```

Duty cycle as from initial commissioning of the machine.
Duty cycle of the frequency converter.

Resetting

Precondition Password level 4 is activated.

1. Keep pressing the «DOWN» key until *reset: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears in the third line.
3. Use the «UP» key to select *y* and confirm with «Enter».
The current date is taken as the starting day. The duty cycle is evaluated as from the new starting day.
4. Press the «Escape» key as often as necessary to return to the main menu.

Further information Information on the best machine duty cycle with the optimum control mode is found in chapter 8.15.

8.6.2 Further status data displaying and resetting

1. Press the «DOWN» key in menu option *< status > statistics >* to display the following status data:
 - Duty cycle from a specified day
 - press.act.value pNloc
 - max: maximum network pressure since last reset
 - min: minimum network pressure since last reset
 - internal press.
 - max: maximum internal pressure since reset
 - motor starts
 - Total number of motor starts
 - Number of motor starts since last reset
 - motor starts /d
 - Max. ___ : permissible motor starts per day (this is specific to the machine)
 - Number of starts recorded over the last 24 hours
 - motor starts /h
 - Max. ___ : permissible motor starts per hour (this is specific to the machine)
 - Number of starts recorded over the last 60 minutes
 - motor starts T↓
 - number of detected motor starts below the minimum temperature
 - last load run
 - Date and time of the last changeover from LOAD to IDLE.
 - last load run
 - Date and time of the last changeover from IDLE to LOAD.
 - motor OFF
 - Date and the date of the last switch-off or the last changeover from IDLE to "ready for operation".
2. Proceed as detailed in the previous section to carry out a reset.
3. Press the «Escape» key as often as necessary to return to the main menu.

8.6.3 Change the number of motor starts

The number of motor starts to date can be changed, e.g. in the case of a motor exchange.

Precondition Password level 4 is activated.

1. In the menu *< status > statistics >*, keep pressing the «DOWN» key until *motor starts* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» or «UP» key to set the required value and confirm with «Enter».
4. Press the «Escape» key as often as necessary to return to the main menu.

8.6.4 Transferring event information or set-up data to a PC

A requirement for data transfer is an online PC. Setting up the interface is described in chapter 7.8.

Precondition Password level 4 is activated, the interface is configured and a PC is connected to the serial interface.

1. In the main menu, keep pressing the «UP» key until *communication* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *data → PC* appears in the third line of the display.
4. Press «Enter».
5. Keep pressing the «DOWN» or «UP» key until *event info* or *settings* appears in the third line of the display.
6. Press «Enter».

Result The data transfer starts. When the transfer is completed, the display changes back to (inactive).

8.6.5 Overview of important settings

This menu option is a summary presentation of the most important settings likely to appear at various points in the menu tree.

- Always take notice of the most important setting concerning pressure control and operating modes.
 - Pressure control
 - Current cut-out pressure
 - Current system setpoint pressure
 - Current system setpoint pressure
 - Operating modes
 - Compressor ON
 - Load control
 - Control mode
 - Acknowledgement

8.7 Displaying analog data

In the menu *< analog data >* the following information can be called up (inputs marked * are optional or dependant on machine model):

- Current local system pressure (pNloc)
- Current external system pressure (pNext)*
- Current internal pressure (pi)*
- Current cut-out pressure (p1 or p2) switching point and switching differential
- Pressure drop over the oil separator (dp)*
- Airend discharge temperature (ADT)
- Airend discharge temperature before start
- Rate of rise of the airend discharge temperature (dT/dt).
- Package discharge temperature*
- Variable frequency drive speed*
- analog output*
- Pressure drop across air filter (air filter dp)*

- Cooling water temperature (WC temperature)*
- Motor temperature (motor temp.)*
- Pressure drop across oil filter (oil filter dp)*

The data for actual pressure can be displayed in `< configuration > press. settings > press.act.value >`.

Displaying analog data

Precondition Password level 4 is activated.

1. In the main menu, keep pressing the «DOWN» key until *analog data* appears in the third line of the display.
2. Press «Enter».
All the compressor's analog data are displayed.

```
88 psig      176 °F
system pressure
pNloc  94 psig      Local system pressure
...
```

3. Scroll with the «DOWN» key to display further analog data.
4. Scroll with the «UP» key to display own analog data.
5. Press the «Escape» key as often as necessary to return to the main menu.

8.8 Displaying operating data

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

- Operating hours
 - Compressor run: Total machine running hours
 - On-load: Machine on-load running time
 - Motor: Motor running time (can be changed)
 - Airend: Airend running time (can be changed)
 - SIGMA CONTROL: Controller's hours of operation
 - Modulating valve: the number of hours the valve has operated
- Load valve: the number of hours the valve has been switched on
- Machine power consumption (according to version)

Displaying operating data

1. In the main menu, keep on pressing the «DOWN» key until *operating data* appears in the third line of the display.
2. Press «Enter».
operating hours appears in the display.
3. Press «Enter» to display the total machine operating hours
or
press «DOWN» to scroll down to display the load valve switching frequency or the energy consumption of the machine.

Changing the operating hours

The motor and airend running times can be changed, e.g. in the case of an exchanged motor.

Precondition Password level 4 is activated.

1. In the main menu, keep pressing the «DOWN» key until *operating data* appears in the third line of the display.
2. Press «Enter».
operating hours appears in the display.
3. Press «Enter».
4. Keep pressing the «DOWN» key until *motor* (or *airend*) appears in the third line of the display.
5. Press «Enter».
6. Use the «DOWN» or «UP» key to set the required value and confirm with «Enter».
7. Press the «Escape» key as often as necessary to return to the main menu.

8.9 MICROMASTER: Display parameter/messages on the frequency converter

The MICROMASTER frequency converter is switched off together with the compressor. Display of parameters or messages on the frequency converter is no longer possible.

The frequency converter is provided with power by the *< servicemode >* function. You can read out parameters or messages on the frequency converter without starting the compressor.



The compressor cannot be started while *< servicemode >* is selected.

Precondition Password level 4 is activated.
Machine switched off («OFF» key)

Switching on the servicemode function

1. Select *< components > motor > power switching >*.
2. Keep pressing the «DOWN» key until ** SFC USS MM* appears in the third line of the display.
3. Press «Enter».
servicemode and *K1M OFF* appear in the display.
4. Press «Enter».
5. Press the «UP» or «DOWN» key to set the value to *K1M ON*.
The warning message *FC MM service* appears and the frequency converter is supplied with power.

Switching off the servicemode function

1. Set *K1M OFF* or
2. press the «EMERGENCY STOP» button.

8.10 Resetting maintenance interval counters

Maintenance interval counters indicate the operating hours between maintenance tasks. The remaining hours in the respective maintenance interval counter can be individually reset.

The controller registers the maintenance intervals for the following components:

- Oil filter and oil separator
- Oil change
- Air filter
- Maintenance: coupling or belt tension
- Re-greasing the bearings of the compressor drive motor and the fan motor
- Compressor drive motor bearing change
- Fan motor bearing change
- Valve
- Electrical equipment

Overview

Proceed as follows to reset a maintenance interval counter:

- If not activated, enter password for level 4.
- Select menu *< maintenance >*.
- Resetting maintenance interval counters

Precondition Maintenance carried out,
service message acknowledged,
password level 4 activated.

Select menu maintenance.

1. In the main menu, keep on pressing the «DOWN» key until *< maintenance >* appears in the third line of the display.
2. Press «Enter».
A maintenance interval counter is shown.

```
88 psig      176 °F
oil filter
6000 h | 0150 h ↵
reset: n
```

Name of the maintenance interval counter.
Preset interval / remaining hours to maintenance.

3. Keep pressing the «UP» or «DOWN» key until the component to be maintained appears in the second line of the display.

Resetting maintenance interval counters

1. Press the «DOWN» key.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» key to select *y* and confirm with «Enter».
The remaining interval hours now changes to the default interval and the reset display changes from *y* to *n*.
4. Press the «Escape» key as often as necessary to return to the main menu.

8.11 Setting the maintenance interval

Overview

Proceed as follows to set a maintenance interval:

- If not activated, enter password for level 4.
- Select menu *< maintenance >*.
- Changing the maintenance interval

Precondition Password level 4 is activated.

Select menu *maintenance > maintenance interval counter*

1. In the main menu, keep pressing the «DOWN» key until *< maintenance >* appears in the third line of the display.
2. Press «Enter».
The maintenance interval hours are shown.

```
88 psig      176 °F
oil filter
6000 h | 0150 h ↵
reset: n
```

Name of the maintenance interval counter.
Preset interval / remaining hours to maintenance.

3. Keep pressing the «UP» or «DOWN» key until the component indication appears in the second line of the display.

Changing the maintenance interval



Setting 0: maintenance interval counter is deactivated.

1. Press «Enter».
An inverse cursor appears.
2. Press «UP» or «DOWN» briefly to change single hours
or
hold down the «UP» or «DOWN» keys to change in blocks of 10, 100 or 1000 hours.
3. Confirm the interval with «Enter».
4. Press the «Escape» key as often as necessary to return to the main menu.

8.12 Acknowledging annual maintenance message

The *annual maint* annual maintenance message serves as a reminder of maintenance work and is not related to actual machine operating hours.

The controller stores the actual data (time stamp) 100 hours after initial machine commissioning.

The message *annual maint* appears if no maintenance has been carried out by the same date the following year or none of the maintenance interval counters listed below have been reset:

- Oil filter
- Oil separator
- Oil change
- Air filter

- To acknowledge the message, proceed as described in chapter 8.10.
The controller stores the current date and starts the next annual interval.

8.13 Checking the pressure relief valve

Overview

- Preparation for the test
- Carrying out the check
- Correct conclusion of the test



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

Depending on available measured values, the internal pressure p_i or system pressure p_N are used for the check.

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



CAUTION

Danger of injury from pressurized components

- The instructions listed below must be followed without fail.

Preparation for the test

1. Note the opening pressure (or 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. Activate password level 4 in the controller (see section 7.2.3).
5. From the main menu, keep pressing the «UP» key until *machine test* appears in the third line of the display.
6. Press «Enter».
TÜV check appears in the display.
7. Press «Enter».

```
88 psig      176 °F
TÜV check
relief valve: n ←
pRV: 232 psig
```

activating pressure of pressure relief valve (example)

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

Carrying out the check

1. Use the «UP» key to select the value y and confirm with «Enter».
The check mode is now activated. Monitoring of internal pressure and system setpoint pressure is deactivated.

2. Press the «DOWN» key once to display the internal pressure

```
88 psig      176 °F
relief valve: y
pRV: 232 psig
pi: 36 psig
```

activating pressure of the pressure relief valve
 actual internal pressure

3. Press and hold the «ON» key.

The machine switches to load, the machine's internal pressure p_i rises.

4. Observe the displayed pressure rise p_i during the check.
5. If the pressure p_i increases to more than 10 % above the correct opening pressure of the pressure relief valve, shut down the machine with the «OFF» key and change the valve.



If the alarm message $pRV \neq$ appears, the pressure relief valve is defective. The permissible internal pressure was exceeded by 29 psi.

- Have the pressure relief valve replaced by an authorized KAESER Service Technician.



Avoid oil mist:

- Release the «ON» key as soon as the pressure relief valve opens to minimize oil mist blow off.

Correct conclusion of the test

1. Press the «UP» key once.
2. Press «Enter».
An inverse cursor appears.
3. Use the «DOWN» key to set the value n and confirm with «Enter».
The "pressure relief valve" check mode is de-activated and the test ended.
4. Press the «Escape» key as often as necessary to return to the main menu.
5. Open the shut-off valve from the machine again.

Result The machine is ready for operation.

8.14 Checking the temperature sensor and overheating shutdown function

The machine should shut down if the airend discharge temperature (ADT) reaches 230 °F. A higher temperature is simulated to check this function. For this, it is necessary to determine and enter an offset value.

During the check mode, this offset value is added to the actual airend discharge temperature to cause the machine to shut down prematurely.

Overview

- Ascertain and enter the offset
- Shut down the machine and allow to cool down slightly
- Carrying out the check
- Correct conclusion of the test

Ascertaining offset

1. Read off the airend discharge temperature under load (normal working temperature) (first line of the display, e.g.: 176 °F)
2. Calculate offset:
Offset = 230 °F – indicated airend discharge temperature
(e.g.: Offset = 54 °F at 176 °F airend discharge temperature)
3. Shut down the machine with the «OFF» key
4. Watch the first line of the display and wait until the airend discharge temperature has dropped by about 9 °F.

Setting the offset

1. Activate password level 4 in the controller (see section 7.2.3).
2. From the main menu, keep pressing the «UP» key until *machine test* appears in the third line of the display.
3. Press «Enter».
TÜV check appears in the display.
4. Press «Enter».
5. Keep pressing the «DOWN» key until the following is displayed:

```
88 psig      176 °F
ADT-alarm: n
offset: 104 °F ↵      offset value setpoint (example)
ADT □:  32 °F
```

6. Press «Enter».
An inverse cursor appears.
7. Use the «DOWN» key or the «UP» key to enter the calculated offset and confirm by pressing «Enter».

Carrying out the check

Precondition Machine cooled down by approx. 9 °F

1. In the main menu, keep pressing the «UP» key until *ADT alarm: n* appears in the third line of the display.
2. Press «Enter».
An inverse cursor appears.
3. Use the «UP» key to select the value *y* and confirm with «Enter».
The "overheating shutdown" check mode is activated.
4. Press the «DOWN» key once to display the airend discharge temperature + offset:

```
88 psig      163 °F      Fallen airend discharge temperature (163 °F)
ADT-alarm: y      Overheating shutdown
offset: 86 °F ↵      offset value setpoint (example)
ADT □:  217 °F      Airend discharge temperature + offset
```

5. Press the «ON» key to switch the machine to LOAD.
The machine switches to LOAD and the airend discharge temperature rises again.
As soon as a value ADT of 230 °F is reached, the machine shuts down and an alarm is activated.



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».
2. Reset the offset to 104 °F and confirm with «Enter».
3. In the main menu, keep pressing the «UP» key until *ADT alarm: y* appears in the third line of the display.
4. Press «Enter».
5. Use the «UP» key to select the value *n* and confirm with «Enter».
The "overheating shutdown" check mode is de-activated and the test ended.
6. Press the «Escape» key as often as necessary to return to the main menu.

8.15 Determining the optimal control mode

Depending on operating conditions, one of the four control modes, DUAL, VARIO, QUADRO or DYNAMIC can be selected for the most economical compressor duty cycle (relationship between hours on load to total operating hours).

1. Enter password for level 4.
2. Reset *duty cycle* in the menu *< statistics >*. (see section 8.6)
3. Select a control mode in the *< configuration >* menu option. (see section 7.5)
4. Operate the machine for an extended period (at least one month or longer).
5. Note the value *duty cycle* then reset again.
6. Repeat the test with each of the other control modes.
7. Compare the duty cycle results of each of the control modes and settle for the mode with the best result.

9 Fault Recognition and Rectification

9.1 Basic instructions

The following tables are intended to assist in locating faults.

There are 2 types of fault:

- Alarm: red LED flashes - see chapter 9.2.
- Warning: yellow LED lights- see chapter 9.3.

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

1. Do not attempt fault rectification measures other than those given in this manual.
2. In all other cases,
have the fault rectified by an authorized KAESER Service Technician.

9.2 Alarm messages (machine stop)

Message	Possible cause	Remedy
blowoff prot. ‡	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.
AI1 open cct. AI2 open cct.	Analog input open circuit. Short to earth.	Check line and connections.
AI1 short cct. AI2 short cct.	The connection between the sensor and the analog input is shorted.	Check line and connections.
AI3/AI4 error	Line-break between the analog input and the sensor. Short circuit to earth.	Check line and connections.
AI5 open cct. AI6 open cct.	Analog input open circuit. Short to earth.	Check line and connections.
AI5 short cct. AI6 short cct.	The connection between the sensor and the analog input is shorted.	Check line and connections.
AI7/AI8 error	Line-break between the analog input and the sensor. Short circuit to earth.	Check line and connections.
model	Compressor model uncertain	Call KAESER Service.
PD T‡	Package discharge (PD) temperature too high.	Check the cooling oil level. Clean the cooler. Check the fan motor.
PD T‡	Package discharge (PD) temperature too low.	Call KAESER Service.
DO0.6/DO0.7 I‡	Short circuit in the line between the digital output and the consumer.	Check line and connections.
DO1.6/DO1.7 I‡	Short circuit in the line between the digital output and the consumer.	Check line and connections.

9 Fault Recognition and Rectification

9.2 Alarm messages (machine stop)

Message	Possible cause	Remedy
airend rotation	The drive motor is turning in the wrong direction.	Changeover phase lines L1 and L2.
error: RS485-USS	Fault in the data transfer with USS protocol (RS485) between the SIGMA CONTROL and the frequency converter.	Cable between the SIGMA CONTROL and the frequency converter. Check the cable shielding.
ext. message 0 ext. message 1 ext. message 2 ext. message 3 ext. message 4 ext. message 5	Customer specific: component connected reports a fault	Remove the fault in the connected component.
FC	Frequency converter faulty.	Call KAESER Service.
back press. run	Drive belts or coupling broken.	Drive belts: Replace drive belts. Coupling: Call KAESER Service.
back press. stop	Back pressure in the oil separator tank caused by defective venting.	Check venting line.
HT cell	Fault in the high tension cell.	Call KAESER Service.
no press.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-belts Call KAESER Service.
comp. T ‡	Thermostatic valve defective	Call KAESER Service.
condensatedrain	The condensate drain is defective.	Refrigeration dryer: check condensate drainage.
RD condens.drain	Refrigeration dryer: The condensate drain is defective.	Refrigeration dryer Check the condensate drain.
RD 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.
RD p ‡	Refrigeration dryer: refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	Call KAESER Service.
RD T ‡	Refrigeration dryer: Compressed air temperature too low.	Call KAESER Service.
WC water volume	Cooling water pressure is too low.	Check cooling water supply. Cooling water stop valve: Check open/closed.
WC	–	–

Message	Possible cause	Remedy
fan M2 I †	Overload shut-down of the first fan motor.	Investigate cause of shut-down. Reset overload protection cut-out. Call KAESER Service.
fan M3 I †	Overload shut-down of the second fan motor.	Investigate cause of shut-down. Reset overload protection cut-out. Call KAESER Service.
fan M4 I †	Overload shut-down of the third fan motor.	Investigate cause of shut-down. Reset overload protection cut-out. Call KAESER Service.
fan M7 I †	Overload shut-down of the control cabinet fan motor.	Investigate cause of shut-down. Call KAESER Service.
motor bearings	Drive motor bearings overheated.	Re-grease the motor bearings. Call KAESER Service.
motor I †	Overload shut-down of the compressor drive motor.	Investigate cause of shut-down. Change the oil separator cartridge. Call KAESER Service.
motor T †	Compressor drive motor overheated.	Clean the motor. Keep ambient conditions within specified limits.
mains cont. off?	Main contactor not dropping out.	Check main contactor and wiring.
mains cont. on?	Main contactor not pulling in.	Check main contactor and wiring.
mains voltage ‡	Second power failure.	Check power supply voltage. Check the door interlock switch.
mains monitor	Fault in main power supply.	Have the main power supply checked.
emergency stop	EMERGENCY STOP pushbutton pressed.	Unlatch the pushbutton.
OS dp †	Oil separator cartridge clogged.	Change the oil separator cartridge.
OS T †	Maximum air temperature at the oil separator tank outlet is exceeded.	Check the line to the trip relay.
oil p †	The machine cannot switch to LOAD until the minimum oil pressure is reached.	Check the oil circulation. Check the pressure switch, line and connection.
p-switch	Customer specific: no details possible.	–
pRV †	The activating pressure of the pressure relief valve on the oil separator tank has been exceeded.	Change the pressure relief valve.
oil content ‡	The oil content limit for pure air has been exceeded.	Change the oil separator cartridge.

Message	Possible cause	Remedy
Sigma Control T ‡	The maximum permissible SIGMA CONTROL housing temperature has been exceeded.	Keep ambient conditions within specified limits. Control cabinet: Check filter mats and fan.
softstart	Fault in the soft start equipment.	Call KAESER Service.
start T ‡	Airend discharge temperature (ADT) too low. Ambient temperature <+37°F	Keep ambient conditions within specified limits.
T-switch	Customer specific: no details possible.	–
ADT dT/dt ‡	The rate of rise of the airend discharge temperature (ADT) is too fast.	Check the cooling oil level. Call KAESER Service.
ADT ‡	Maximum permissible airend discharge temperature (ADT) exceeded.	Keep ambient conditions within specified limits. Clean the cooler. Check the cooling oil level.
access doors	Door open / interlocked panel removed while the machine is running.	Fit and secure all panels and close access doors.

Tab. 51 Alarm messages and measures

9.3 Warning messages (yellow LED lights)

Message	Possible cause	Remedy
blowoff prot. ↑	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.
bus alarm	The bus link from the Profibus DP interface is interrupted.	Check bus highway and plug.
PD T ↑	Compressed air discharge temperature too high.	Clean the cooler. Check the cooling oil level.
PD T ↓	Package discharge (PD) temperature too low.	Call KAESER Service.
DO test	The 'controller outputs' test function is activated.	Stop the 'controller output' mode.
restart inhibit	Too frequent manual on and off switching.	Do not exceed the maximum number of motor switchings per hour when manual on/off switching.
elect. equip. h ‡	The maintenance interval for checking electrical equipment and wiring has expired.	Carry out the check and reset the maintenance interval counter.
error: FEPRM	Internal controller memory error.	Call KAESER Service.
error: RAM	Internal RAM defective.	Call KAESER Service.

Message	Possible cause	Remedy
error: RS485-PP	Wrong configuration or transmission error.	Check the link/interface connections between the two controllers. Check maximum cable length and screening. 1 master and 1 slave configured.
error: SMS	SMS can not be sent.	Call KAESER Service.
ext. message 0 ext. message 1 ext. message 2 ext. message 3 ext. message 4 ext. message 5	Customer specific: Connected component initiates a maintenance message.	Carry out maintenance on connected component.
FC AI1 fault	SFC machine: Network pressure sensor on AI1 defective.	Call KAESER Service.
FC MM service	SFC machine: Frequency converter service mode.	Deactivate the service mode as soon as the frequency converter settings are completed.
FC mains	SFC machine: Frequency converter power supply failed.	Check power supply.
annual maint	Last maintenance was 1 year ago.	Carry out the necessary maintenance and reset the corresponding maintenance interval counter.
no press.buildup	The compressor cannot build-up to working pressure.	Check for air leaks. Check the value for internal pressure given in the <i><analog data></i> menu against the reading on the oil separator tank pressure gauge.
comp. T ↓	The airend discharge temperature (ADT) did not reach the minimum value within the specified time.	Call KAESER Service.
condensatedrain	The condensate drain is defective.	Check the condensate drain and drain line.
RD condens.drain	Refrigeration dryer: The condensate drain is defective.	Check the condensate drain.
RD 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.
RD p↓	Refrigeration dryer: refrigerant lost; pressure in the refrigerant circuit too low. Inlet pressure switched tripped.	Call KAESER Service.

Message	Possible cause	Remedy
RD T ↑	Refrigeration dryer: Compressed air temperature too high.	Maintain operating conditions. Clean the refrigerant condenser. Clean the cooler. Install an extractor fan.
RD T ↓	Refrigeration dryer: Compressed air temperature too low.	Call KAESER Service.
bearing lube h ‡	The maintenance interval for re-greasing the bearings has expired.	Re-grease the motor bearings.
motor bearing h ‡	The maintenance interval for checking the compressor drive motor bearings has expired.	Have the motor bearings checked by an authorized KAESER Service Technician.
ext.load signal?	Uncertain external load signal: The high cut-out pressure was exceeded. The external load control has not switched to idle.	Check settings of the external controller. Take into account pressure drops across filters and dryer.
fan bearing h ‡	The maintenance interval for checking the fan motor bearings has expired.	Have the motor bearings checked by an authorized KAESER Service Technician.
air filter dp ↑	Air filter clogged.	Carry out air filter maintenance
air filter dp †	Air filter clogged.	Carry out air filter maintenance
air filter h ‡	Maintenance interval for air filter check has elapsed.	Check the air filter.
modem problem	SIGMA CONTROL does not recognise the modem.	Check the link between SIGMA CONTROL and the modem.
motor bearings	Drive motor bearing defective.	Call KAESER Service.
motor T ↑	Drive motor overheating.	Clean the motor. Keep ambient conditions within specified limits.
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 cross-section of piping between compressor and air receiver.
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 cross-section of piping between compressor and air receiver.
system press. ↑	Network pressure is above the "sys.press. high" value.	Check for air leaks. Check the 'sys.press. high' warning setting. Check if the machine switches to LOAD.
system press. ↓	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.

Message	Possible cause	Remedy
mains voltage ↓	1. Power supply failure: Machine was re-started automatically.	Check power supply. Check the door interlock switch.
OS dp ↑	The pressure drop across the oil separator cartridge has risen. Oil separator cartridge clogged.	Change the oil separator cartridge.
OS h ‡	The oil separator cartridge change interval has expired.	Change the oil separator cartridge.
oil filter dp ↑	The pressure drop across the oil filter has risen. Oil filter clogged.	Change the oil filter.
oil level ↓	Cooling oil level too low.	Top up the cooling oil.
oil T ↓	Cooling oil temperature too low.	Check temperature switch, line and connection. Check the oil circulation. Increase room temperature.
oil change h ‡	The interval for the oil change has expired.	Change the cooling oil.
oil filter h ‡	The oil filter change interval has expired.	Change the oil filter.
p-switch	Customer specific: no details possible.	–
buffer battery	Data retention battery is almost discharged.	Change the battery.
oil content ↑	The oil content limit for pure air will soon be reached.	Check the scavenge tube in the oil separator cartridge. Check the dirt trap strainer in the scavenge line. Check air treatment upstream of the measuring point.
V-belt tension	Belt tension is too low.	Re-tension drive belts.
blt.coup.insp.h ‡	The belt tension / coupling inspection interval has expired.	Carry out a visual check. Re-tension drive belts.
blt.coup.insp.h ‡	The belts/coupling change interval has expired.	Drive belts: Check drive belts. Coupling: Call KAESER Service.
start T ↓	The airend temperature is too low (< +37 °F).	Keep ambient conditions within specified limits.
start T ↓ ↓	The airend temperature is too low (<14 °F) for the machine to be operated.	Keep ambient conditions within specified limits.
T-switch	Customer specific: no details possible.	–

Message	Possible cause	Remedy
TRAP Interrupts	System message	Call KAESER Service.
valve insp. h ‡	The motor bearings checking interval has expired.	Call KAESER Service.
ADT ↑	Maximum airend discharge temperature (ADT) almost reached.	Clean the cooler. Check the cooling oil level. Replace the oil filter. Ensure adequate ventilation. Keep surrounding temperature within recommended limits.
access doors	Doors opened with the machine stopped.	Close access doors.

Tab. 52 Warning messages

10 Maintenance

10.1 Safety

Follow the instructions below to ensure safe machine maintenance.
Warning instructions are located before a potentially dangerous task.

Basic safety instructions

1. Follow the instructions in chapter 3 'Safety and Responsibility'.
2. Maintenance work may only be carried out by authorized personnel.
3. Before switching on, make sure that:
 - no personnel are working on the machine,
 - all access doors and panels are closed and secure.

Working on live components

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

Further information Details of authorized personnel are found in chapter 3.4.1.
Details of dangers and their avoidance are found in chapter 3.5.

10.2 Testing the controller

Binary inputs and outputs to and from the controller can be displayed as follows:

Precondition Password level 4 is activated.

1. In the main menu, keep on pressing the «UP» key until *machine test* appears in the third line of the display.
2. Press «Enter».

10.2.1 Displaying the status of binary inputs and outputs

The controller's binary inputs and outputs can be displayed as follows:

Precondition Password level 4 is activated.

1. In the main menu, keep on pressing the «UP» key until *machine test* appears in the third line of the display.
2. Press «Enter».

10.2.1.1 Displaying inputs

1. Keep pressing the «DOWN» key until *DI test* appears in the third line of the display.

2. Press «Enter».

The status of the inputs is shown.

```
88 psig          176 °F
-----
```

```
DI 0.76543210
```

```
10010101
```

Input address 0.7... 0.0

Status: 1 = voltage; 0 = no voltage

10.2.1.2 Displaying outputs

1. Keep pressing the «DOWN» key in the < *machine test* > menu option until *DO test:* appears in the third line of the display.
2. Press «Enter».
The status of the outputs is shown.
3. Press the «DOWN» key to display further output addresses.
4. Press the «Escape» key as often as necessary to return to the main menu.

10.2.2 Testing the LEDs on the controller

The LEDs on the controller are tested as follows:

Precondition Password level 4 is activated.

1. In the main menu, keep on pressing the «DOWN» key until *machine test* appears in the third line of the display.
2. Press «Enter».
3. Keep pressing the «DOWN» key until *lamps test:* appears in the third line of the display.
4. Press «Enter».
An inverse cursor appears.
5. Use the «UP» key to select the value *y* and confirm with «Enter».
The lamps test is now activated. All LEDs start to flash. The test ends automatically after 10 seconds.
6. Press the «Escape» key as often as necessary to return to the main menu.



Not all LEDs flash?

- Call KAESER Service.

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 inquiry and order for spares.

11.2 KAESER AIR SERVICE

KAESER AIR SERVICE offers:

- authorized service technicians with KAESER factory training,
- increased operational reliability ensured by preventive maintenance,
- energy savings achieved by avoidance of pressure losses,
- optimum conditions for operation of the compressed air system,
- the security of genuine KAESER spare parts,
- increased legal certainty as all regulations are kept to.

- Why not sign a KAESER AIR SERVICE maintenance agreement!

Result Your advantage:
lower costs and higher compressed air availability.

11.3 Service addresses

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

11.4 Displaying the version number, machine model, material number and serial number

1. From the main menu, keep pressing the «UP» key until *configuration* appears in the third line of the display.
2. Press «Enter».

```
88 psig      176 °F
general
press. settings ↵
control mode
```

3. Press the «UP» key and select menu *< general >* with «Enter».
4. Press the «DOWN» key to display the following information:

```
88 psig      176 °F
typeSX 4
PN: 7.7001.0
SN 00234567
```

Machine model
Material number
Serial number

5. For further information on hard and software, press the «UP» key and then select *version number* with «Enter».

88 psig	176 °F	
system 2.56		system version
software 82.00		Software version
hardware 0.6		hardware version

6. Press the «Escape» key as often as necessary to return to the main menu.

12 Decommissioning, Storage and Transport

12.1 De-commissioning

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

12.2 Packing

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

12.3 Storage

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

12.4 Transporting

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

12.5 Disposal

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

