

Service manual

Master controller

SIGMA AIR MANAGER BASIC ≥1.12

Number: 9_5731 01 USE

Original instructions
/KKW/CSAMB 1.00 en 01 SBA-SIGMA-AIR-MANAGER-BASIC

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1 Regarding this Document

1.1 Using this document

This service manual is part of the controller.

An outline of the keys and the menu tree is found on the last page of this service manual.

1. Keep the service manual available as long as you work with the controller.
2. Pass the manual on to the next owner/user of the controller.
3. Make sure that every subsequent modification to the controller is also entered in the service manual.

1.2 Copyright

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1.4 Symbols and markings

1.4.1 Warnings

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

- DANGER
- WARNING
- CAUTION

1. **▲ DANGER** *These show the kind of danger and its source.
The possible consequences of ignoring a warning are shown here.
The signal word "DANGER" indicates that death or severe injury can result from ignoring the warning.*
 - *The measures required to protect yourself from danger are shown here.*
2. 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. 1 The levels of danger and their meaning

1.4.2 Other instructions 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 Master Controller Data



This manual uses the SAM BASIC abbreviation for the SIGMA AIR MANAGER BASIC master controller.

- Please enter the system data of your SIGMA AIR MANAGER BASIC here:

System information	
Material number	
Serial number	
Software	

Tab. 2 System information

2.2 Connection possibility

You can connect a maximum of 4 machines for sequenced operation.

2.3 Periphery



- The analog input is permanently assigned with the system pressure.
- Every other input can be assigned with predefined functions.
- Details on assignable and assigned inputs and outputs can be found in the circuit diagrams in the annex.

Inputs and outputs	Number
Digital inputs (DI) for floating relay signals	4
Floating relay digital outputs (DO) (as changeover contact, 230 V, 3 A)	5
Analog inputs (AI) 0(4)-20 mA	1 hard-assigned for network pressure
Analog outputs (AO) (0-20 mA, load max. 300 Ω)	1

Tab. 3 Inputs and outputs

2.4 Electrical specifications

Electrical data from the master controller	
Mains voltage/phase/network frequency [V//Hz]	100–240/1/50–60
Rated current [A]	0.7–0.35
User's fusing [A]	10–16
Power cable core cross-section [mm ²]	3x1.5

Electrical data from the master controller

Equipotential bond connection [mm ²]	1x16
Degree of protection	IP54 to IEC 529

Tab. 4 Electrical data master controller

Electrical data of the buffer battery

Voltage [V]	3.6
Capacity [Ah]	1.8

Tab. 5 Electrical data buffer battery

Battery life

Without power supply [years]	3
With power supply [years]	10

Tab. 6 Buffer battery life

2.5 Hardware

2.5.1 Industrial computer

- Industrial computer with Pentium® class processor
- Analog outputs (0–20 mA)
- 230/115V relay outputs (floating contacts)
- 24V digital inputs (common negative rail)
- Internal low volts monitoring of the 24V supply
- Internal temperature monitoring
- Buffer battery for RAM and real-time clock

2.6 Software

- RMOS real-time operating system
- Controller software
- Visualization software
- Data base

2.7 Pressure transducer

Models I und II pressure transducers

Type	I	II
Measurement range [psi]	0–14.5	0– 87/145/232/290/464/ 653
Overload limit [psi]	50	double final pressure

Type	I	II
Deviation of characteristic from final value Limit setting [%]	≤ 0.5	≤ 0.5 (0.25 typical)
Air connection, male thread	G 1/2 B DIN 16288 Stainless steel	G 1/4 A DIN 3852 Stainless steel Viton seals
Rated temperature range [°F]	−4...+176	−13...+185
Rated temperature range [K]	253...353	248...358
Temperature range of medium [°F]	−22...+212	−40...+212
Temperature range of medium [K]	243...373	233...373
Storage temperature range [°F]	−40...+212	−40...+212
Storage temperature range [K]	233...373	233...373
Temperature influence / 10 K at zero [%]	± 0,2	± 0,15
Temperature influence / 10 K over the range [%]	± 0.2	± 0.15
Output signal (two-wire technique) [mA]	4–20	4–20
Power supply connection (plug to EN 175301-803)	PG 11	PG 9
Enclosure	Stainless steel	Stainless steel
Degree of protection	IP 65	IP 65
Tightening torque [Nm]	17–20	17–20

Tab. 7 Models I und II pressure transducers

Pressure transducer model III and vacuum

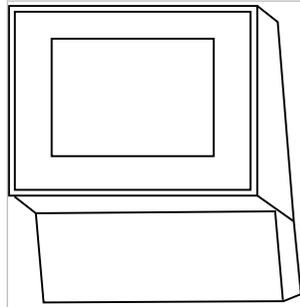
 The **Type III** pressure transducer is used for SIGMA AIR MANAGER BASIC by default.

Type	III	Vacuum screw compressors [pumps]
Measurement range [psi]	0–232	–
Measurement range, absolute [psi]	–	0–14.5
Overload limit [psi]	464	44
Deviation of characteristic from final value Limit setting [%]	≤ 1 (0.5 typical)	≤ 1 (0.5 typical)
Air connection, male thread	G 1/2 A	G 1/2 A
Air connection, male thread	G 1/8 A	G 1/8 A
Rated temperature range [°F]	−13...+176	−13...+185
Rated temperature range [K]	248...353	248...358
Temperature range of medium [°F]	−22...+212	−22...+212
Temperature range of medium [K]	243...373	243...373
Storage temperature range [°F]	−40...+212	−40...+212
Storage temperature range [K]	233...373	233...373
Temperature influence / 10 K at zero [%]	± 0.4	± 0.4
Temperature influence / 10 K over the range [%]	± 0.4	± 0.4

Type	III	Vacuum screw compressors [pumps]
Output signal (two-wire technique) [mA]	4–20	4–20
Power supply connection (plug to EN 175301-803)	PG 9	PG 9
Enclosure	Brass	Brass
Degree of protection	IP 65	IP 65
Tightening torque [Nm]	17–20	17–20

Tab. 8 Models III und vacuum pressure transducers

2.8 Control cabinet



C0200

Fig. 1 Control cabinet

Material	Sheet metal, painted RAL 7035 light-grey
Width [in]	15
Height [in]	21
Depth [in]	9
Weight [lb]	33

Tab. 9 Cabinet dimensions

3 Safety and Responsibility

3.1 Basic instructions

⚠ DANGER

Disregard of these instructions can result in serious injury.

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

The master 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,
 - Impairment of the master controller and other property.
- Therefore, observe the following:
- 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 service manual.
 - In particular, immediately rectify (have rectified) any faults that could be detrimental to safety.

3.2 Specified use



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

The master controller is intended exclusively for the operation of compressors, blowers and vacuum systems in industrial fields and may only be operated within its associated control cabinet.

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 specified use given in this manual.

3.3 Improper use



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

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

1. Adhere to the specifications in the service manual.
2. Do not allow conversions or changes.

3.4 User's responsibilities

3.4.1 Observe statutory and universally accepted regulations

- Observe relevant statutory and accepted regulations during installation, operation and maintenance of the equipment.

3.4.2 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.

Authorized operators possess the following qualifications:

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

Authorized installation and maintenance personnel have the following qualifications:

- are of legal age,
- have read, are familiar with and adhere to the safety instructions and sections of the service manual applicable to installation and maintenance,
- are fully conversant with the safety concepts and regulations of electrical and compressed air engineering,
- are able to recognize the possible dangers of electrical and compressed air devices and take appropriate measures to safeguard persons and property,
- they have received adequate training in and authorization for the safe installation and maintenance of this master controller.

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

3.5 Dangers

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

- Take full heed of all safety instructions.

3.5.1 Safely dealing with sources of danger

Electricity

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



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

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

3.5.2 Using the master controller safely

Pay attention to the following points to avoid damage to the master controller:

- Do not remove any plugs on the master controller while the compressed air system is in operation.
- Operate the master controller only when all supplies are connected.
- Never modify, bypass or disable safety devices.
- Do not remove or obliterate labels and notices.
- Use only spare parts that have been approved by the manufacturer for this master controller.

3.6 Warranty

This service manual contains no independent warranty commitment. Our general terms and conditions of business apply with regard to warranty.

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

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

Furthermore, we accept no warranty obligation for:

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

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

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

4 Design and Function

4.1 Overview

The SIGMA AIR MANAGER BASIC master controller is designed for the control of compressor air systems with several compressors. The master controller reacts flexibly to fluctuating compressed air demand, so reducing energy consumption. In addition, it allows the use of various monitoring functions.

The master controller consists of the following components:

- The central pressure transducer measures the pressure in the air main and passes the value on to the arithmetical unit.
- The arithmetical unit decides according to default parameters, which machines are switched to load to keep the system pressure constant.
- The display and control panel gives information on actual pressure and other parameters and offers various possibilities for individual settings.

4.2 The Operating Panel

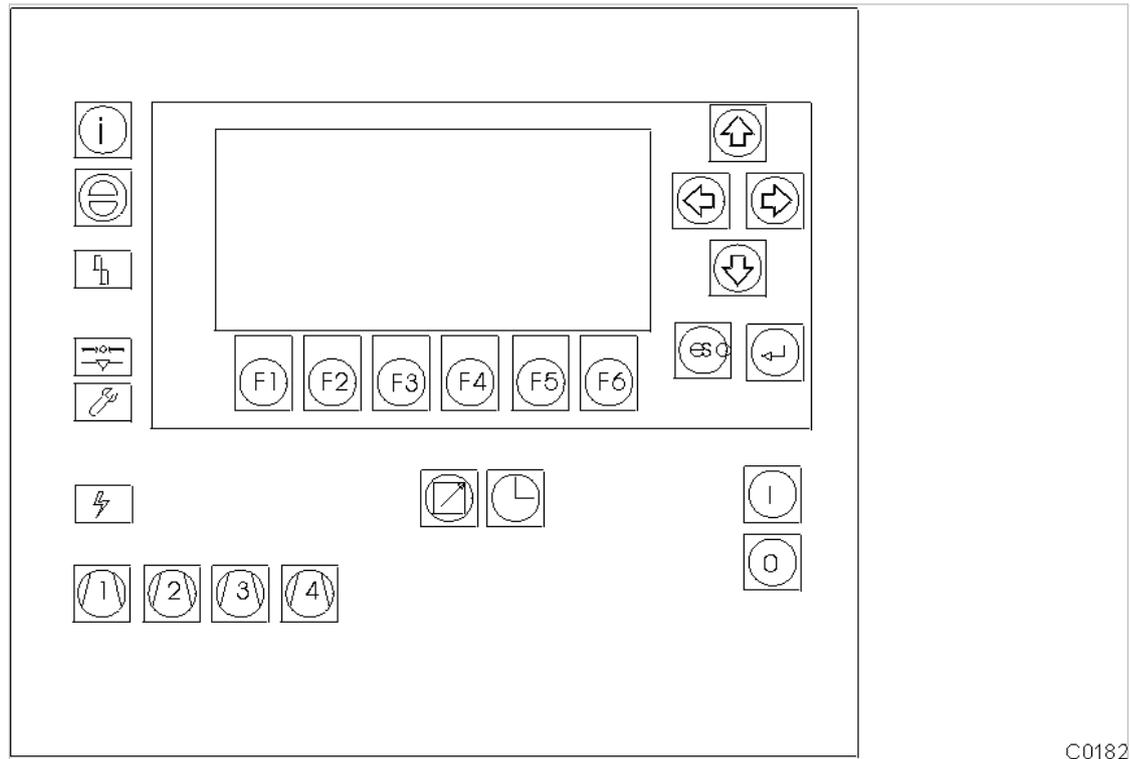
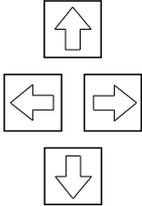


Fig. 2 SAM BASIC control panel

C0182

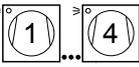
4.2.1 Table showing the function keys

Symbol	Key	Function
	«Arrow keys»	Move the cursor (depending on operational situation either field-wise or entry-wise to the left, right, up or down).
	«Escape»	Jump back to the next higher menu level. Exit edit mode without saving the edited parameter.
	«Enter»	Exit edit mode saving the edited parameter.
	«ON»	Switch on the compressor air system.
	«OFF»	Switch off the compressor air system (no compressed air supplied).
	«Clock»	Switch the clock on or off
	«Remote »	Switch the compressor air system on or off from a control system.
	«Machine selection»	Delete from or add individual machines to the selection.
	«Function buttons»	Select displayed functions.
	«Acknowledgement (reset)»	Confirm messages and reset the event memory (if permissible).
	«Information»	Display help and explanatory text.

Tab. 10 Function buttons

4.2.2 Table of Light Emitting Diodes

Symbol	Description	Meaning
	Air System ON	The air station is switched on.
	Clock mode ON	The air station is controlled by the shift clock.
	Remote mode	The air station can be controlled by a central control system.

Symbol	Description	Meaning
	Machine selection	This machine is selected (is available to the master controller).
	Fault	Flashing: Fault on an air system component. Illuminated: The alarm has been acknowledged, but the fault has not yet been removed.
	Minimum pressure	Network pressure has fallen below the setpoint.
	Service/warning LED	Flashing: Maintenance work necessary. Illuminated: Maintenance indication acknowledged, but maintenance not yet carried out.
	Power ON	Power supply to the master controller is present.
	Help key	Additional information on the actual program function is available.

Tab. 11 Light emitting diodes

4.2.3 Display

The display is arranged as follows:

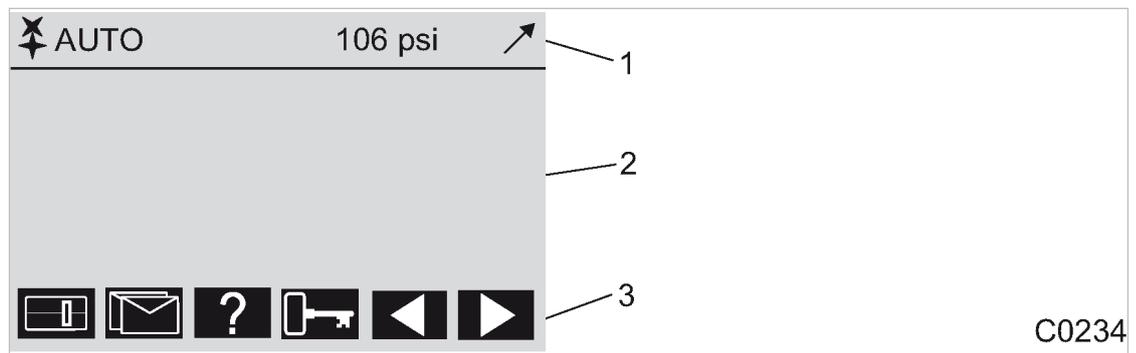


Fig. 3 Display arrangement

- ① Header
- ② Main field: machine status / message texts / settings
- ③ Menu selection footer (example)

The following information is displayed from left to right in the header ①:

- System running: represented by a rotating symbol.
- Mode: station in automatic mode, manual mode or shut down.
- Pressure indication: shows the momentary network pressure.
- Tendency: the arrow shows whether pressure is rising, is constant, or falling.

Main display area ②: depending on operational state and setup, various events and settings are shown.

Footer ③: the functions and menu options that can be called up with the keys «F1» to «F6» are shown.

4.2.4 Password protection

Access to the master controller is controlled by four levels of authority that are protected by password.

When the master controller is switched on, the lowest level of access (Level 0) is activated. In Level 0 parameters can be displayed and some of these can be edited.



The password sets itself back to Level 0 if no entries are made over a period of 5 minutes.

The level of authority required will be quoted in this manual for every function.

4.3 Menus – overview



An overview of the main menu is provided at the end of this manual.

4.3.1 Main menu level

Normally, the main menu with current information on the compressed air system is displayed. These are distributed over several display frames that can be scrolled with the «F5» and «F6» keys.

- Large type-size display of pressure
- Pressure/time diagram
- Machine overview
- Duty cycle
- Maximal, medium and minimal working pressure

See chapter 8.1 for further information on these displays.

4.3.2 Menu tree

Use the «F1» to «F4» keys to select the following menu options:

Navigation (menu)	Symbol	Sub-menu options	Chapter
«F1»: Settings		■ «F1»: System	7.2
		■ «F2»: Pressure regulation	7.4
		■ «F3»: Compressor	7.3
		■ «F4»: Compressed air system	7.6
		■ «F5»: Shift clock	7.7
		■ «F6»: Inputs and outputs	7.8
«F2»: Messages		■ «F1»: Alarms, warning and service messages	9.2
		■ «F2»: Operational Messages	8.2.1
«F3»: Choice of language		■ «F1»+«F6»: Choice of language	7.2.2
		■ «F3»: Notes	

Navigation (menu)	Symbol	Sub-menu options	Chapter
«F4»: Password		<ul style="list-style-type: none"> ■ «F1»: Log-off ■ «F2»: Password list ■ «F3»: Key lock ■ «F4»: Password allocation 	7.2.6.1 7.2.6.2 7.2.6.3 7.2.6.4

Tab. 12 Main menu

Menu options for F1 (Settings)

Menu option	Sub-menu options
«F1»: System	<ul style="list-style-type: none"> ■ «F1»: Date and time ■ «F2»: Summer / winter ■ «F3»: Country-specific setting ■ «F4»: Control panel <ul style="list-style-type: none"> ■ «F1»: Lamps test ■ «F2»: Keys test ■ «F3»: Display test ■ «F4»: Display settings ■ «F5»: System information
«F2»: Pressure regulation	
«F3»: Compressor hours	
«F4»: Compressed air system	<ul style="list-style-type: none"> ■ «F1»: Base load sequence ■ «F2»: Restart ■ «F3»: Air main charging ■ «F4»: Main pressure values ■ «F5»: Compressor type ■ «F6»: Operating mode
«F5»: Shift clock	
«F6»: Inputs and outputs	<ul style="list-style-type: none"> ■ «F1»: Digital inputs ■ «F2»: Analog input ■ «F3»: Digital outputs ■ «F4»: Analog output

Tab. 13 Menu options for settings (F1)

Menu options for Messages (F2)

Menu	Submenu
«F1»: Alarms, warning and service messages	<ul style="list-style-type: none"> ■ «F1»: Current messages ■ «F1»: Message history
«F2»: Operational Messages	<ul style="list-style-type: none"> ■ «F1»: Current messages ■ «F1»: Message history

Tab. 14 Menu options for messages (F2)

4.4 Operation and function

The master controller was designed and developed for a number of applications. Generally, most of the default settings can be kept or only have to be slightly changed.

4.4.1 Adaptive 3D control

The adaptive 3D control minimizes the energy requirements of the compressed air station by automatically adapting to the operating conditions.

It automatically adapts the selection of the compressors to be activated and deactivated as well as the cut-out and cut-in pressures for the selected compressors to the current operating conditions of the compressed air station.

4.4.2 Base load sequence

Rotary screw compressors, vacuum pumps and blowers

The controller will equally use machine of the same size. The standard for comparison is the number of operating hours. The machine with the least number of operating hours is used the most.

A total hours offset is defined to prevent compressors changing over hourly. During this period, a machine can carry on running before other machines are selected.

Piston compressors

The base load is changed in machines of the same size if a machine has run the time set in the "change after" parameter.

Further information Enter the standard of comparison for base load sequencing during commissioning (see chapter 7.3.4).

4.4.3 Standby machine

For example, if a machine is to run only as reserve machine, it can be specified as "activate – last". The machine will be only reactivate if all other available machines are running and still cannot satisfy the compressed air demand.

Further information Reserve machine assignment, see chapter 7.3.4.

4.4.4 Shift clock mode

The compressed air system can be operated from a shift clock. There are 32 switching points per week available.

Further information See chapter 7.7 for programming the clock.

4.4.5 Air main charging

After the activation of the compressed air station, the air network is charged at the specified network charging speed.

Further information Air main charging, see chapter 7.6.3.

4.4.6 EMERGENCY operation

A compressed air station can run EMERGENCY operation if each compressor has its own system pressure switch or electronic controller. This is always the case with rotary screw compressors.

Compressed air systems with rotary blowers or reciprocating air compressors may or may not have machines provided with their own system pressure switches.

Air stations comprising machines that do not contain their own system pressure switches cannot run in EMERGENCY operation. These compressed air systems cannot deliver compressed air without a master controller.

Compressed air systems with EMERGENCY mode (manual mode)

EMERGENCY mode can cause large pressure swings in the air main.

The air compressors linked to the master controller are automatically switched to emergency mode if power is lost to the master controller while it is switched on (LED Station ON), if the connection to the pressure transducer is interrupted or the master controller itself fails. The compressors then run under their internal controllers, independent of the master controller.

The machines can be manually switched to EMERGENCY operation (manual mode) for test purposes.

Compressed air systems without EMERGENCY mode capability

Without a master controller no compressed air can be delivered.

The output relays trip if power to the master controller is lost, if the connection to the pressure transducer is interrupted or the controller itself fails. This causes air compressors linked to the master controller to switch to idle or off. The compressed air system no longer delivers compressed air.

5 Installation and Operating Conditions

5.1 Surroundings

Temperature range

Ambient temperatures	
Ambient temperature	0 to 104 °F
Storage temperature	-13 to +131 °F

Tab. 15 Ambient temperatures

Note permissible ambient temperatures

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

Note storage temperature

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

5.2 Installation conditions

The master controller can be operated in general environments or in industrial environments.

- Install the master controller as appropriate.



Certain conditions for the installation location must be fulfilled:

- Free access to the control cabinet.
- Control cabinet door can be opened fully.
- Existing emergency exit paths are not blocked (even with the control cabinet door fully open).
- Protection from direct sunlight, rain, splashed water or excessive dust build up must be provided.

6 Installation

6.1 Installation

Connection	Chapter
Installing the control cabinet	See 6.4
Identifying the machines	See 6.5
Connecting the pressure transducer	See 6.6
Planning cabling	See 6.7
Laying cables	See 6.8
Lead in the cables and connect to the master controller	See 6.9
Connecting floating relay contact signals for sensors	See 6.10
Setting up the machines	See 6.11

Tab. 16 Installation

6.2 Reporting transport damage

1. **⚠ CAUTION** *Incorrect transport
Machine damage*
 - *Protect the equipment against vibration and shock.*
2. Check the master controller for visible and hidden transport damage.
3. Inform the carrier and the manufacturer in writing of any damage without delay.

6.3 Compressed air supply during installation

- Check the compressor station emergency operating characteristics.
 - See chapter 6.3.1 for stations with EMERGENCY mode.
 - See chapter 6.3.2 for stations without EMERGENCY mode.

6.3.1 Station with emergency operating mode

It is possible to install and start up the master controller without shutting down the complete air system.

⚠ DANGER

Mortal danger from electric current

- *The machine must be free of voltage before work begins.*

1. Isolate the machine from all sources of voltage.
2. Make sure the machine is voltage-free.
3. Connect the machine to the master controller see chapter 6.7 to 6.10).
4. Put the machine back into operation.
5. Repeat steps 1 to 3 for any further machines.

6. Carry out settings as detailed in chapter 7.
7. Do not switch the master controller from manual to automatic mode until these settings have been completed.

The master controller then takes over control of the machines.

Further information See chapter 4.4.6 for emergency operation.

6.3.2 Stations without emergency operating mode

The master controller is required for the supply of compressed air. The compressed air system is not operational until initial start-up of the master controller is completed.

- Switch on the compressor station after commissioning the master controller.

Further information See chapter 4.4.6 for emergency operation.

6.4 Installing the control cabinet

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



Pay attention to the following when fitting the control cabinet:

- The display must be level with the eyes to ensure good readability.
 - The fixing materials must be compatible with the type of wall and the weight of the control cabinet.
 - A template for the boreholes is to be found in the annex.
 - Pay attention to the installation conditions (see chapter 5.2)
- Mount the control cubicle on the wall.

6.5 Identifying the machines



Same model machines have to be identified as well, because the internal pressure regulation can be set differently.

- Give the machines individual numbers.

The source of alarm and service messages displayed on the master controller can be assigned to the correct machine.

Machine and controller marking when in remote mode



The machines and controller must carry a warning notice when they are in remote mode.

- Warning notice to indicate the machines.
 - WARNING: This machine is remotely controlled and can start automatically at any time.
- Warning notice to indicate the master controller.
 - Before starting, make sure that no one is working on the machines and that they can be started safely.

Place the notices so they are highly visible.

1. Place warning notices on the machine.
2. Place warning notices on the master controller.

6.6 Connecting the pressure transducer

Precondition The connection point is not under pressure.

⚠ CAUTION

*Network pressure too high
Damage to the pressure transducer*

- *Never connect the pressure transducer to a pressurized network having a maximum pressure exceeding the rated pressure of the pressure transducer.*

1. Check the maximum network pressure.
2. Check the nominal network pressure.

6.6.1 Mechanical connection

The pressure transducer graphic (illustration 4) shows the correct position for the transducer.

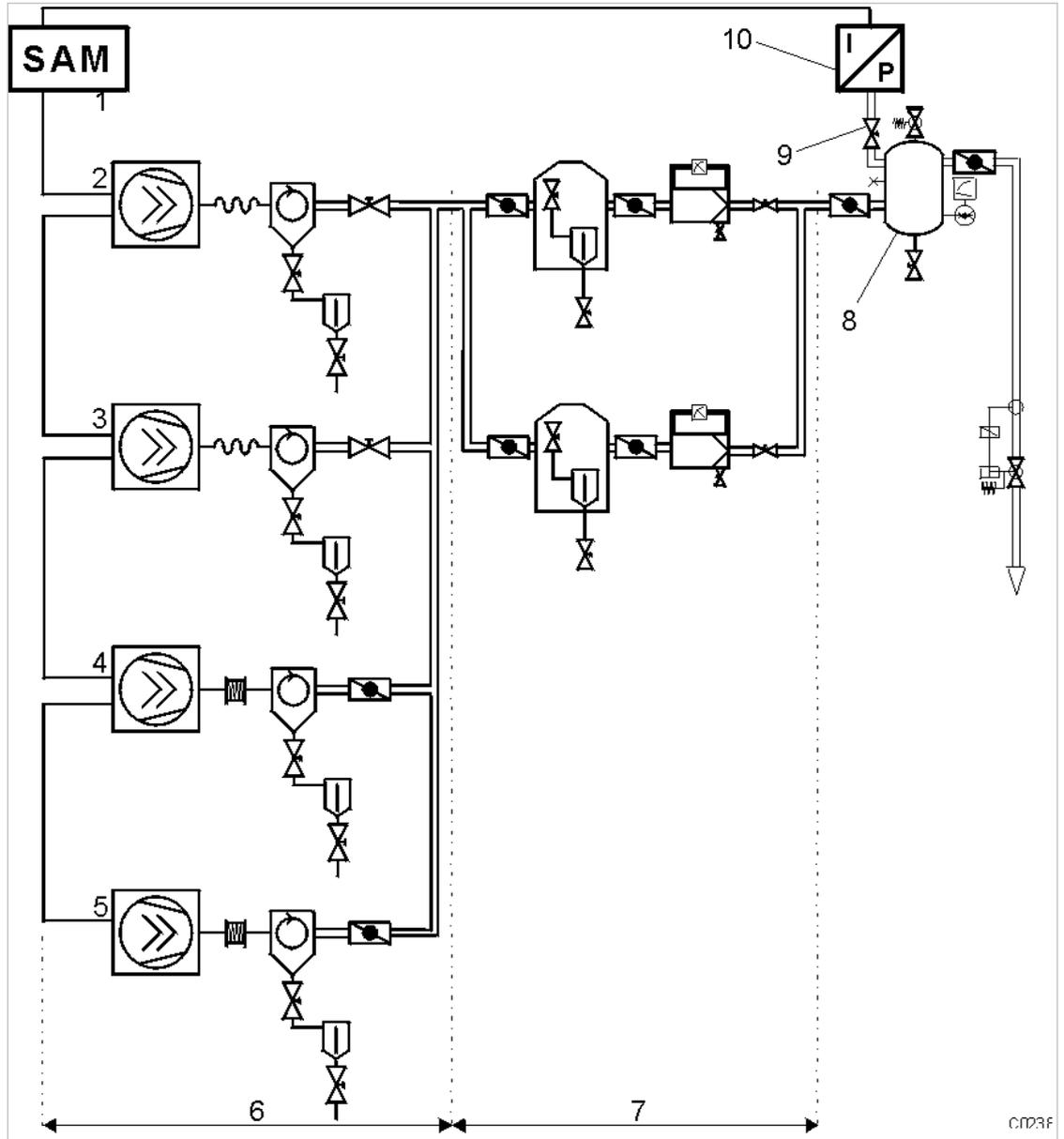


Fig. 4 Pressure transducer position

- | | | | |
|---|-------------------|---|---------------------------|
| ① | SIGMA AIR MANAGER | ⑥ | Compressed air production |
| ② | Machine 1 | ⑦ | Compressed air treatment |
| ③ | Machine 2 | ⑧ | Air receiver |
| ④ | Machine 3 | ⑨ | Shut-off valve |
| ⑤ | Machine 4 | ⑩ | Pressure transducer |

- Pay attention to the following when connecting the pressure transducer:
 - Connect the pressure transducer either to the side or the top of the air receiver so that no condensate can settle.
 - If the pressure transducer is connected to the main collector pipe, fit a small, additional air receiver (item 8) order separately, see chapter 13.8 for the material number).
 - Fit the pressure transducer downstream of the air treatment components because pressure losses caused by air treatment components or pipework can occur between the machine and the point of measurement.
 - The airflow at the point of measurement must not pulsate.
 - Pay attention to the installation depth.
 - Fit a shut-off valve between the air receiver and the pressure transducer. This allows replacement of the pressure transducer without having to vent the air receiver. Do not close the shut-off valve during operation.
 - A kit of parts for the air connection is available separately (see chapter 13.8 for the material number).

6.6.2 Power supply



Avoid signal corruption.

1. Use two conductor screened cable with minimum section 0.75 mm².
2. The pressure transducer must be earthed.
 - Earth by metallic contact with the air receiver or
 - via a separate equipotential bond with minimum section 1 x 10 mm² (e.g. an earth clamp (G3/4) on the transducer housing).
3. Connect the SIGMA AIR MANAGER and the pressure transducer to the same equipotential bond. The potential difference between both earthing points must be zero.
4. Connect the cable screening to earth on the pressure transducer and to a screening connection in the control cabinet.
5. Maintain a separation of at least 4 in. between connecting cables and power cables.

6.7 Planning cabling

Instructions on the electrical installation

- A supply disconnecting device to EN 60204 must be installed by the user.
- The maximum lengths for digital input and output cables are 328 ft.
- Use galvanic isolation on cables laid outside the building to ensure lightning protection (preferably fibre optic cable).
- See circuit diagrams in the annex for cable types, cross-sections and cable selection. Flexible cables should be used within the cabinet, except for supply cables and equipotential bonds.
- Suppress all inductive loads connected to the relay outputs; see chapter 6.8.1.
- The machines must be linked in the form of a star, i.e. each individual machine is connected directly to the master controller.

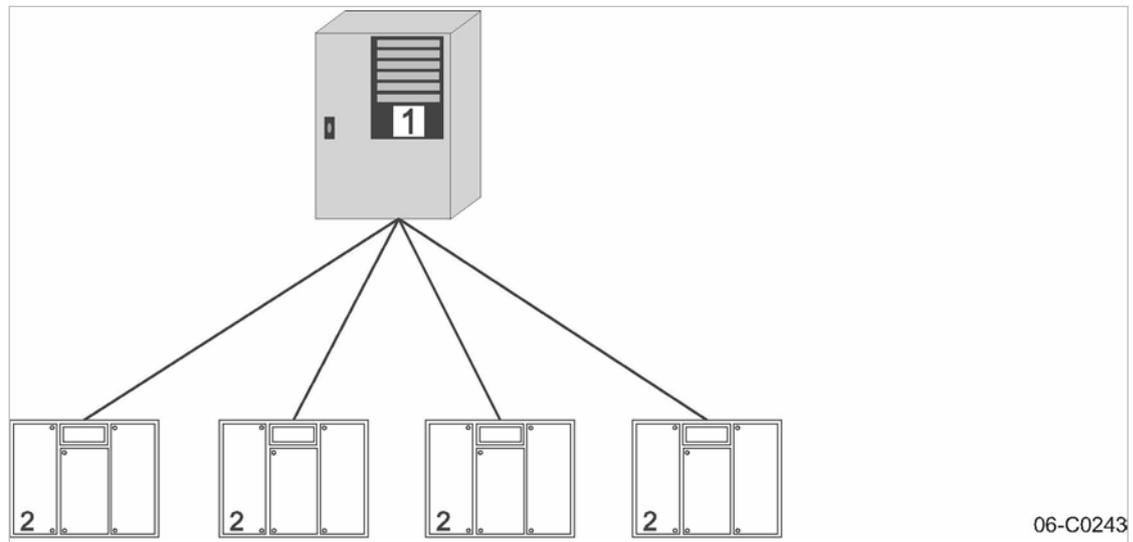


Fig. 5 Configuration of the network with floating relay contacts

- ① Master controller
- ② Machine

6.7.1 Requirements for the machines



The connection to the floating relay output of the master controller is in series with the system pressure switch in the machine.

Machines that are to be linked to the master controller, SIGMA AIR MANAGER BASIC, must have the following relay contacts:

- an "external load control" input.
- Also recommended: a floating "motor running" contact (normally open).

If a machine is not prepared for connection to a master controller, it can be retrofitted. Documents and parts for the retrofit are available separately.

Machines fitted with SIGMA CONTROL BASIC must be equipped with a "load control" function module. The function module provides the SIGMA CONTROL BASIC with a digital input for external load control. Function modules see chapter 13.8.

6.8 Laying cables

⚠ DANGER

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

- *Isolate the master controller and external sources from all voltage.*

1. Switch off all phases of the controller and external power sources.
2. lock them out,
3. observe all accepted safety regulations and national legislation applicable to all work carried out on the master controller.

4. Have the master controller connected to the power supply by an authorized and qualified electrician to national legislation and the regulations of the electricity company concerned.



The terminals in the master controller that could be supplied by an external voltage source are marked:

Markings

- Orange or
- Label

5. Make the connections to the power supply, to the individual machines and to the pressure transducer as detailed in the circuit diagrams.

6.8.1 Wiring modifications to the machine



Interruptions to the air supply caused by unsuppressed inductive loads connected to the relay outputs of the master controller, such as auxiliary conductors or solenoid valves.

1. Suppress inductive loads with an RC interference suppressor.
2. Connect the interference suppressor in parallel with the coil (connections A1–A2). If the connections are inaccessible, e.g. solenoid valves, the suppressor can also be connected to the corresponding terminals on the terminal strip.
3. Use an RC interference suppressor suited to the coil voltage and apparent holding power, see chapter 13.8.



One of the four RC suppressors supplied can be used for standard 115/230 V coils.



Jumpers on the input for external load control (sequencing input).
➤ Remove jumpers.

6.9 Connecting the cables to the master controller

6.9.1 Connecting the equipotential bond

1. Connect the master controller housing to the user's equipotential bond with the marked bolts.
2. Keep the connection as short as possible.
3. Use an earth strap or cable with a cross-section of at least 16 mm².

6.9.2 Leading in cables and connecting the screening

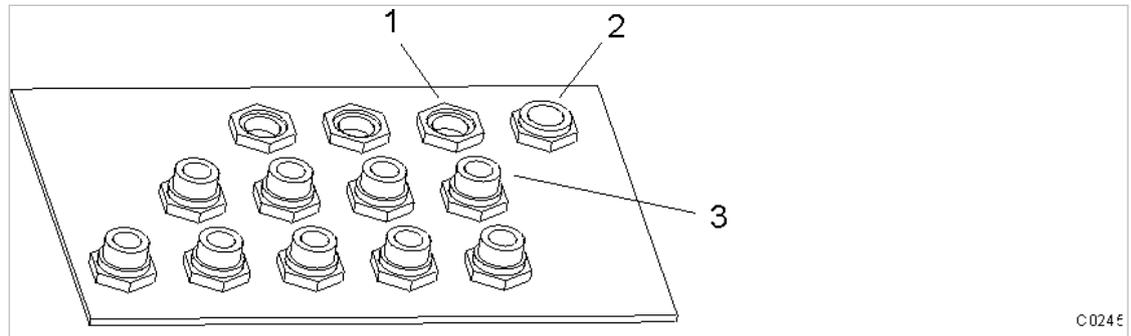


Fig. 6 Cable glands with and without ferrite suppressors

- ① Cable glands for screened cables
- ② Cable gland for power supply cable
- ③ Cable glands for non-screened cables

1. Lead non-screened cables (for digital inputs and relay outputs) through the front cable glands fitted with ferrite suppressors to protect them against electromagnetic interference.
2. Lead screened cables (for pressure transducer and analog outputs) and the power supply cables through the rear cable glands without ferrite suppressors.

Connecting the screening

At the control cabinet:

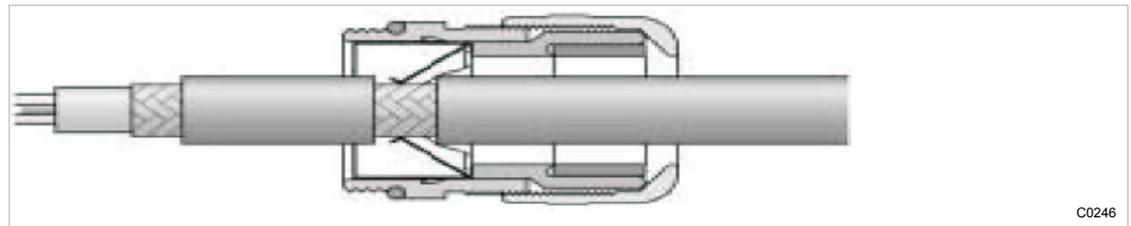


Fig. 7 Connecting the screening

1. Strip off the cable insulation by about 0.4 inch where the cable passes through the cable gland.
2. Push the cable through the metal cable gland on the control cabinet until the stripped section snaps in and contacts the earth clamp in the cable gland.

At the master controller:

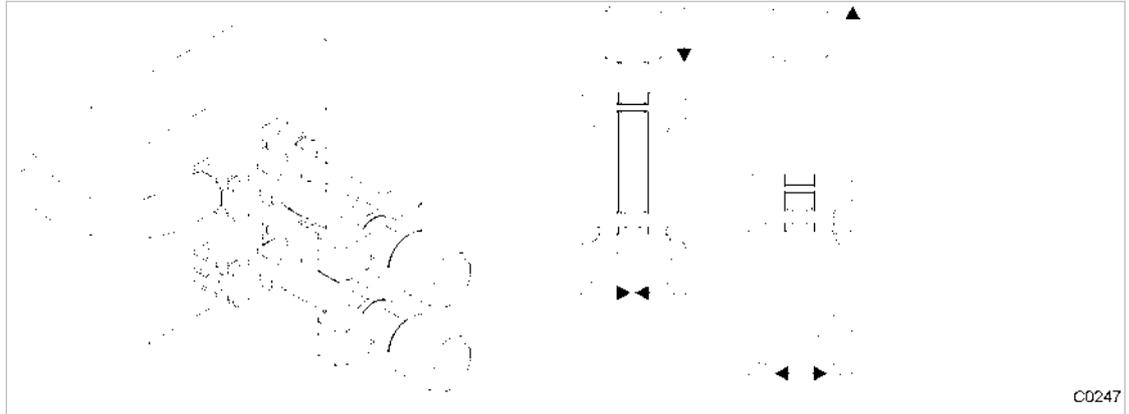


Fig. 8 Cable screening clamps

1. Strip off the cable insulation by about 0.8 inch at the terminal.
2. Unscrew the spindle of the cable screening clamp completely.
3. The screening connects to the controller via the housing.
4. Use a cable screening clamp to secure the screening.

6.9.3 Laying the cables in the control cabinet

1. Bundle and bind cables carrying digital signals (inputs).
2. Bundle and bind cables connecting the compressors (relay outputs).

6.9.4 Connecting the cables

- Make the connections to terminals and interfaces as detailed in the corresponding electrical diagram.

6.10 Connecting floating relay contact signals for sensors

- Connect sensors according to the electrical diagram in the appendix.

6.11 Setting up the machines

⚠ CAUTION

Damage to drive motors can occur when the permissible motor starting frequency is exceeded on machines without idle control (piston compressors, blowers).

- *Set the SIGMA AIR MANAGER pressure band to a width which ensures that the motor switching frequency is not exceeded.*
- *If necessary, increase the capacity of the air receiver.*

Precondition The settings described in this section must be entered in full for every machine to ensure faultless operation under control of the master controller. Make sure that the compressed air system remains in operation should the master controller fail.

- Carry out settings as detailed in this manual.

6.11.1 Linking via floating relay contact

Precondition The machines are provided with the relay contacts required and they are wired up (see chapter 6.7.1).

- Note the settings made here in the table in the annex (see chapter 13.6)



Screw compressors always have an emergency mode. Piston compressors and blowers may or may not have this emergency facility.

6.11.1.1 Air systems with emergency mode facility

- In automatic mode the master controller takes over LOAD/IDLE control.
- In manual mode the machines run under the control of their own system pressure switches.

When the machine is linked, the system pressure switch (-B1) remains in operation. This has the function of an additional safety pressure switch. The system automatically runs in EMERGENCY mode via these pressure switches should power to the master controller fail or the master controller itself malfunction, ensuring a further supply of compressed air.

- Set the pressure switch.

Further information Setting recommendation for the pressure switch: See annex in chapter 13.6.1.

6.11.1.2 Air systems without emergency mode capability

Blowers and reciprocating compressors are not fitted with a pressure switch that could ensure EMERGENCY operation.

When these machines are connected, the LOAD/IDLE switching is controlled by the master controller.



These air stations will stop delivering compressed air if the master controller fails.

- Take suitable application-specific measures.

7 Initial Start-up

7.1 Overview

The master controller was designed and developed for a number of applications. Thus, a great variety of settings is possible.



Prior to delivery, the master controller is preconfigured with a standard configuration. Generally, most of these settings can be used for many applications or need only minor modifications. Thus, not all the steps listed below may be required for the initial start-up, depending on the application involved.

SIGMA AIR MANAGER is factory set for the following applications:

- Air systems with four screw compressors
- Load outputs from compressors 1–4 on digital outputs DO 0.1 – DO 0.4
- "Motor running" signal from compressors 1–4 on digital input DI 0.0 – DI 0.3
- Pressure transducer final pressure 232 psi
- Required pressure 96 psi
- Pressure band 17 psi
- Automatic restart after power failure with 60 seconds time delay after resumption of power.
- Network filling at 14.5 psi/min.
- Group alarm on output DO 0.0
- System pressure on analog output AO 0

Subjects discussed:

- 7.2 Configuring the Master Controller
- 7.3 Connecting the Machines to the Master Controller
- 7.4 Specify the required pressure
- 7.5 Setting the Pressure Switch
- 7.6 Setting the Parameters for the Compressed Air System
- 7.7 Programming the Clock
- 7.8 Configuring the Peripheral Devices
- 7.9 Commissioning the Master Controller

7.2 Configuring the master controller



The keys and LED indications are shown on the last page of this service manual and in the chapter Design and Function.

- Become familiar with the function keys.

7.2.1 Switching on the master controller

The master controller starts booting when the power supply is switched on. The boot-up is finished when the large-font display of pressure appears (after about 25 seconds).



If nothing appears on the display, press and hold the «info» key and the «up» arrow key simultaneously.

⚠ CAUTION

The compressed air supply may be damaged from premature changeover to automatic mode.

➤ *Do not set automatic mode until all the settings in this chapter have been made.*

1. Press the «ON» key.
2. Make sure that the compressor station is in “Manual” mode.



- Compressed air stations without emergency facility will not be delivering compressed air.
- In compressed air stations with emergency operation capability, the machines run under their own internal control.

7.2.2 Changing the display language

1. Press «F3» in the main menu.
2. Set the required language with «F1» and «F6».
3. Press «esc» to return to the main menu.

7.2.3 Selecting menu options

Menu options are displayed either as an icon in the menu bar at the bottom of the display or as text in the display.

➤ Select the required menu option with the «F1» to «F6» keys.

7.2.4 Character entry

If characters have to be entered, a display frame opens with numbers, letters and special characters. It is divided into several sections that can be accessed with the arrow keys.

If only numerals are to be entered, a smaller display frame opens in which only numerals, a comma, a minus sign and the **C** and **E** functions can be selected. The procedure is the same as for character entry.

1. Use the arrow keys to select the desired characters and confirm with the «enter» key.
2. Repeat step 1 until all characters are entered.
3. To delete a character use the arrow keys to move the cursor to **C** on the right of the display frame and confirm with «Enter».
4. When all characters are entered, use the arrow keys to move the cursor to **E** on the right of the display frame and confirm with «Enter».
5. Entry of characters can be cancelled with the «esc» key.

7.2.5 Selection lists

Some settings can be made using selection lists.

1. If a selection list is displayed, select the required setting with the arrow keys.
2. Confirm the setting with the «Enter» key.



If there are only two selections, no list is displayed. The other relevant setting is immediately activated and does not have to be confirmed.

➤ Press the «Enter» key to switch between possible settings.

7.2.6 Password level and key lock



In this manual, the password level required will be quoted for every function.

The following passwords are entered in the master controller on delivery:

- Password for level 1: 11
- Password for level 2: 12
- Password for level 3: 13

➤ Further information is given in the following chapters.

7.2.6.1 Log-off



The password sets itself back to level 0 if no entries are made over a period of five minutes.

Alternatively, the password can be manually reset as follows:

1. Select *<Password «F4» >* in the main menu.
2. Press «F1» (logoff).
3. Press «esc» to return to the main menu.

7.2.6.2 Password list

A list of the passwords together with the related password levels is displayed.

1. Select menu option *<Password«F4» Password list «F2» >*.
2. If required, enter password for level 3.
3. Press the «esc» key to close the list.

7.2.6.3 Key lock

The following keys can be locked:

- «Remote»
- «Clock»
- «ON»
- «OFF»
- «Machine selection»

1. Select menu option *<Password «F4» Key lock «F3» >*.
2. If required, enter password for level 2.
3. Select the required key with the arrow keys.
4. Press the «enter» key until "locked" is displayed.
5. Press the «escape» key to return to the next higher level.

7.2.6.4 Assigning passwords



Assign level 0 to delete a password.

1. Select menu option *<Password «F4» Assign password «F4» >*.
2. If required, enter password for level 3.

3. Enter the password and the appropriate level.
4. Press the «escape» key to return to the next higher level.

7.2.7 Checking/Setting time and date



If the machine is being operated with a clock program, check the time at regular intervals for discrepancies (generally once per year).

1. Select menu point *<Settings «F1» – System «F1» – Date and Time «F1» >*.
2. Select date or time with the arrow keys.
3. Press «Enter».
4. If required, enter password for level 2.
5. Enter date and/or time (see chapter 7.2.4 for entering characters).
6. When the date and time is correct press the «esc» key to return to the next higher level.

7.2.8 Setting summer / winter

1. Select menu *<Settings «F1» – System «F1» – Summer and Winter «F2» >*.
2. Use the arrow keys to select the individual settings and confirm with the «enter» key.
3. If required, enter password for level 2.
4. Set the options for automatic changeover.
5. When the settings are complete, press the «esc» key to return to the next higher level.

7.2.9 Country-specific settings



The units of measure and time and date format are standardized for the language selected, but can be changed, if required.

1. Select menu *<Settings «F1» – System «F1» – Country-specific settings «F3» >*.
2. Use the arrow keys to select the individual settings and confirm with the «enter» key.
3. If required, enter password for level 1.
4. Set the language, units of measure and date and time formats.
5. Press the «escape» key to return to the next higher level.

7.2.10 Setting up the display

1. Select menu *<Settings «F1» – System «F1» – Control panel «F4» – Display settings «F4» >*
2. Set up the:
 - Lighting
 - Lighting time delay
 - Contrast

7.3 Connecting the compressors to the master controller

- In the main menu, select *<Settings «F1» – Inputs and outputs «F6» >*.

7.3.1 Hiding non-existing machines

Precondition The electrical and mechanical connections to the machine are concluded.

1. Select menu option digital output «F3».
2. Enter password for level 3, if required.
3. If less than the full quota of compressors are connected, the spare outputs should be used for other signals or deleted with "Spare"
 - Spare
 - System pressure low
 - Group alarm
 - Group maintenance/group warning
 - External alarm
 - External maintenance/warning
 - Compressor alarm
 - Compressor maintenance / warning
 - Controller operational
 - Air system ON
 - Remote mode
 - Clock mode
 - K1, K2, K3 or K4 load
 - K1, K2, K3 or K4 alarm

7.3.2 Setting the type of machine and working pressure

Precondition Menu point <Settings «F1» > is selected.

1. Select menu <Air system «F4» – Compressor type «F5» >.
2. Enter password for level 3, if required.
3. Select the machine type.



"High pressure" refers to piston compressors with a maximum working pressure higher than 464 psi.

4. On blowers and piston compressors select whether or not the machines have a pressure switch with which emergency operation can be implemented.

The final pressure of the pressure transducer is automatically given by the type of compressor selected:

Machine type	Final pressure of pressure transducer [psi]
Rotary screw compressors	232
Piston Compressors	232
Blowers	14.5
Vacuum pumps	14.5 (abs)
High Pressure	653

Tab. 17 Default values, pressure transducer final pressure



If the final pressure of the pressure transducer installed in the compressed air system differs from the default setting, the setting can be corrected as follows:

- Adjust the pressure transducer final pressure in *<Settings «F1» – Compressed air system «F4» – Main pressure values «F4» >*.

7.3.3 Setting the compressor data

Precondition Menu point *<Settings «F1» >* is selected.

1. Call up the menu option compressor «F3». Every machine has its own 2-tiled screen, with the corresponding machine number displayed at the top right. Use the «F5» and «F6» keys to move between the machines. Use the F1 and F2 function keys to switch between the first and second tile.
2. Make the following settings for each machine:
 - If required, enter password for level 3.
 - Enter the machine's delivery quantity.
 - In the case of machines with frequency converters, set "FC Compressor yes".
 - Use «F1» to activate the second tile of the screen.
 - Enter the total hours and load hours for the machine.
 - Enter the default interval hours.
 - Select maintenance interval "RESET" and press «Enter» to accept the default hours for the value Reminder. The hours are now counted further by the master controller.



On conventionally linked machines that are connected to the master controller without the "motor running" feedback signal, the total hours are counted when the master controller switches to the load mode.

7.3.4 Setting the base load sequence

Use this menu to specify after which reference value the system should switch within one compressor size (class).

Precondition Menu point *<Settings «F1» >* is selected.

1. Select menu option *<Compressed air station «F4» – Base load sequence «F1» >*.
2. If required, enter password for level 3.
3. Set the changeover time see 4.4.2.

If required, adjust the automatic classification of the compressors.

 - **Exact:**
Only compressors with exactly the same FAD are combined in a class.
 - **Normal:**
The system tolerates small deviations in the free air delivery when combining compressors in classes.
 - **Tolerant:**
The system tolerates significant deviations in the free air delivery when combining compressors in classes.

4. If necessary, specify which compressors are to be activated first and last.

Switching compressors online:

- **First:** The controller will always activate these machine first and deactivate them last. This function may be used, for instance, for machines with heat recovery.
- **Last:** The controller will always activate this machines last. Their deactivation is governed by the consumption, if the machine is no longer required for the compressed air delivery.
 - **Rigid:** Exactly the compressors defined here are activated last. "Last – rigid" may be used for instance with older machines to be deployed as standby systems only. Ensure that these machines are sufficiently in use, by, e.g., activating them via the shift clock channel A once a week for one hour as primary machines.
 - **Sequencing:** If several compressors of the size (class) of the specified compressor, a compressor of this class is switched last. The system selects the one with the most operating hours from all suitable compressors. The other compressors of this size are added earlier, depending on consumption. "Last – sequencing" may be used if, for example, the compressors of a certain class are to be used deliberately less frequently than those of the other class(es).

7.4 Setting the required pressure

The required pressure is the pressure required by the consumers in the compressed air network (pressure-measuring transducers).

The controller will usually maintain the required pressure with a maximum deviation of 1.5 psi.



For energetic reasons, the operating pressure is to be set as low as possible, i.e., not higher as required for the consumers within the compressed air network.

Precondition *<Main menu level>* is selected.

1. Select machine overview with function key «F6».
2. If required, enter password for level 1.
3. Specify the required pressure

Further information You can set the required pressure in the *<Control «F2» >* menu as well.

7.5 Enter minimum pressure and pressure regulation



The adaptive 3-D control should only be optimized by persons experienced in air system optimizations. Incorrect settings can result in faults in the air supply and unnecessarily high energy consumption.

1. In the main menu, select *<Settings «F1» Control «F2» >*.
2. If required, enter password for level 2.
3. Enter the minimum pressure "pt" and the associated delay time "tpt".
If the pressure falls below minimum pressure "pt" for longer than delay time "tpt", the alarm message "117 Pressure below minimum" is triggered.
4. Contact authorized KAESER Service representative if the adaptive 3-D control must be set beyond the settings of pt and tpt.

7.6 Setting the station parameters

- In the main menu, select *<Settings «F1» Station «F4» >*.

7.6.1 Setting main pressure values



The "Actual Pressure Damping" is the period over which pressure value readings are averaged.

It influences the pressure regulation and should only be altered after consultation with KAESER.

Precondition The menu option *<Settings «F1» Station «F4» >* is selected.

1. Select «F4» (Main pressure values).
2. If required, enter password for level 2.
3. Specify the maximum required pressure.
4. Specify the minimum required pressure.
5. The final pressure of the pressure transducer has already been set.
6. Enter the password for level 3, if necessary, and then set the actual pressure value damping.

7.6.2 Configuring the restart

Automatic restart of the machines after a power failure is configured in this menu option.



An automatic restart after a power failure is only possible if a SIGMA CONTROL software version 0.70 or later is installed. In earlier software versions the machines run in manual mode when the power supply returns. Contact an authorized KAESER Service representative for advice.

Precondition The menu option *<Settings «F1» Station «F4» >* is selected.

1. Select menu option Restart «F2».
2. If required, enter password for level 2.
3. Switch on automatic restart.
4. Enter the delay period for restart.
5. Specify whether minimum pressure should be monitored when the compressor air system is off.

7.6.3 Air main charging

Upon activation of the compressed air system (keys «ON», Remote ON/OFF or Shift clock), the compressed air network is filled at the specified charging speed. The controller will use as many compressors as required.

Precondition The menu option *<Settings «F1» Station «F4» >* is selected.

1. Select menu option *<air main charging «F3» >*.
2. If required, enter password for level 2.
3. Enter the air network charging speed (speed of pressure rise when charging).

Result Upon attaining the required pressure, the master controller switches to normal operation.

7.7 Programming the shift clock

Shift operation of the compressed air system can be set in the shift clock menu option.

In all, 32 switching points are available.

- The required pressure can be changed for defined periods of time.
- The entire compressed air system can be switched on or off.
- Specific machines can be taken off the compressed air supply.
- Use "channel A" to first switch the machined specified last in the *<Settings «F1» Station «F4» Base load sequencing «F1» >*.
see chapter 7.3.4.



The switching points entered are repeated weekly.
During non-standard periods such as company holidays, the compressed air system has to be switched manually.

- In the main menu, select *<Settings «F1» Shift clock «F5» >*.

7.7.1 Setting the switching points

The number of unassigned and assigned switching points is shown at the top left.

The switching point number is shown at the top right.

A frame around the weekday indicates that it is selected.

You can select several weekdays at once.

1. If required, enter password for level 2.
2. Selecting the weekday:
 - Use the arrow keys to move the cursor to the required weekday.
 - Press «Enter».
3. Enter the switching time.
4. Enter the required pressure.
5. Specify the used compressors.
6. Adjust "channel A" if necessary.
7. To shut down the compressed air system, enter ~~##-##-##~~ or the compressors.
8. Press «F2» key to save the switching point.
9. Repeat steps 1 through 8 to set additional switching points.
All settings apply until the next switching point is reached.

Further information See chapter 13.7.1 for examples of switching point setting.

7.7.2 Deleting a switching point



Only the settings displayed in the menu option are deleted. If several days of the week are selected, the respective switching points for all these days are deleted.

1. Select the switching points to be deleted with the «F5 »and «F6» keys.
2. If required, enter password for level 2.
3. If necessary, cancel the selection of individual weekdays.
4. Delete the selected switching point with the «F1» key.

7.7.3 Activating the clock

- Press the «shift clock» key.
The shift clock mode LED illuminates.

7.8 Configuring Peripheral Devices

- Input and output functions activating/configuring.

7.8.1 Configuring the digital inputs

- Select menu option <settings «F1» – Input and output «F6» – Digital input «F1» >.

Digital input name:

	Input name	Input assignment	Input status*
1	DI 0.0	"C1 Motor running" (the motor in compressor 1 is running)	0
2	DI 0.1	"C2 Motor running" (the motor in compressor 2 is running)	0
3	DI 0.2	"C3 Motor running" (the motor in compressor 3 is running)	0
4	DI 0.3	"C4 Motor running" (the motor in compressor 4 is running)	0

* = 0 ≙ no voltage on the input, signal transmitter contact is open

* = 1 ≙ voltage on the input, signal transmitter contact is closed

Tab. 18 Digital inputs

Input status

You can check at each input state* whether the floating relay inputs are wired properly.

- If necessary, check input states.

Input assignment

Each input can be assigned with the following functions:

- "C1 Motor running" (the motor in compressor 1 is running)
If the contact connected to the input is closed, the SIGMA AIR MANAGER counts the total hours and service hours for this compressor.
 - On compressors whose answerback signal "Motor running" is not connected to the SIGMA AIR MANAGER, the total hours and service hours during load control are counted by the SIGMA AIR MANAGER.
 - If the complete air supply system is to be shut down when an alarm message is received, the remote ON-OFF contact must be used.
The duty cycle for this compressor can only be determined if the answerback signal "Motor running" is connected.
 - C2 Motor running; see "C1 Motor running"
 - C3 Motor running; see "C1 Motor running"
 - C4 Motor running; see "C1 Motor running"
- After assignment, check whether the hours are counted.

Further input assignment

- Remote OFF/ON:
The air system can be switched on (contact closed) and off (contact open) by the contact connected to the input. This only functions when remote mode is activated.
 - Remote shift clock:
The clock can be switched on (contact closed) and off (contact open) by the contact connected to the input. This only functions when remote mode is activated.
 - External message 1:
A message can be triggered by a contact connected to input. Messages received by SIGMA AIR MANAGER are displayed and saved (see chapter 9.2).
Alarms appearing on SIGMA AIR MANAGER do **not** shut down the complete air supply system. If the complete air supply system is to be shut down, the remote ON-OFF contact must be used.
 - Message text:
Setting of message texts is via function key «F6».
Here you can see one of your own message texts.
 - Type of message:
Alarm (A)
When a message is received, the alarm LED lights.
The group alarm output (or the external alarm output if activated) is switched.
Service (S)
When a message is received, the Service/Warning LED lights.
Warning (W)
The group service/warning output (or the external service/warning output if activated) is switched.
 - Time delay
The message is only displayed after it is queued for the set time period.
 - Active on input
It has to be determined whether the message appears with open contact (0 V) or closed contact (24 V).
1. Enter a message text is desired.
 2. If necessary, enter a time delay.
 3. Specify the desired behavior for the input.
- External message 2, see External message 1
 - External message 3, see External message 1
 - External message 4, see External message 1
 - C1 no alarm:
If the contact connected to the input opens, the alarm message "Compressor 1 group alarm (A)" appears.
SIGMA AIR MANAGER stops calling on that compressor to deliver air. The control signal via output "C1 Full load" is cut off. If the load command has already been given before the alarm message appears, another compressor, if possible, will be switched to load.
If the input contact closes again, SIGMA AIR MANAGER will assume the compressor is able to take on the load even if the alarm message has not yet been reset.
 - C2 no alarm, see "C1 no alarm"

- C3 no alarm, see "C1 no alarm"
- C4 no alarm, see "C1 no alarm"
- After assignment, check all functions.

7.8.2 Configuring analog inputs

- Select menu point <Settings «F1» – Input and output «F6» – Analog input «F2» >.

Analog input name

	Input name	Input assignment	Input status
1	AI 0	System pressure	4–20 mA
2	–	–	–

Tab. 19 Analog input

Analog input

The only analog input available, AI 0, is **always** used to acquire the system pressure from the pressure transducer.

- Use the analog input **exclusively** to capture the system pressure from the pressure transducer.

Input status

Current flowing in the input circuit (4–20 mA)

- Using a suitable pressure transducer.

7.8.3 Configuring digital outputs



In air systems with EMERGENCY mode capability, the relay contacts of outputs DO 0.1, DO 0.2, DO 0.3 and DO 0.4 are bridged when the air system is switched off. See electrical diagrams in chapter 13.10.

Digital output name:

	Output name	Output assignment	Output status*
1	DO 0.0	Group alarm	0
2	DO 0.1	C1 load	1
3	DO 0.2	C2 load	1
4	DO 0.3	C3 load	0
5	DO 0.4	C4 load	0

* = 0 ≙ output relay de-energized

* = 1 ≙ output relay energized

Tab. 20 Digital outputs

Output assignment:

- System pressure low
- Group alarm
- Group service/warning (group service/warning)

- External alarm:
External alarm = "External message 1" or "2" or "3" or "4" as alarm.
 - Service/Warning external (Service/Warning external):
External service warning = "External message 1" or "2" or "3" or "4" as a Service or Warning message type.
 - Compressor alarm
 - Compressor service/warning (Compressor service/warning)
The maintenance interval counter for a linked compressor has expired (chapter 9.2).
 - Controller operational
SIGMA AIR MANAGERS's internal program is running.
 - System ON
The compressor air system is switched on, the LED in the green «ON» key lit.
 - Remote mode
The control center activates the controller, the green LED «Remote control» is illuminated.
 - Clock mode
The clock is switched on, the LED in the green «clock» key lit.
 - C1 load (compressor 1 on load control)
SIGMA AIR MANAGER commands the connected compressor to deliver compressed air (load). This contact is used to control the compressor.
The relay is de-energized on air systems with EMERGENCY operation capability.
The relay is energized on air systems without independent operation capability.
For independent operation see chapter 4.4.6.
 - C2 Full load (compressor 2 on load), see C1 Full load.
 - C3 Full load (compressor 3 on load), see C1 Full load.
 - C4 Full load (compressor 4 on load), see C1 Full load.
 - C1 Alarm (compressor 1 alarm)
 - C2 Alarm (compressor 2 alarm)
 - C3 Alarm (compressor 3 alarm)
 - C4 Alarm (compressor 4 alarm)
- Select menu <Settings «F1» – Input and output «F6» – Digital output «F3» >.

Further settings to current output assignments



Negation:

- No:
 - The output relay is energized when the assigned function is **active**. e.g. Group alarm triggered.
- Yes:
 - The output relay is energized when the assigned function is **not** active, e.g. group alarm **not** triggered.

- Use the «F6» function key to negate the output.



You cannot negate in K1 Load, K2 Load, K3 Load and K4 Load.

7.8.4 Configuring analog outputs

- In the main menu, select <Settings «F1» – Inputs and outputs «F6» – Analog output «F4» >.

Analog output name

	Output name	Output assignment	Output status
1	AO 0	System pressure	0–20 mA
		Required pressure	
		FC set point pressure	

Tab. 21 Analog output

Scaling the analog outputs

	Output current	Pressure
1	at 0 mA	0.00 psi
2	at 20 mA	232 psi

Tab. 22 Scaling the analog outputs

- Comply with standardization.

Scaling the output signal

Peripheral, analog components can work with different input currents (0–20 mA, 4–20 mA).

Example:

The system pressure is to appear at the output as a 4–20 mA signal corresponding to 0–116 psi.

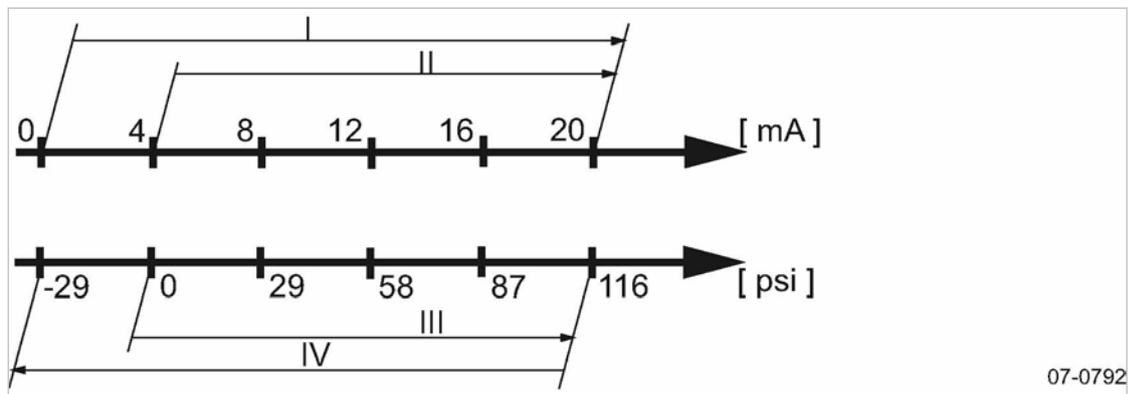


Fig. 9 Output signal scaling

- I Signal range 0–20 mA
- II Signal range 4–20 mA
- III Pressure range 0–116 psi
- IV Pressure range –29–116 psi

- Calculate the values to be set as follows:

Acceptance:

- 0–116 psi $\hat{=}$ 4–20 mA
- A range of 116 psi thus represents a signal range of 16 mA.

Calculation:

- A signal range of 20 mA therefore represents:

7 Initial Start-up

7.9 Master controller commissioning

- $(116 \text{ psi} / 16 \text{ mA}) \times 20 \text{ mA} = 145 \text{ psi}$
- 0 mA is thus $\Rightarrow 116 \text{ psi} \text{ minus } 145 \text{ psi} = -29 \text{ psi}$

➤ Set the following values:

Current values	Pressure values
at 0 mA	-29 psi
at 20 mA	116 psi

Tab. 23 Settings

7.9 Master controller commissioning

Precondition No one is working on the machine.
 All enclosure panels are in place and secured.
 The temperature of the machines is not below +37 °F.
 All access doors on the machines are closed.

⚠ WARNING

Risk of injury during an automatic machine start.

- *Before switching on, make sure that all conditions are met.*
- *Compare the settings for initial start-up of the master controller with those listed in the service manual.*

➤ Use the commissioning checklist.

To be checked	Chapter	Complied?
Date and time is set	7.2.7	
Machines are set up	6.11	
Machines are connected	7.3	
Required pressure is set	7.4	

Tab. 24 Commissioning

Precondition When all points in the checklist are complied with, see table 24.

➤ Press the «machine preselect» key for the required machines on the master controller.

Result The green «preselect» key LED lights up.

Stations with emergency mode facility	Stations without emergency operating mode
<ol style="list-style-type: none"> 1. Set the machines to remote mode. 2. Switch the controller to automatic operation as follows: <ul style="list-style-type: none"> ■ In the main menu select <i><Settings «F1» – Compressed air system «F4» – Mode «F6» ></i>. ■ Enter password for level 2, if required. ■ Switch from MANUAL to AUTOMATIC mode. ■ Return to the main menu with the «esc» key. 	<ol style="list-style-type: none"> 1. Switch on the machines. 2. Press the «ON» key on the master controller to begin the delivery of compressed air.

Result The master controller takes over control of the machines.

8 Operation

8.1 Displaying operating data

The current data of the compressed air system is shown in the main menu. These are distributed over numerous display frames that can be scrolled with the «F5» and «F6» keys:

Precondition The basic settings of the main menu are specified.

1. Select large font display of pressure.
The current system pressure is displayed in large font.
2. Select the "pressure/time diagram".
A profile of system pressure over the preceding 15 minutes is displayed graphically.
3. Select "List of machines".
In this display, the required pressure can be set and the computed momentary FAD of the compressor station is shown.
The status of the compressors, the pressure tendency and the next switching point are displayed. The following symbols are used:

Symbol	Meaning
1	Machine 1 is preselected
[4]	Machine 4 is the reserve machine
✱	Machine 1 is not available to the master controller.
◇	The machine is the next to be deactivated.
◆	The machine is the next to be activated.
	Machine running under load
	Machine running in idle mode
	Machine ready for operation, waiting for command
	Compressor has a fault
	Tendency: pressure rising
	Tendency: pressure falling
7.40 bar 	Next cut-out pressure: a compressor will be cut out when this point is reached, 107 psi for example
 6.70 bar	Next cut-in pressure: a compressor will be cut in when this point is reached, 97 psi for example

Tab. 25 Machine list symbol

4. Select "Duty cycle"



Only those compressors are shown that have their "Motor running" answerback signal connected to the SIGMA AIR MANAGER.

The average duty cycle of the compressor since the air system was commissioned is displayed.

The duty cycle is calculated as follows:

$$(\text{hours under load} / \text{total running hours}) \times 100\%$$

5. Select "Pressure values"

The following values are shown:

- Maximum system pressure, together with the respective time of occurrence.
- Mean system pressure since last reset.
- Minimum system pressure, together with the respective time of occurrence.
- Date and time of the last reset in the line above the word "Reset".
- The display of these three values can be reset at the same time, by using "Reset" and the password (password level 2).

8.2 Displaying messages

- Note the list of messages in the annex.

8.2.1 Displaying operational messages

Operational messages are stored in the master controller's event memory. They do not have to be acknowledged.

A differentiation is made between the following messages:

- Current messages
- Event memory (the last 100 messages are stored)

1. Select menu option *<message «F2» – operational messages «F2» >*.

2. Select a menu option:

- Current messages «F1»
- event memory «F2»

The events (messages) are shown with the following data:

- Message (event) number
- Message coming K, KG or message gone G
- Time and date of the event.
- Message text
- Type of message (O = operational message)

3. Use the arrow keys to scroll through the events.

8.3 Calling up system information

- Select from the main menu *<settings «F1» system «F1» system information «F5» >*.

The following data are shown:

- Material number
- Serial number
- Details of the software used

9 Fault Recognition and Rectification

9.1 KAESER SERVICE



The messages valid for your master controller are dependent on how the compressor station is equipped. Self-definable messages (see chapter 7.8.1, External message 1–4) cannot be considered in this overall description.

1. Do not attempt fault removal measures other than those given in this manual!
2. If the fault cannot be removed by the action suggested: Inform KAESER SERVICE.

9.2 Alarm, service and warning messages

Alarm, service and warning messages are displayed on the master controller and stored in the event memory. The messages are displayed in a display frame (message window) that overlays the current displayed information. The messages are identified by a Δ at the top left of the message window.

New messages that are not acknowledged are displayed together with the following data:

- Message (event) number
- Date and time
- Message text
- Type of message:
 - A=Alarm
 - S=Service
 - W=Warning
 - N=Note



Messages must be acknowledged.

- Use the «acknowledgement» key to acknowledge messages.

A differentiation is made between events (messages) that are current and the event memory in which the last 100 events are saved.

1. Select menu option *<message«F2»alarm, service and warning messages«F1» >*.

2. Select a menu option:
 - Current messages «F1» or
 - event memory «F2»

Every message is displayed with three time stamps:

 - first time stamp: message coming
 - second time stamp: message acknowledged
 - third time stamp: message gone

The following data are shown in addition:

 - message (event) number
 - message has come (C, CG or CGQ), message acknowledged (Q) or message gone (G)
 - date and time
 - message text
 - type of message (A, S, W, N)
3. Use the arrow keys to scroll through the events.

9.2.1 Master controller messages

The following messages can appear on the master controller (in the master controller's message text x represents a number).



Interruption of air supplies

- Switching the power supply to the master controller off and on again will interrupt the compressed air supply on the air systems without emergency mode for about 30 seconds.
- With most messages, the master controller continues running in its current operating mode.
- If the message has asterisks (**) however, machines with EMERGENCY mode switch to their own internal control. Machines without EMERGENCY mode no longer supply compressed air if these messages appear.
- Messages marked with an asterisk (*) must be acknowledged with the «acknowledgement key» after the cause has been corrected.

See chapter 7.9, item 2 for switching back to auto or switching the air system on.

9.2.2 Alarms

No.	Message	Possible cause	Remedy
1–4	Text to be entered by the user	The input to which the message was assigned has switched on.	Check the message signal and rectify the cause.
65–68	Compressor X group alarm	Machine not operational.	<ul style="list-style-type: none"> ■ Remove fault on the machine. ■ Check the cable

(*) = Mandatory acknowledgement

(**) = EMERGENCY operation

No.	Message	Possible cause	Remedy
81–84 (*)	Compressor X does not switch to load	"motor running" answerback signal from the machine not switching correctly. Possible cause: Answerback contact or wiring Compressor does not start, e.g. because of backpressure.	<ul style="list-style-type: none"> ■ Check answerback contact and wiring. ■ Remove reason for the machine not starting.
100 (*)	Summer/winter system changeover faulty.	An error occurred during internal clock changeover from summer to winter or vice versa.	<ul style="list-style-type: none"> ■ Check clock time and correct if necessary. ■ Consult an authorized KAESER SERVICE Representative.
101 (*)	System EEPROM read error	An error occurred while reading from the EEPROM.	•Consult an authorized KAESER Service Representative.
113 (*); (**)	Pressure sensor Open circuit	The connection to the pressure transducer is interrupted.	<ul style="list-style-type: none"> ■ Remove the cause of the interruption. ■ Acknowledge message. ■ Switch the compressed air system back to automatic mode or switch on again.
114 (*); (**)	Pressure sensor Short circuit	The connection to the pressure transducer is short circuited	<ul style="list-style-type: none"> ■ Remove the cause of the short circuit. ■ Acknowledge message. ■ Switch the compressed air system back to automatic mode or switch on again.
117	Minimum pressure under cut.	Pressure was less than minimum pressure pt for a longer period than set for time tpt.	<ul style="list-style-type: none"> ■ Find the cause of pressure undercut. ■ Rectify the cause.
130 (*); (**)	System FLASH error	An error occurred in the master controller's internal FLASH memory.	<ul style="list-style-type: none"> ■ Switch the master controller's power supply off and leave off. ■ Consult an authorized KAESER Service Representative.
131 (*); (**)	System RAM error	An error occurred in the master controller's internal RAM memory.	<ul style="list-style-type: none"> ■ Switch the master controller's power supply off and leave off. ■ Consult an authorized KAESER Service Representative.
132 (*); (**)	System Airend discharge temperature too high	The master controller's ambient temperature has exceeded the permissible 104 °F.	<ul style="list-style-type: none"> ■ Maintain ambient temperature below 104 °F. ■ Acknowledge message. ■ Switch the compressed air system back to automatic mode or switch on again.

(*) = Mandatory acknowledgement

(**) = EMERGENCY operation

No.	Message	Possible cause	Remedy
133 (*); (**)	System Temperature too low	The master controller's ambient temperature has fallen below the permissible 32 °F.	<ul style="list-style-type: none"> ■ Maintain ambient temperature above 32 °F. ■ Acknowledge message. ■ Switch the compressed air system back to automatic mode or switch on again.
135 (*); (**)	System HEAP error	There is not enough internal memory for the master controller program.	<ul style="list-style-type: none"> ■ Switch the master controller's power supply off and on again. ■ Consult an authorized KAESER Service Representative.
136 (*); (**)	System TRAP error	An error occurred in the master controller's program.	<ul style="list-style-type: none"> ■ Switch the master controller's power supply off and leave off. ■ Consult an authorized KAESER Service Representative.
139 (*)	System application error. (DW No.; CODE)	There is a problem in a subroutine in the master controller's program.	<ul style="list-style-type: none"> ■ Note the complete message, especially the numbers in the brackets. ■ Consult an authorized KAESER Service Representative.
140 (*); (**)	System application error. (DW No.; CODE)	There is a problem in a subroutine in the master controller's program.	<ul style="list-style-type: none"> ■ Note the complete message, especially the numbers in the brackets. ■ Consult an authorized KAESER Service Representative.

(*) = Mandatory acknowledgement

(**) = EMERGENCY operation

Tab. 26 Alarms

9.2.3 Service and warning messages

No.	Message	Possible cause	Remedy
1–4	Text definable by the user	The input to which the message was assigned has switched.	Check the message signal and rectify the cause.
273–276	Compressor X Carry out maintenance.	The maintenance interval entered in the master controller for the machine has expired.	<ul style="list-style-type: none"> ■ Carry out maintenance on the machine. ■ Reset maintenance interval counters (see chapter 7.3.3).
289	System Change the SAM buffer battery.	The buffer battery in the master controller is discharged.	Change the buffer battery soonest (see chapter 10.3).

Tab. 27 Service and warning messages

9.2.4 Notes

No.	Message	Possible cause	Remedy
579	Function already used	This function was assigned to a different input.	Use each function only once.

No.	Message	Possible cause	Remedy
580	Delay period too long. (0s to 999s)	The period entered is too long and cannot be accepted by the master controller.	Enter an acceptable period.
584	Function already used	This function was assigned to a different output.	Use each function only once.
595	Undiscovered compile time error.	An error occurred in the master controller's program.	Consult an authorized KAESER Service Representative.
596	Values must be different.	Two equal values have been entered; they must differ. The master controller cannot accept these values.	Enter suitable values.
597	Value below lower limit! Minimum: <###> bar	The value entered is too small. The master controller cannot accept the value.	Enter a suitable value.
609	No weekdays selected.	The switching point cannot be saved as no weekday has been defined.	Select weekday(s).
610	Given switching time not entered.	The switching point to be deleted is nonexistent.	Information only, no corrective action necessary.
611	Not enough spare switching points.	All 32 shift clock switching points have been assigned.	Set up the shift clock so that the maximum of 32 switching points are used.
612	Clock set to summer time.	Time switches from winter to summer time automatically.	Information only, no corrective action necessary.
613	Clock set to winter time.	Time switches from summer to winter time automatically.	Information only, no corrective action necessary.
614	Keys locked.	The depressed key is locked.	Unlock key (see chapter 7.2.6.3).
615	Compressor non-existent	<ul style="list-style-type: none"> ■ A preselected machine has been "removed". ■ The «machine preselect» key has not been assigned to a machine. 	Information only, no corrective action necessary.
617	No switching points entered	An attempt is made to activate the «clock» although no switching points have been set up.	Set up switching points (see chapter 7.7).
619	OFF/ON Controlled by REMOTE	ON or OFF by key is currently not possible as remote ON/OFF is active via a relay contact or control centre.	<ul style="list-style-type: none"> ■ Press the «remote» key to deactivate the remote ON/OFF. ■ Use «ON» or «OFF» keys as required.

No.	Message	Possible cause	Remedy
620	Shift clock Controlled by REMOTE	The shift clock cannot be activated/deactivated by the «clock» key because the clock is active via a floating relay contact.	<ul style="list-style-type: none"> ■ Press the «remote» key to deactivate remote control of shift clock. ■ Use the «clock» key as required.

Tab. 28 Notes

9.3 O&O messages (operation & observation)

Messages concerning operation and observation are displayed on the master controller, but not stored in the event memory. The messages are identified by a ! at the top left of the message window. They have to be acknowledged with the «escape» key. Mostly, they refer to either too large or too small entry value.

- Acknowledge messages with the «Escape» key.

9.4 System messages

The master controller displays across the entire screen a message with a text similar to the following: *“Critical system error occurred ... system halted”*

- The complete master controller system is stopped, all outputs are deactivated.
 - On compressed air systems with emergency operation capability, the machines run under their own internal control.
 - Compressed air systems without this capability cannot supply compressed air.
1. If such a message appears, write it down in full and then contact your authorized KAESER Service representative.
 2. Leave the compressed air systems running in emergency mode.
 3. On air systems without an emergency mode capability, try to remove the fault by switching the power supply to the master controller off and then on again.

10 Maintenance

10.1 Maintenance tasks on electrical equipment



Maintenance tasks on electrical equipment may only be carried out by the following persons:

- trained technicians
- by technicians trained to maintain the master controller and by service personnel instructed by and under the supervision of such a trained technician
- authorized KAESER Service personnel.

1. Check personnel for specialized suitability.
2. Assign suitable personnel to maintenance tasks.
3. Instruct on correct maintenance procedures in accordance with the service manual.
4. Document maintenance tasks carried out.



Enter completed maintenance tasks in the list in the service manual.

10.2 Testing the control panel

The LEDs, keys and the display can be checked for correct function.

1. Select menu *<Settings «F1» – System «F1» – Control panel «F4» >*.
2. Press the «F1» key to carry out the LED test; if required, enter the password for Level 1.
All LEDs on the master controller will light up for approximately five seconds. Any unlit lamps are defective.
3. To carry out the key test, press the «F2» key and then the key to be tested; if required, enter the password for Level 2.
An image of the key that has been pressed appears on the display. The actual key function is not triggered. The arrow keys cannot be tested.
4. To test the display, press and hold «F3».
As long as «F3» is pressed the display turns black and defective pixels can be recognized.

10.3 Changing the buffer battery

- Follow instructions carefully.

10.3.1 Danger from batteries

WARNING

There is danger of acid burns if batteries are overheated or damaged.

- *Store the battery in a cool and dry place.*
- Dispose of damaged buffer batteries correctly.

10.3.2 Battery life

Under normal operating conditions the buffer battery in the master controller has a life of approximately 10 years. Unused buffer batteries can be stored for five years.

⚠ CAUTION

Data loss from flat battery

- Heed warning messages from the controller concerning the buffer battery charge level.
- Exchange the buffer battery only when the master controller is switched on.



If the battery is discharged and a power failure occurs the event memory settings and clock time are lost after approximately one hour.

- Heed the charging time for unused buffer batteries.

10.3.3 Battery changing sequence

⚠ CAUTION

Cable crack from incorrect handling.

- Never remove the battery plug from its socket by pulling on the cable.

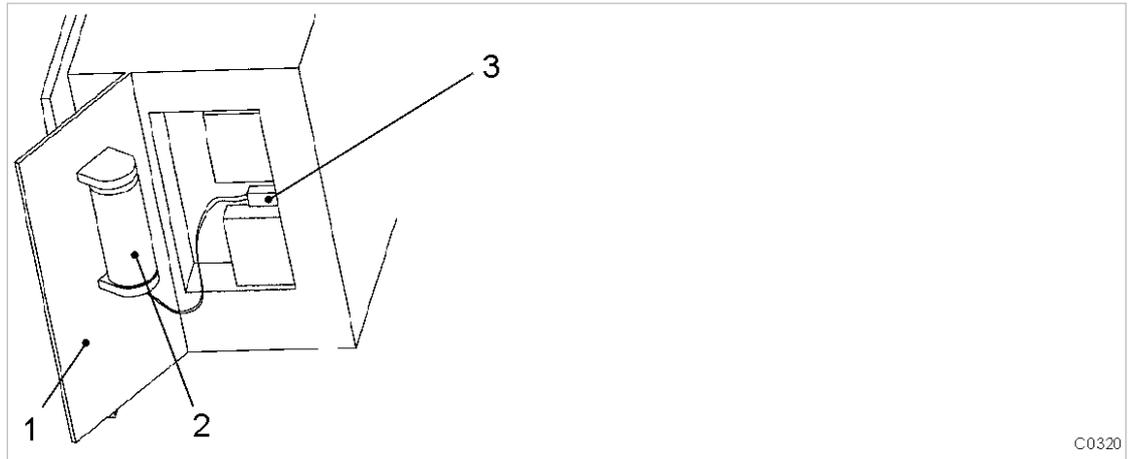


Fig. 10 Buffer battery location

- ① Side cover
- ② Buffer battery
- ③ Battery cable plug

Precondition New battery to hand.
The master controller is switched on.

1. Remove the securing pins on the side cover ① of the master controller with a screwdriver.
2. Remove the side cover ①. The battery ② is fixed to the side cover.
3. Carefully withdraw the plug on the battery cable ③ from the socket.
4. Remove the battery ② from the fixing.
5. Insert a new battery.

6. Plug the battery cable  into the socket:
 - Blue cable (-) above
 - Red cable (+) below
7. Push extra cable into the master controller's housing.
8. Replace the cover and fix with the securing pins.
9. Check date, time and settings, correcting if required. (see chapters 7.2.7 to 7.2.9)



Used batteries are hazardous waste

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

11 Spares, Operating Materials, Service

11.1 Note the Nameplate

The nameplate contains all information to identify your controller. 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 Spare parts

Name	Voltage [V]	Capacity [Ah]	Order number
Lithium buffer battery	3.6	1.8	7.7704.0

Tab. 29 Spare buffer battery

11.3 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.

11.4 Displaying Version and Serial Number

- Select menu option <Settings «F1» – System «F1» – System information «F5» >.

12 Decommissioning, Storage and Transport

12.1 De-commissioning

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

- The master controller is temporarily not needed,
 - The master controller is to be moved to another location,
1. Isolate the master controller (power supply disconnecting device) from all power phases.
 2. Switch off external power sources.

12.2 Disposal

Precondition The master controller is decommissioned.

1. The master controller is completely disconnected.
2. The battery has been removed (see 10.3) and properly disposed of.
3. Hand the master controller over to an authorized disposal expert.

13 Annex

13.1 Anchor holes for the control cabinet

See instructions in chapter 6.4

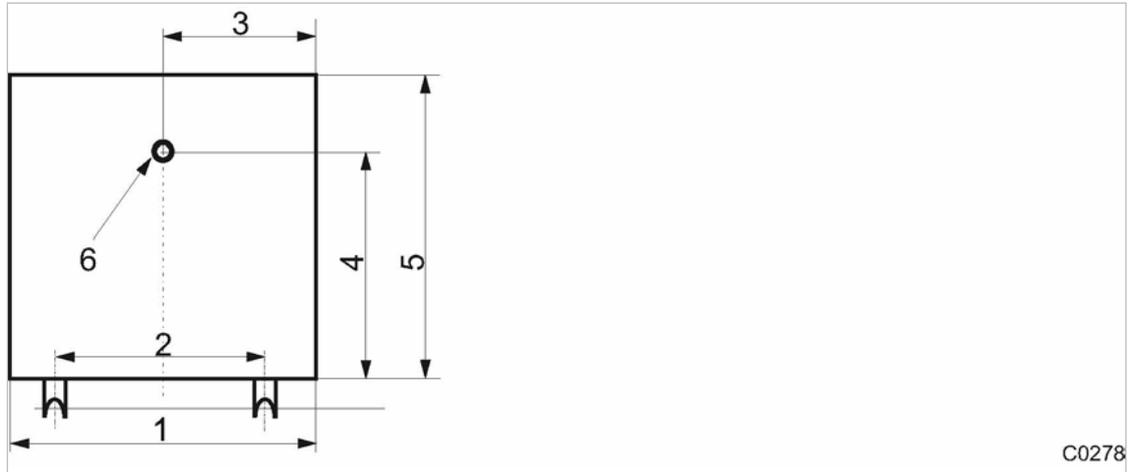


Fig. 11 Anchor holes for the cabinet

- | | | | |
|---|-----------|---|-----------|
| ① | 15 inch | ④ | 12 inch |
| ② | 13.4 inch | ⑤ | 13.3 inch |
| ③ | 7.5 inch | ⑥ | ∅ .3 inch |

13.2 Machine assignment

No.	Model	Compressor number	Year of manufacture	Electrical diagram number
1				
2				
3				
4				

Tab. 30 Machine assignment

13.3 Master controller settings

The master controller factory settings are listed below. Enter alterations in the empty fields.

➤ Enter changes in the prepared list.

Result These entries simplify the task, particularly of external Service Technicians, in determining the cause of problems arising.

13.3.1 Summer/winter changeover

See instructions in chapter 7.2.8

Date / time			
Name	Factory setting		
Winter → summer changeover			
Hours offset (h)	+1h		
Relative weekday	Last		
Weekday	Sunday		
Month	March		
Time setting	2		
Summer → winter changeover			
Hours offset (h)	-1h		
Relative weekday	last		
Weekday	Sunday		
Month	October		
Time setting	3		
+ ≙ Yes, - ≙ No			

Tab. 31 Summer/Winter changeover

13.3.2 Pressure regulation settings

13.3.2.1 Control parameters

See chapter 7.4 and chapter 7.5 for instructions.

Date / time						
Name	Unit	Factory setting				
Required pressure	[psi]	96				
Minimum pressure pt	[psi]	88				
Delay period tpt	[s]	10				

Tab. 32 Pressure parameters

13.3.2.2 System parameter

See chapter 7.6, chapter 7.4 and chapter 7.9.

Date / time					
Name	Unit	Factory setting			
Base load sequence					
Sequence / hours offset	(h)	100			
first		# - # - # - #			
last		# - # - # - # fixed			
+ ≙ Yes, - ≙ No					

Date / time					
Name	Unit	Factory setting			
Tolerance class		normal			
Restart					
Automatic restart		+			
Delay period for restart	[s]	60			
Minimum pressure with active System OFF		–			
Air main charging					
Network charging with	(psi/min)	14.5			
Main pressure values					
Maximum required pressure	[psi]	102			
Minimum required pressure	[psi]	58			
Actual pressure damping	[s]	1			
Final pressure of pressure transducer	[psi]	232			
Compressor type					
Type		Rotary screw compressors			
Pressure switch on the compressor (emergency operation)		+			
Operating mode					
Operating mode		Manual			
+ $\hat{=}$ Yes, – $\hat{=}$ No					

Tab. 33 System parameter

13.3.3 Compressor data

See chapter 7.3.3 for instructions.

Date / time					
Name	Unit	Factory setting			
Machine 1					
Delivery	(m ³ /min)	0			
VFD compressor:		–			
Total hours	(h)	0			
Load hours	(h)	0			

Date / time						
Name	Unit	Factory setting				
Default (maintenance hours)	(h)	500				
Rest (maintenance hours)	(h)	500				
Machine 2						
Delivery	(m ³ /min)	0				
VFD compressor:		–				
Total hours	(h)	0				
Load hours	(h)	0				
Default (maintenance hours)	(h)	500				
Rest (maintenance hours)	(h)	500				
Machine 3						
Delivery	(m ³ /min)	0				
VFD compressor:		–				
Total hours	(h)	0				
Load hours	(h)	0				
Default (maintenance hours)	(h)	500				
Rest (maintenance hours)	(h)	500				
Machine 4						
Delivery	(m ³ /min)	0				
VFD compressor:		–				
Total hours	(h)	0				
Load hours	(h)	0				
Default (maintenance hours)	(h)	500				
Rest (maintenance hours)	(h)	500				

Tab. 34 Compressor data

13.3.4 Shift clock

See instructions in chapter 7.7

13.3.5 Periphery

See chapter 7.8 for instructions.

13.3.5.1 Digital inputs

Date / time			
Name	Factory setting		
DI 0.0	C1 Motor running		
DI 0.1	C2 Motor running		
DI 0.2	C3 Motor running		
DI 0.3	C4 Motor running		

Tab. 36 Digital inputs

Further settings for "External messages"

Date / time				
	Text	Type	Time	Set by
Factory setting		S	0 s	24 V
External message 1				
External message 2				
External message 3				
External message 4				

Tab. 37 External message

No.	message text	Remarks
39	SAM remote mode	The following functions can be controlled in remote control operation: Remote ON/OFF Remote shift clock
40	SAM power ON mode (CODE)	The master controller's power supply has been switched on. CODE = internal information for authorized KAESER Service representative.
65–68	Compressor x deselected	The machine has been deselected by either the preselect key or the internal shift clock (green LED off). It is neither controlled nor monitored by the master controller.

Tab. 41 Operational Messages

13.6 Machine settings

13.6.1 Set values for the system pressure switch

See instructions in chapter 6.11

Suggested setting [psi]



The reference point is the maximum working pressure.

- Adjust the system pressure switch (-B1) setpoints as follows:

Machine number	Cut-in pressure		Cut-out pressure	
Maximum working pressure 14.5 psi to 36 psi:				
Machine 1	ON	– 1.5	OFF	+ 0.7
Machine 2	ON	– 2.2	OFF	+ 0.7
Machine 3	ON	– 2.9	OFF	+ 0.7
Machine 4	ON	– 3.6	OFF	+ 0.7
Maximum working pressure 36 psi to 87 psi:				
Machine 1	ON	– 2.9	OFF	+ 2.9
Machine 2	ON	– 5.8	OFF	+ 2.9
Machine 3	ON	– 8.7	OFF	+ 2.9
Machine 4	ON	– 11.6	OFF	+ 2.9
Maximum working pressure 87 psi to 232 psi:				
Machine 1	ON	– 5.8	OFF	+ 4.4
Machine 2	ON	– 10.2	OFF	+ 4.4
Machine 3	ON	– 14.5	OFF	+ 4.4
Machine 4	ON	– 18.9	OFF	+ 4.4
Maximum working pressure 232 psi to 653 psi:				
Machine 1	ON	– 58	OFF	+ 14.5
Machine 2	ON	– 72.5	OFF	+ 14.5
Machine 3	ON	– 87	OFF	+ 14.5

Machine number	Cut-in pressure		Cut-out pressure	
Machine 4	ON	- 101.5	OFF	+ 14.5

Tab. 42 Recommended settings: System pressure switch

Personal settings

Date / time							
Switching point		ON	OFF	ON	OFF	ON	OFF
	Unit						
Machine 1	[psi]						
Machine 2	[psi]						
Machine 3	[psi]						
Machine 4	[psi]						

Tab. 43 Personal settings: System pressure switch

13.7 Examples and suggested settings

- Note suggested settings.

13.7.1 Example of switching point setting

See instructions in chapter 7.7.1

Guidelines for establishing the switching points

- The compressor station comprises the following machines:
 - 2 small machines (1, 2)
 - 2 large machines (3, 4)
- Required pressure for the compressor station 97 psi
- Compressor station ON:
 - Weekdays 6:30-17:00
 - Fridays 6:30-15:00
- Compressor station OFF:
 - Saturday
 - Sunday
 - Midday 12:00-13:00

No.	Day	Time	Function	Compressors
1-5	Mon-Fri	06:30	ON	1-2-3-4
6-10	Mon-Fri	12:00	OFF	## ###
11-15	Mon-Fri	13:00	ON	1-2-3-4
16-19	Mon-Thurs	17:00	OFF	## ###
20	Fri.	15:00	OFF	## ###

Tab. 44 Example of a compressor station ON/OFF clock program

Precondition The menu item *<Settings «F1» – Shift clock «F5» >* is selected.

- Enter password for level 2 if necessary.

Switching points 1-5

1. Select the days Mon., Tues., Wed, Thurs. and Fri.
2. Enter switching time 06:30:00.
3. Enter the required pressure 97 psi
4. Enter compressors 1-2-3-4.
5. Press «F2» to save the switching points.

Switching points 6-10

1. Enter switching time 12:00:00.
2. Enter compressors # # # # #.
3. Do not change the other settings.
4. Press «F2» to save the switching points.

Switching points 11-15

1. Enter switching time 13:00:00.
2. Enter compressors 1-2-3-4.
3. Do not change the other settings.
4. Press «F2» to save the switching points.

Switching points 16-19

1. Remove the check mark from Fri. by placing the cursor over Fri. and pressing «Enter».
Only Mon. to Thurs. are still selected.
2. Enter switching time 17:00.
3. Enter compressors # # # # #.
4. Press «F2» to save the switching points.

Switching point 20

1. Remove the selection for Mon. to Thurs.
2. Select Fri. for the day.
3. Enter switching time 15:00:00.
4. Do not change the other settings.
5. Press «F2» key to save the switching point.

Result All the switching points are set.

- Activate the clock by pressing the «clock» key.

Result The *green clock LED* lights.
The entered switching points are active.

13.7.2 Connection of 4 machines in total, one of which as reserve

See chapters 7.3.4 and 7.7.1 for instructions.

Setting parameters

- The compressed air system comprises the following machines:
 - 3 new machines (machine 1, 2 and 3)
 - One old machine to be used as reserve (machine 4)
- In order for the reserve machine not be deactivated for a very long time, it is to be used every week on Friday between 10:00 and 12:00 AM.

Settings of the reserve machine

Precondition Menu *<Settings «F1» – Station «F4» – Base load sequence «F1» >* is selected.

Enter password for level 2 if necessary.

- Switching compressors online: Finally , enter ~~# # # 4~~. Leave the default setting "fixed".

Setting the shift clock – switching points 1

Precondition The menu item *<Settings «F1» – Shift clock «F5» >* is selected.

Enter password for level 2 if necessary.

1. Select Fri. for the day.
2. Enter switching time 10:00:00.
3. Enter compressors 1–2–3–4-A.
4. Press «F2» to save the switching points.

Setting the shift clock – switching points 2

1. Enter switching time 12:00:00.
2. Enter compressors 1–2–3–4-#.
3. Press «F2» to save the switching points.

Result Except for Friday between 10:00h to 12:00h, machine 4 is deployed only if the other three machines are unable to cover the compressed air requirement. From 10:00h on Friday, machine 4 is used first.

After 12:00h on Fridays, machine 4 is used as long as necessary due to air requirements. Subsequently, it is again used last.

13.8 Installation accessories

Pressure transducer

Description	Pressure range	Order number
For model I	0 – 14.5 psi	7.4599.0

Description	Pressure range	Order number
For model II	0 – 87 psi	7.3397.1
	0 – 145 psi	7.2816.3
	0 – 232 psi	7.2817.3
	0 – 290 psi	7.4762.0
	0 – 464 psi	7.6689.0
	0 – 653 psi	7.4773.0
For model III	0 – 232 psi	7.7040.1
For vacuum	0 – 14.5 psi (absolute)	7.7046.0

Tab. 45 Pressure transducer

Pressure transducer fitting parts and lines

Description	Remarks	Order number
Fitting set straight, elbow G 1/4, G1/2 with shut-off valve and accessories up to 232 psi up to 653 psi	For air receiver connection	8.0484.10050 8.0484.00090
Fitting set G 1/4, G1/2 with shut-off valve and accessories up to 218 psi	1 quart air receiver for connection to pipework.	204465.0
Connecting cable for pressure transducer	Screened, 2 x 0.75 mm ² , for indoor installation, PVC sheath, grey, 6 mm diameter dia.	7.2679.0

Tab. 46 Pressure transducer accessories

Module for load/idle control for SIGMA CONTROL BASIC

Description	Remarks	Pressure	Order number
Module for external load/idle control SIGMA CONTROL BASIC 7.7005.1 and 7.7005.2	Digital input for load control via SIGMA AIR MANAGER. For machines with SIGMA CONTROL BASIC (7.7005.1 or 7.7005.2) without frequency converter.	116 psi	7.7006.00003
		160 psi	7.7006.00013
		218 psi	7.7006.00023
SFC module with external load/idle control	as 7.7006.00003 but for machines with frequency converter (SFC)	116 psi	7.7706.00033
SIGMA CONTROL BASIC machine controller with module for external load/idle control	Exchange controller with digital input for load control by SIGMA AIR MANAGER. For machines with SIGMA CONTROL BASIC (7.7005.0).		7.7008.0
Module for external load/idle control SIGMA CONTROL BASIC 7.7005.3	Digital input for load control via SIGMA AIR MANAGER. For machines with SIGMA CONTROL BASIC 7.7005.3 without frequency converter	116 psi	7.7056.00002
		160 psi	7.7056.00012
		218 psi	7.7056.00022

Description	Remarks	Pressure	Order number
SFC module with external load/idle control	For machines with SIGMA CONTROL BASIC like 7.7056.00002 but with frequency converter (SFC)	116 psi	7.7056.00032

Tab. 47 Load/idle module

RC interference suppressor

Description	Remarks	Order number
RC interference suppressor	For suppression of inductive loads connected to the relay outputs of the master controller. Coil voltage: 110–230 V AC/DC Coil capacity: 15 VA	7.2812.1

Tab. 48 RC interference suppressor

13.9 Exchanging the battery

Exchanging the battery

Date / time				
Name				

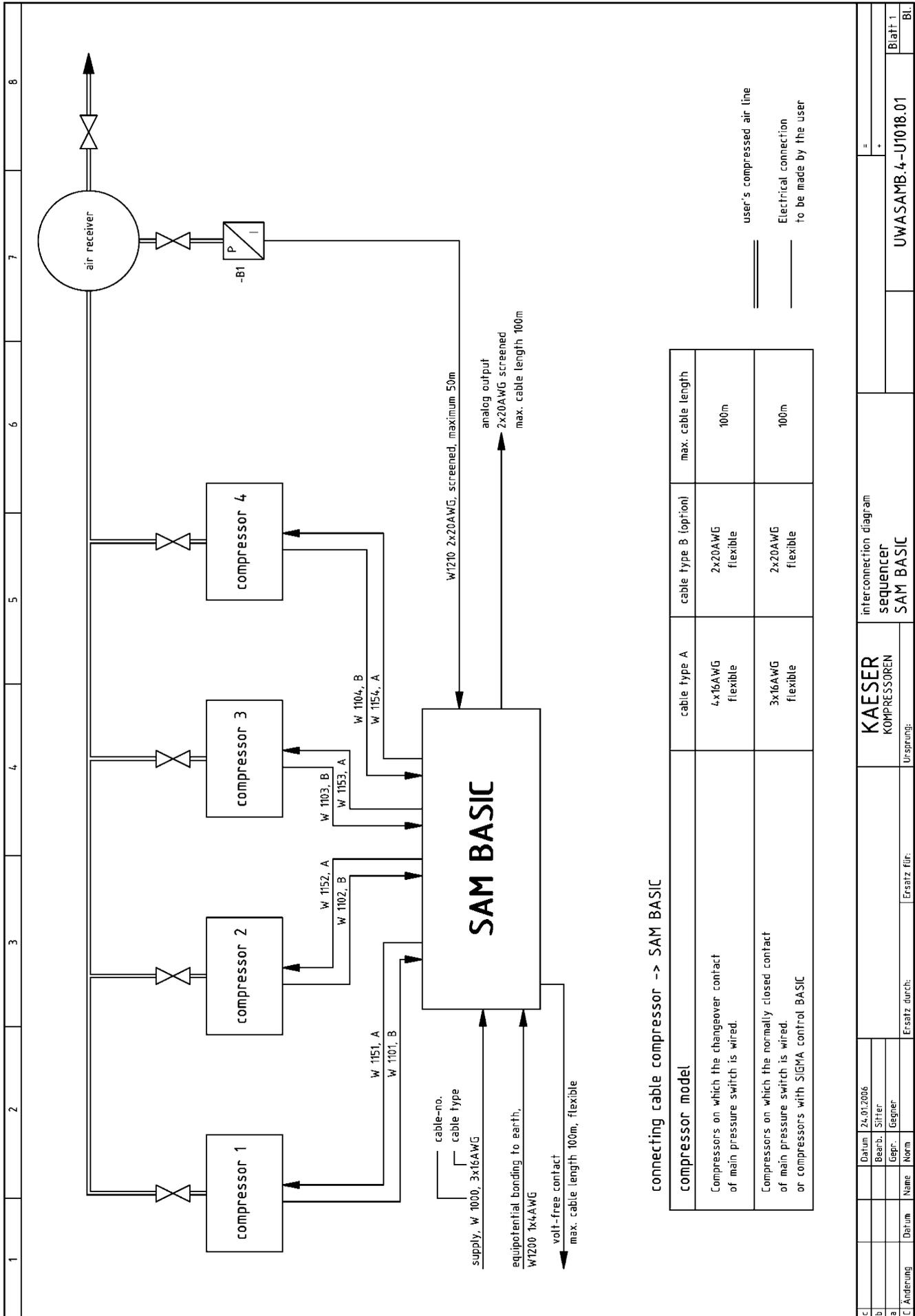
Tab. 49 Changing the battery

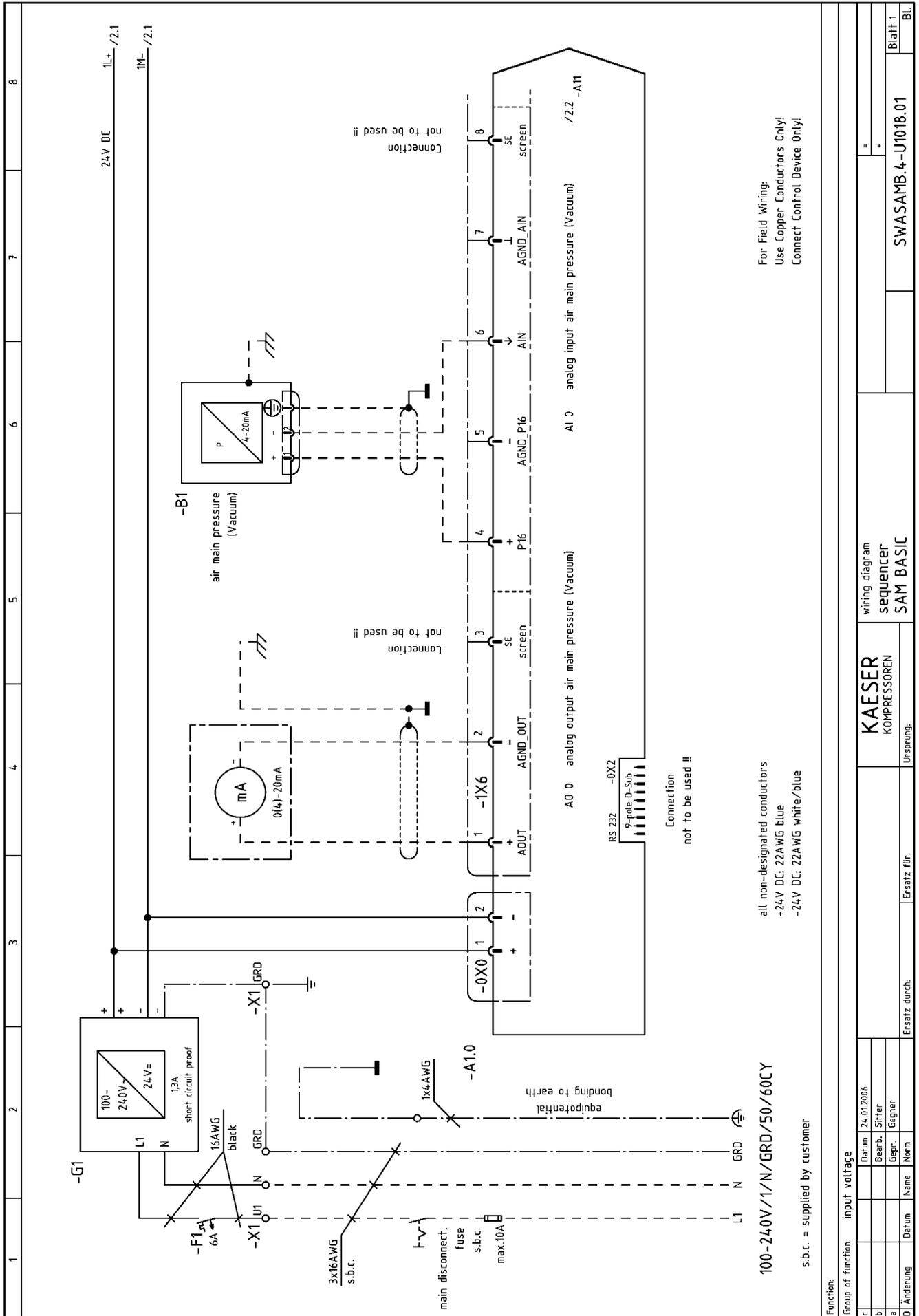
13.10 Electrical Diagram

1	2	3	4	5	6	7	8
<p>Wiring Diagram sequencer SAM BASIC 2 - 4 Package Power supply: WYE system with center point solidly grounded</p>							
<p>manufacturer: KAESER COMPRESSORS 96450 COBURG GERMANY</p>							
<p>The drawings remain our exclusive property. They are entrusted only for the agreed purpose. Copies or any other reproductions, including storage, treatment and dissemination by use of electronic systems must not be made for any other than the agreed purpose. Neither originals nor reproductions must be forwarded or otherwise made accessible to third parties.</p>							
c	Datum	24.01.2006	USE	KAESER KOMPRESSOREN		cover page sequencer SAM BASIC	=
b	Bearb.	SfHer					+
a	Gepr.	Gegner					
A. Änderung	Datum	Name	Norm	Ersatz durch:			Blatt 1
				Ersatz für:		DWASAMB.4-U1018.01	Bl.

Lfd. Nr. No.	Benennung Name	Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page	SAM BASIC	DWASAMB.4-U1018.01	1	
2	list of contents	SAM BASIC	ZWASAMB.4-U1018.01	1	
3	interconnection diagram	SAM BASIC	UWASAMB.4-U1018.01	1	
4	wiring diagram	SAM BASIC	SWASAMB.4-U1018.01	1	
5	wiring diagram	SAM BASIC	SWASAMB.4-U1018.01	2	
6	wiring diagram	SAM BASIC	SWASAMB.4-U1018.01	3	
7	wiring diagram	SAM BASIC	SWASAMB.4-U1018.01	4	
8	electrical component parts list	SAM BASIC	GWASAMB.4-U1018.01	1	
9	lay-out	SAM BASIC	AWASAMB.4-U1018.01	1	

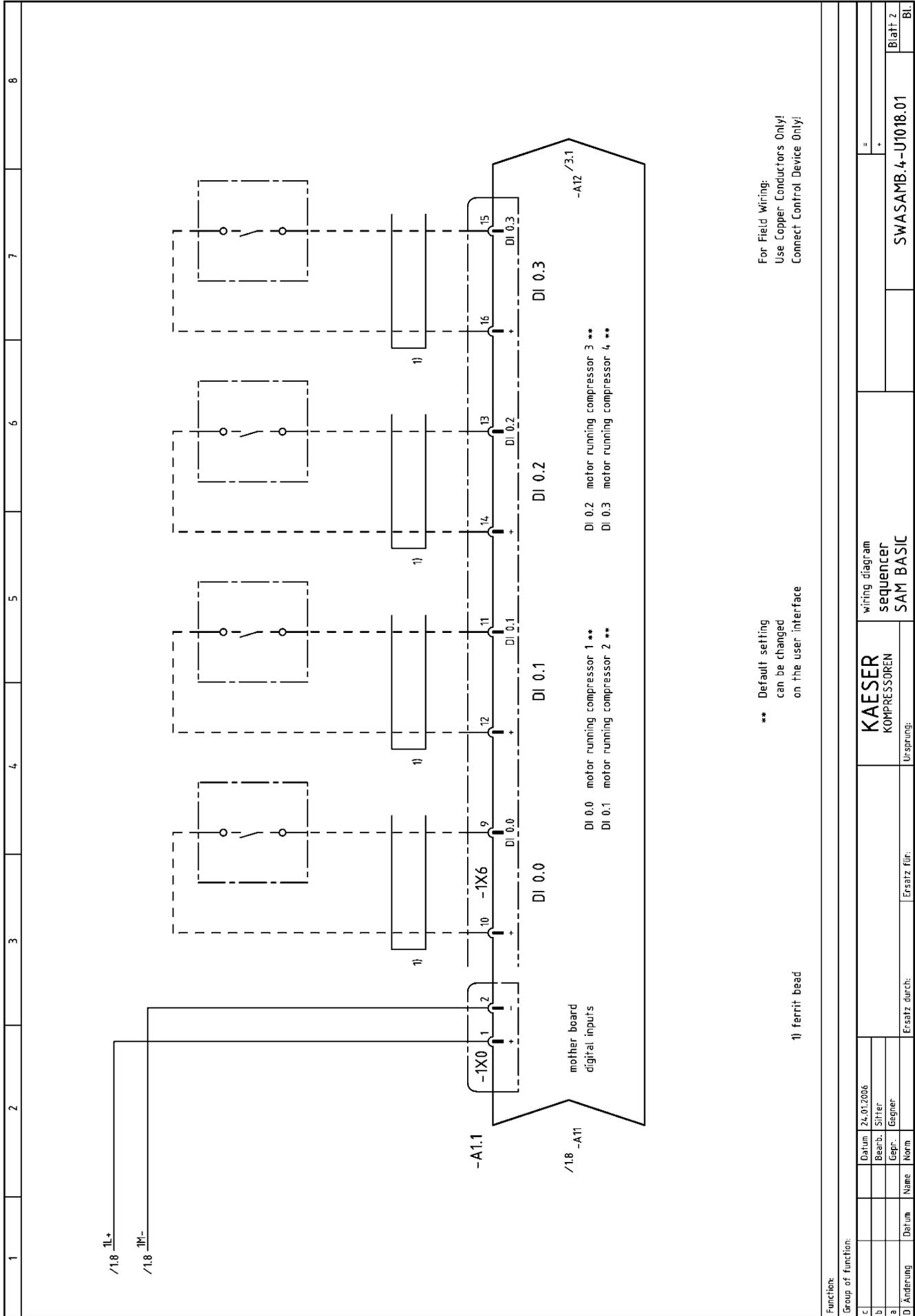
c	Datum	24.01.2006	KAESER KOMPRESSOREN Ursprung:	list of contents sequencer SAM BASIC	= + ZWASAMB.4-U1018.01	Blatt 1 BL
b	Bearb.	Sifrer				
a	Gepr.	Gegner				
B. Änderung	Datum	Name	Ersatz durch:		Ersatz für:	

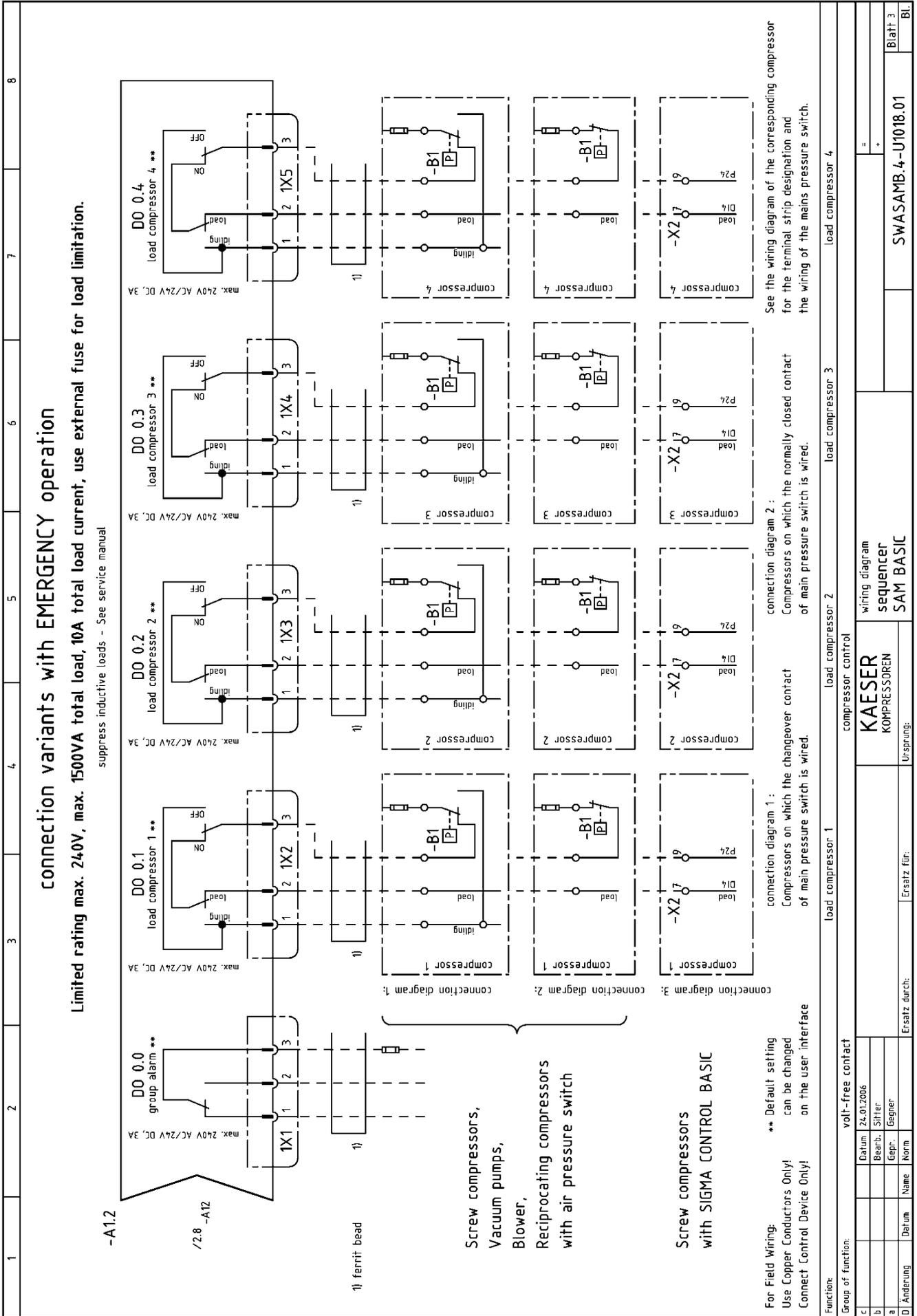




For Field Wiring:
Use Copper Conductors Only!
Connect Control Device Only!

Function:		input voltage	
c	Datum	24.01.2006	
b	Bearb.	SIFter	
a	Gepr.	Gegner	
D. Änderung		Datum	Name
Ersatz durch:		Ersatz durch:	Ursprung:
		writing diagram	
		sequencer	
		SAM BASIC	
		SWASAMB.4-U1018.01	
		Blatt 1	
		BL	





1	2	3	4	5	6	7	8
A	B	C	D		E	F	G
Stückzahl Qty.	Benennung und Verwendung Description and function	Fabrikatsbezeichnung Typ: notwendige techn. Daten (z.B. Steuerspannung, Frequenz, Einstellbereich); Bestell-Nr.; Hersteller Identification data Type: basic technical data (e.g. control voltage, frequency, adjustable range); order No.; manufacturer	Lfd. Nr. Item	Betriebsmittel-Kennz. nach DIN 40719, Teil 2 Identifying symbol of device	Stromlaufplan Planabschnitt Circuit diagram sheet No., section No.	Einbauort Location	Concerns only the manufacturer Wst.-Nr. H Schabl. Nr. I BZ-Pos. J VA Kz.* K Eingangs- vermerk
1	control cabinet						
1	control cabinet door		208189.0 KAESER				
1	lock insert control cabinet		2081810 KAESER				
9	dummy plate	grey	9.094.2.0 S&V				
1	control	SZ-BP2	7.3169.00490 ABB				
1	cut-out	SAM BASIC	7.7706.0 Siemens	-A1			
1	power supply	S201-B6	7.6298.0 ABB	-F1			
2	connector plug	100-240VAC/24VDC 13A	7.7025.1 Siemens	-G1			
1	connector plug	BL3.5/SN SW 2-pol.	7.314.2.00550 Weidmüller	-0X0,-1X0			
5	connector plug	BL3.5/16 SN SW 16-pol.	7.314.2.00560 Weidmüller	-1X6			
2	series terminal	Typ 8213B/3 0G 3-pol.	7.5726.00010 Wieland	-1X1...-1X5			
4	screen-terminal	WK2.5/U	7.394.8.0 Wieland	-X1			
2	earth-flat-cable	WK4 SL/U	7.394.9.0 Wieland	-X1			
9	ferrit bead	EMC	7.634.2.0 Wago				
3	screwed cable gland	2xM6 250mm	7.3184.00020 Jitex				
3	screwed cable gland	M20x1,5	7.4890.00020 Würth				
			7.5289.00010 Jacob				
			7.5288.0 Jacob				
1	pressure transducer	See service manual					
4	interference suppressor RC	20002 110-230VAC/DC 15VA	7.2812.1 Murr	-B1			

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

In Zweifelsfällen gilt die deutsche Fassung.

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

The German version applies in cases of doubt.

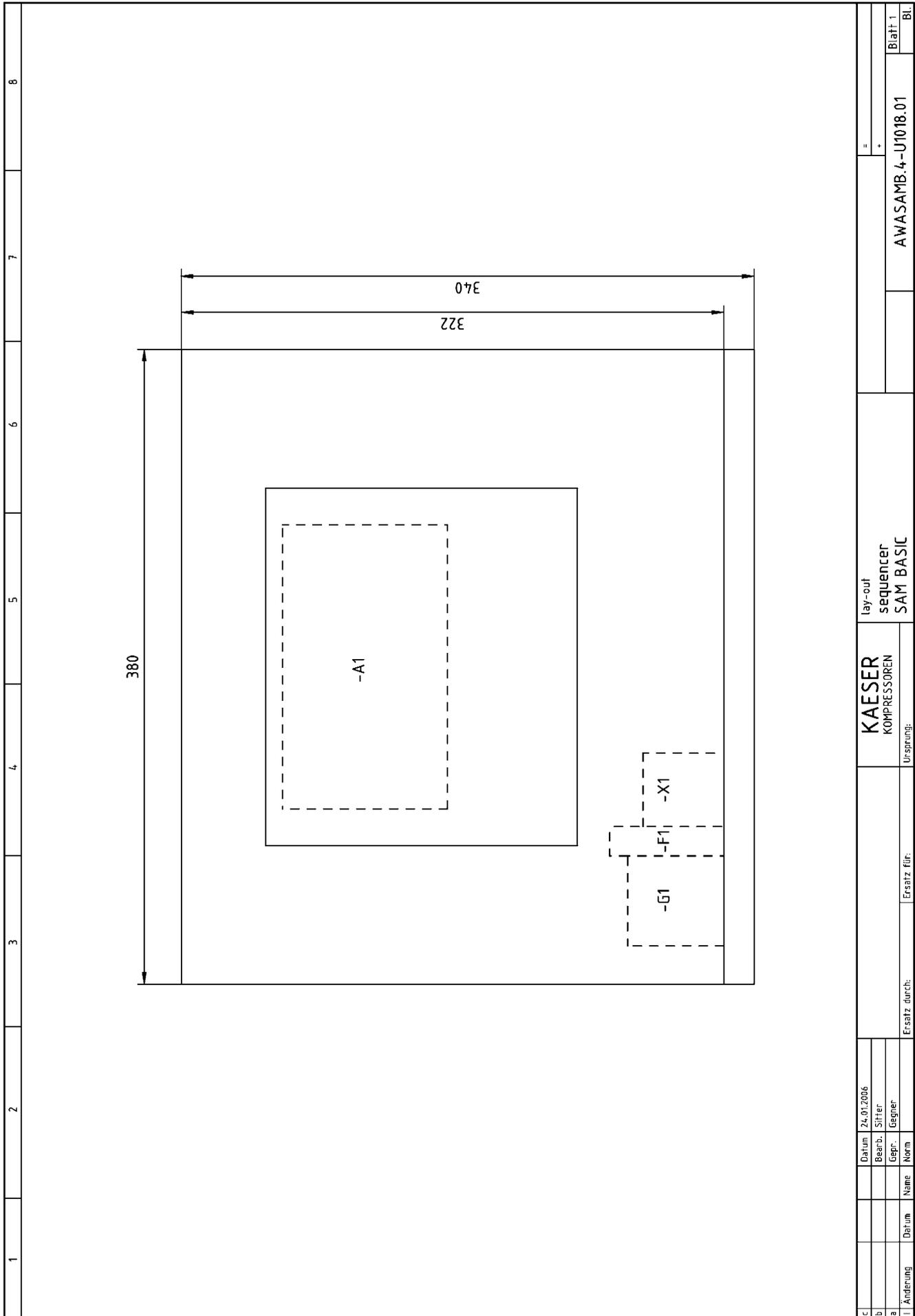
electrical component parts list
sequencer
SAM BASIC

KAESER
KOMPRESSOREN

Ursprung:

Ersatz durch:

Blatt 1
GWASAMB.4-U1018.01
Bl



c	Datum	24.01.2006	KAESER KOMPRESSOREN		lay-out sequencer SAM BASIC	=	AWASAMB.4-U1018.01	Blatt 1
b	Bearb.	SfH'er	KOMPRESSOREN			+		Bl
a	Gepr.	Gegner	Ursprung:					
l	Änderung	Datum	Name	Norm	Ersatz durch:			
					Ersatz für:			

13.11 Menu option Settings – Overview

Menu option Settings «F1» to «F4»

Navigation (menu)	Symbol	Sub-menu options	Chapter
«F1»: Settings		▪ «F1»: System	7.2
		▪ «F2»: Control	7.4
		▪ «F3»: Compressor	7.3
		▪ «F4»: Compressed air system	7.6
		▪ «F5»: Shift clock	7.7
		▪ «F6»: Inputs and outputs	7.8
«F2»: Messages		▪ «F1»: Alarms, warning and service messages	9.2
		▪ «F2»: Operational Messages	8.2.1
«F3»: Choice of language		▪ «F1» + «F6»: Language selection	7.2.2
		▪ «F3»: Notes	
«F4»: Password		▪ «F1»: Log off	7.2.6.1
		▪ «F2»: Password list	7.2.6.2
		▪ «F3»: Key lock	7.2.6.3
		▪ «F4»: Password allocation	7.2.6.4

Tab. 50 Main menu

