User manual

Controller

SIGMA CONTROL 3 FLUID ≥ 1.0.0

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1 About this document

Read the operating manual carefully and ensure you are familiar with the contents before using this product.

This document constitutes an integral part of the product and describes the product at the time of initial delivery following completion. Keep the document throughout the entire lifetime of the product and pass it on to any subsequent owner or user.

For reasons of improved readability, the simultaneous use of the male, female and plural language forms has been dispensed with. All personal designations apply equally to all genders.

Supplement the manual with any amendments that may be provided by KAESER. Provide the data from the nameplate wherever you are asked to do so. This simplifies orientation for every user.

The illustrations in this manual are basic representations, which may differ from the actual in minor details.

Where any menu displays are depicted in this document, these serve as examples only. Menus or functions may be depicted in the document that are not available in the specific product, or will only be introduced at a later point in time.

1.1 Warning notices

Warning notices warn of hazards that can lead to personal injury and provide instructions on how to avoid damage. Warning notices precede actions associated with hazards and also apply to sub-chapters if they precede the chapter.

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

Signal word	Consequence if the hazard is not avoided
DANGER	Hazard with a high level of risk that will result in death or serious injury if not avoided
WARNING	Hazard with a medium level of risk that may lead to death or serious injury if not avoided
CAUTION	Hazard with a low level of risk that may lead to minor or moderate injury if not avoided

Tab. 1 Signal words and their consequences

Example:

⚠ **WARNING**

Description of the hazard, cause and consequences

► Instructions on how to avoid the hazard

1.2 Material damage warnings

Material damage warnings warn of situations that can lead to material/property damage and provide instructions on how to avoid damage. Material damage warnings precede actions associated with risks and also apply to sub-chapters if they precede the chapter.

Material damage warnings are identified by their signal word NOTICE.

Example:

NOTICE

Description of the hazard, cause and consequences

► Instructions on how to avoid the damage

1.3 Symbols and pictograms

Symbols and pictograms in this document draw your attention to information that requires special attention. Follow all instructions provided to prevent damage.

Representation	Meaning	Representation	Meaning
A1	Section or information relating to an optional equipment feature	Softkey	Software-dependent button on display for triggering an operating function
►	This symbol indicates an individual action requirement	1. ... 2. ... 3. ...	A series of action requirements are numbered consecutively. Follow the sequence accordingly.
«Operating element»	Visualisation of an operating element, e.g. a key	*Display element*	Visualisation of a display element, e.g. a control indicator
	Safety-related condition that must be fulfilled in order to be able to perform the subsequent activity		Prerequisite that must be met in order to be able to perform the subsequent activity
	Useful information or information that needs to be observed		Reference to another source of information
	Materials and tools		Spare parts
	Tool		Information or action relating to environmental protection
	Assistance relating to an activity		Assistance relating to an individual action step
	Result of an implemented activity		Result of an individual action step

Tab. 2 Symbols and pictograms

1.4 Copyright

This manual is copyright protected. Should you have any queries relating to usage and duplication of this documentation, please contact KAESER. KAESER will be glad to provide advice regarding the appropriate use of the information.

1.5 Software

The software used for the SIGMA CONTROL 3 contains copyright-protected software packages which are licensed as open source. A copy of these licences is contained in the SIGMA CONTROL 3.
In order to view the licences, open the “COPYING” file in the SIGMA CONTROL 3 root directory on a browser:
http://<Hostname>/COPYING

Alternatively, the licences can be viewed at the following address:
http://www.gnu.org/licenses
http://code.google.com/p/curve25519-donna/

Within three years of receiving your SIGMA CONTROL 3, you may obtain the complete source code for the copyright-protected KAESER software packages by order to the following address:

K&E Elektrokonstruktion
KAESER KOMPRESSOREN SE
96450 Coburg, P.O. Box 2143
Germany

2 Technical data

2.1 SIGMA CONTROL 3 controller

SIGMA CONTROL 3 consists of an industrial PC that provides a multitude of functions:

- Internal controller temperature monitoring
- Undervoltage monitoring
- Proximity sensor on display
- Real-time clock with battery buffer (battery life: > 10 years)

2.1.1 Versions and options

Option/Type	SC3S	SC3M	SC3L
Diagonal display	5" 12.7 cm	5" 12.7 cm	7" 17.8 cm
Interfaces	Digital and analogue inputs and outputs integrated	Digital and analogue inputs and outputs integrated	—
	—	Slot for optional KAESER communications module	Slot for optional KAESER communications module
	—	Input/Output Module (IOM)	Input/Output Module (IOM)
	—	Internal machine interface (e.g. for converter)	Internal machine interface (e.g. for converter)

Tab. 3 Versions and options

2.1.2 Mechanical and electrical data

Option/Type	C61 SC3S	C62 SC3M	C63 SC3L
Material	Plastic	Plastic	Plastic
Width [mm]	162	202	202
Height [mm]	138	153	153
Depth [mm]	96	96	74
Protection rating, exterior / interior	IP54 / IP20	IP54 / IP20	IP54 / IP20
Working ambient temperature [°C]	-20 – 60	-20 – 60	-20 – 60
Voltage [V DC]	24	24	24
Current [A]	2.3	2.4	1.0
Voltage source	External	External or I/O module	I/O module

Tab. 4 Mechanical and electrical data

2.1.3 Interfaces

2.1.3.1 SC3S interfaces

Fig. 1 SC3S interfaces

Identification	Interface	Function
X1	Ethernet (10 / 100 / 1000 Base T), RJ45	SIGMA NETWORK / customer network
X2	Mini-Fit Jr 4.2, 6-pole, pins	Voltage supply 24 V DC, Modbus RTU / USS
X5	Slot for SD memory card	Software update with SD memory card
X6 X13	Flat plug 6.3 mm	Functional earthing (FE)
X7	Pin header 3.5 mm, 12-pole	6 x digital inputs
X8	Pin header 3.5 mm, 8-pole	2 x digital inputs 2 x digital outputs
X9	Pin header 3.5 mm, 16-pole	2 x analogue input current 3 x analogue input resistor
X10	Pin header 5.08 mm, 14-pole	6 x digital output relay
X11	Ethernet (10 / 100 / 1000 Base T), RJ45	IoT interface / customer network
X14	Battery holder for BR2032 or CR2032	Buffer battery for real-time clock

Tab. 5 SC3S interfaces

2.1.3.2 SC3M interfaces

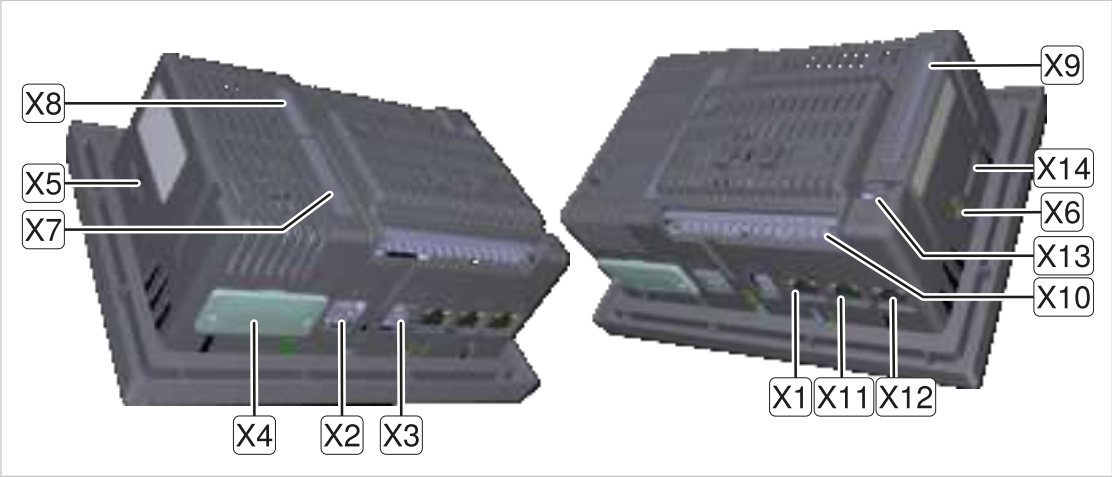

Fig. 2 SC3M interfaces

Identification	Interface	Function
X1	Ethernet (10/100/1000 Base T), RJ45	SIGMA NETWORK / customer network
X2	Mini-Fit Jr 4.2, 6-pole, pins	Voltage supply 24 V DC, connection to I/O modules
X3	Mini-Fit Jr 4.2, 4-pole, pins	Modbus RTU / USS
X4	Slot for optional KAESER communications module.	▪ C41 PROFIBUS ▪ C44 Modbus TCP ▪ C45 PROFINET IO ▪ C50 EtherNet/IP
X5	Slot for SD memory card	Software update with SD memory card
X6 X13	Flat plug 6.3 mm	Functional earthing (FE)
X7	Pin header 3.5 mm, 12-pole	6 x digital inputs
X8	Pin header 3.5 mm, 8-pole	2 x digital inputs 2 x digital outputs
X9	Pin header 3.5 mm, 16-pole	2 x analogue input current 3 x analogue input resistor
X10	Pin header 5.08 mm, 14-pole	6 x digital output relay
X11	Ethernet (10/100/1000 Base T), RJ45	IoT interface / customer network
X12	Ethernet (10/100/1000 Base T), RJ45	Internal machine interface (e.g. for converter)
X14	Battery holder for BR2032 or CR2032	Buffer battery for real-time clock

Tab. 6 SC3M interfaces

2.1.3.3 SC3L interfaces

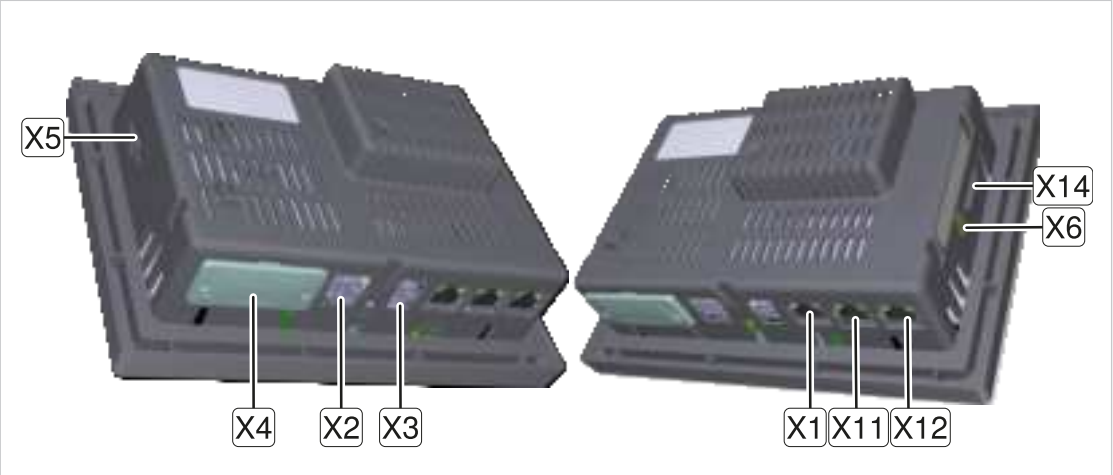

Fig. 3 SC3L interfaces

Identification	Interface	Function
X1	Ethernet (10 / 100 / 1000 Base T), RJ45	SIGMA NETWORK / customer network
X2	Mini-Fit Jr 4.2, 6-pole, pins	Voltage supply 24 V DC, connection to I/O modules
X3	Mini-Fit Jr 4.2, 4-pole, pins	Modbus RTU / USS
X4	Slot for optional KAESER communications module.	▪ C41 PROFIBUS ▪ C44 Modbus TCP ▪ C45 PROFINET IO ▪ C50 EtherNet/IP
X5	Slot for SD memory card	Software update with SD memory card
X6 X13	Flat plug 6.3 mm	Functional earthing (FE)
X11	Ethernet (10 / 100 / 1000 Base T), RJ45	IoT interface / customer network
X12	Ethernet (10 / 100 / 1000 Base T), RJ45	Internal machine interface (e.g. for converter)
X14	Battery holder for BR2032 or CR2032	Buffer battery for real-time clock

Tab. 7 SC3L interfaces

2.1.3.4 Reader for user login

Characteristic	Value
SIGMA CONTROL 3 controller hardware	Reader
Hardware (external)	KAESER key
Maximum distance for short-range detection [mm]	50
Frequency [MHz]	13.56
Maximum transmit power emitted at 10 m distance [dB(μA / m)]	11

Tab. 8 RFID

The reader transmits at a frequency of 13.56 MHz and is permitted for use in EU member states.

2.1.3.5 WLAN interface

Characteristic	Value
WLAN standard	IEEE 802.11 a/b/g/n/ac/ax
Range in line of sight [m]	10
Antenna	Integrated
Frequency [GHz]	2.4

Tab. 9 WLAN interface

2.1.4 Display

Characteristic	Value	Value	Value
Option / Type	C61 SC3S	C62 SC3M	C63 SC3L
Diagonal display	5" 12,7 cm	5" 12.7 cm	7" 17.8 cm
Width [mm]	110	110	155
Height [mm]	65	65	90
Display resolution [pixels]	800 x 480	800 x 480	1024 x 600
Display type	Colour display with capacitive touchscreen	Colour display with capacitive touchscreen	Colour display with capacitive touchscreen
Background illumination	LED	LED	LED

Tab. 10 Display

2.1.5 SC3S/SC3M inputs and outputs

Input / Output	Quantity
Digital input (DI), 24 V DC	8
Digital output transistor (DOT), 24 V DC, 0.5 A	2
Analogue input current (AII), 0 – 20 mA	2
Analogue input resistor (AIR), Pt100	3
Digital output relay (DOR), 250 V AC, 4 A	6

Tab. 11 Number of internal inputs and outputs

Maximum cable lengths

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

Tab. 12 Cable lengths

3 Safety and responsibility

This product is manufactured to the latest engineering standards and in accordance with acknowledged safety regulations. Nevertheless, dangers can arise through its use:

- Danger to life and limb for the operator or third parties.
- Damage to the product and other property.

To prevent injury, follow all safety instructions.

Only use the product as intended.

Only use the machine when in perfect technical condition. Resolve safety-relevant faults immediately.

3.1 Intended use

SIGMA CONTROL 3 is designed exclusively for controlling the machine in which it has been installed at the factory. Any other use shall be considered improper. The manufacturer shall not be liable for any damage that may result from improper use. The operator shall be solely liable for any risks incurred.

Comply with all instructions contained in this document and the machine operating manual.

Only operate the product within its performance limits and under the permissible ambient conditions.

3.2 Improper use

Always use the SIGMA CONTROL 3 only as intended.

Do not use the SIGMA CONTROL 3 to control machines or products other than those for which it is intended.

3.3 Cybersecurity

- All data are transmitted unencrypted via the communications module.
- Any user who can access the data stream is in a position to read the machine data and to control the machine.

Ensure the following for secure operation of the machine or product:

- The controller is not publicly accessible via the Internet.
- A router or firewall is installed upstream of the controller.
- Only authorised personnel have access to the controller.
- If provided: A broken warranty seal may indicate the controller has been tampered with.
- The communications module is not publicly accessible via the Internet.
- The communications module is only accessible to end devices that are permitted to receive data from the machine and to control the machine.

4 Design and function

4.1 Touchscreen display

SIGMA CONTROL 3 is operated via a full graphic, colour touchscreen display.

The main menu consists of multiple pages that can be selected by swiping the screen.

Main menu

In the Main menu, time curves for the *Network pressure pNloc* and *Airend discharge temperature ADT / Block discharge temperature BDT* are displayed, in addition to important operating states and machine data.

Fig. 4 Main menu page 2

No.	Menu element	Description	See chapter
1	☰	Open the Navigation bar	4.1.2 Navigation bar
2	⏻	Open the ON / OFF Control bar	4.1.3 ON / OFF Control bar
3	Status bar	Display status information	4.1.1 Status bar
4	—	Display operating states and machine data	—
5	Operating state indicator	Current operating state indicator Open the ON / OFF Control bar by swiping left over the Operating state indicator	—
6	●○●	Current main menu page indicator	—
7	Message indicator	Display new messages Open the Navigation bar by swiping right over the Message indicator	—

Tab. 13 Main menu page 2

4.1.1 Status bar

The status bar in the upper part of the display provides important status information at a glance regarding the machine and the controller. Content is displayed dynamically in accordance with the priority level of the information. High-priority notifications take precedence over notifications of lower priority until the cause has been rectified.

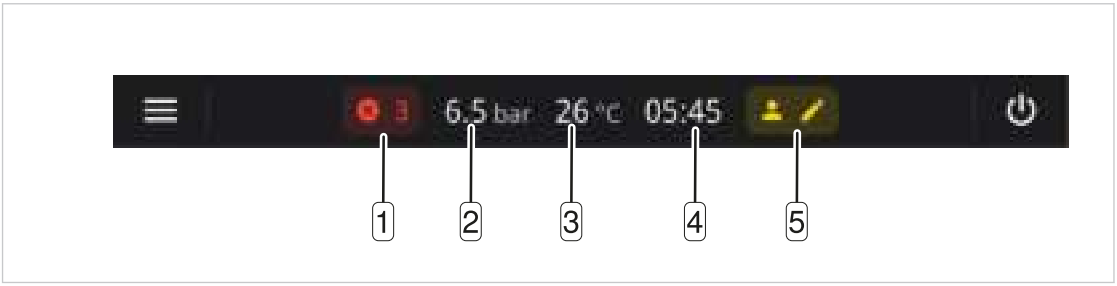

Fig. 5 Status bar – Content examples

No.	Menu element	Description
1	Messages	Number of pending messages
2	Network pressure	Current *Network pressure pNloc*
3	Temperature	Current *Airend discharge temperature ADT / Block discharge temperature BDT*
4	Time	Current time
5		Current role and access level of logged-in user. Tapping here opens the *Current user* menu

Tab. 14 Status bar – Content examples

4.1.2 Navigation bar

The Navigation bar 3 is opened by tapping on the ☰ menu element 1 or by swiping from left to right across the message indicator bar 2.

Fig. 6 Opening the Navigation bar

1 ☰ menu element “Menu”
2 Message indicator bar
3 Navigation bar

Menu element	Menu
	Main menu
	Messages
	Maintenance
	Monitoring
	User
	Settings
	Help

Tab. 15 Navigation bar

4.1.3 ON/OFF Control bar

The ON/OFF Control bar [2] is opened by tapping on the ⏻ menu element [1] or by swiping from right to left across the operating state indicator bar.

Fig. 7 ON/OFF Control bar

[1] ⏻ menu element
[2] ON/OFF Control bar

Menu element	Operating element	Description
	ON	Switch the machine on
	OFF	Switch the machine off
	TIME CONTROL	Switch time control on / off
	REMOTE CONTROL	Switch remote control on / off
	IDLE	Force IDLE operating point

Tab. 16 ON/OFF Control bar

4.2 User login

Two access levels are available for user login to the controller:

- Monitoring mode
- Operating mode

Settings can be entered with the *Operating mode* access level.

Login takes place using the KAESER key supplied for this purpose.

Alternatively, login can be achieved by manual input of a Username and Password. To do so, a corresponding user account must first be created.

Fig. 8 User login with KAESER key

1 User login menu element
2 SIGMA CONTROL 3
3 Reader
4 KAESER key