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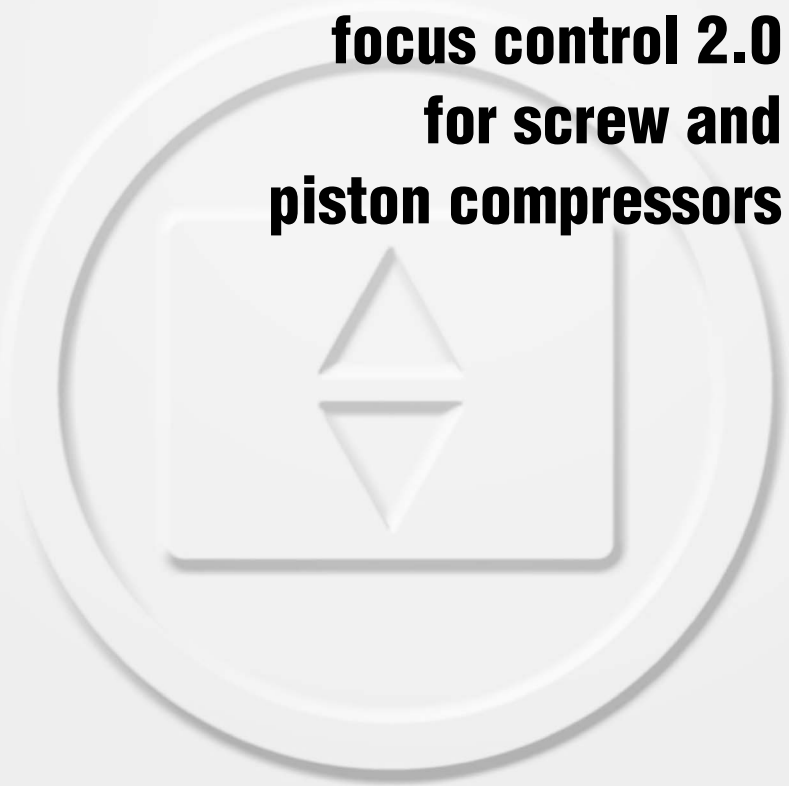
COMPRESSED AIR SYSTEMS

Operating instructions

focus control 2.0 for screw and piston compressors



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Operating instructions **focus** control 2.0 for screw and piston compressors

IMPORTANT!

READ CAREFULLY BEFORE USE

KEEP OPERATING INSTRUCTIONS FOR FUTURE REFERENCE

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Index

1.1 Who are these operating instructions intended for?

These operating instructions are intended for BOGE end customers, who have purchased a compressor and want to operate it using **focus** control 2.0 as compressor control.

They are also intended for customers who want to use **focus** control 2.0 as master control to operate several linked compressors effectively within a multiple compressor system.

Besides reading these operating instructions the following qualifications and technical knowledge are required from the operator for a professional operation of the control:

– knowledge of the compressor / compressors
– knowledge of the appertaining operating instructions
– classification as qualified or appropriately trained personnel with technical background knowledge in compressed air technology (see also „Personnel requirements“, page 7).

1.2 Contents of the operating instructions

The operating instructions exclusively deal with functioning, operation and parameterisation of the **focus** control 2.0.

The following contents and descriptions of activities **do not form part** of these operating instructions:

– All safety-relevant information as to the individual compressors. They form part of the compressor operating instructions.
– Work such as electrical commissioning or repair of the control.
– Any work on the control necessitating the opening of the swich cabinet, e.g. the installation of software updates.
– Any work on compressors and accessories (e.g. installation, commissioning or connection to the control).

DAny of the above mentioned work may **only** be performed by authorised and qualified electricians or BOGE service personnel.

BOGE recommends to have control, compressor(s) and accessories set up and commissioned by BOGE service personnel. Any maintenance and repair work on the control may also be carried out by BOGE service personnel.

Please contact your BOGE-Service by calling phone number:

Telephone: +49 5206 601-140

1.3 Additional important documents and specifications

For any work not described in these operating instructions the following documents and specifications are required:

– the operating instructions of the compressor;
– the operating instructions of the connected accessories.

Additionally, when operating several compressors within a multiple compressor system:

– the operating instructions of all connected compressors;
– the operating instructions of the controls of all connected compressors.

Please observe the specific safety information provided in these documents!

Below you will find directions how to read these instructions and information as to the design of the warning signs.

1.4 Orientation aid for reading these instructions

Helping to quickly understand and operate the compressor control the layout of these operating instructions is conceived to find your way through.

Symbols and typographic features

The following table provides an overview of all symbols and typographic features meant to facilitate the reading:

Symbol	Meaning
	**Setup mode** In this section, settings can only be made after release via the access card (RFID-tag), see chapter „RFID identification field (1)“, page 12.
	**Tips and further notes for optimum handling** **Tips and notes helping to optimally operate the control are marked with the illustrated symbol.**
– Information 1 – Information 2 – Information 3	**Listing** **For a clear and understandable presentation some important information are listed up.**

Symbol	Meaning
● Action step	**Instructions I** Instructions with **one action step** only are indicated with the symbol shown.
1. Action step 1 2. Action step 2 3. Action step 3	**Instructions II** Instructions with **several action steps** are numbered and must be carried out in the specified sequence.
→ Feedback for action step	**Feedback** **The result to be expected after an action step is indicated with the arrow shown on the left.**
(1) **(2)** **(3)**	**Illustrations** The illustrated displays of the operating unit are possibly subdivided by frames. The individual frames are numbered.

Tab. 1.1: Overview of all means of design for a better reading of the operating instructions

Design of warning signs

The warning notes in these instructions are to indicate dangers that may occur during execution of specific actions. Apart from this, they point out how a danger situation can be prevented. Warning signs are designed according to a fixed structure, described in the following.

Signal words

The following signal words are used:

Signal word	Meaning
WARNING	Warns of dangers that can possibly lead to serious or fatal injuries.
CAUTION	Warns of damage to property and loss of data
NOTE	Warns of malfunctions within the operating process/communication

Warning signs

The following warning signs are used:

Warning signs	Meaning
	Warns of a potential hazardous area
	Warn of life threatening electrical voltage levels

Warning sign design

Warning signs are a combination of signal words, warning signs and information text and structured as follows:

	**SIGNAL WORD** **Kind of danger** Source of danger and consequences if the warning is not observed. ➔ How to avoid danger.

2.1 Basic information on safety

Prior to commissioning and operation

Prior to commissioning and operation of **focus** control 2.0 the following points must be observed:

- These operating instructions must be read completely prior to commissioning/operation of the control.
- These operating instructions must be available at the place of operation, at all times.
- Parameterisation and changing of settings to be carried out by authorised qualified personnel only, see also „Personnel requirements“.
- Work on the control making the opening of the switch cabinet necessary are to be carried out by authorised qualified electricians only, see also „Personnel requirements“.
- Prior to first commissioning, check operating unit for visible signs of transport damage.
- Damages to the control that impair a safe operation of the machine must be repaired at once.

Intended use

The control serves solely for the correct operation of one or several BOGE screw or piston compressors and connected accessories, if applicable.

Reasonably foreseeable misuse

The control is neither suitable for the operation and control of other types of compressed air generators nor for the operation and control of compressors from other manufacturers.

2.2 Special safety notes

Switch cabinet

The control is installed in a switch cabinet.
The operating unit is installed in the front of the switch cabinet. Operating of the control is only possible by means of the operating unit with closed switch cabinet.

WARNING

Danger of electric shock

Live parts are installed inside the switch cabinet. After opening the switch cabinet there is the serious danger of an electric shock.

➔ Never open switch cabinet during operation.

➔ Operate control with closed switch cabinet only.

➔ Switch cabinet to be opened by qualified electricians only.

Please observe that these operating instructions must only be used to make settings that can be executed via the operating unit of the control.

Emergency stop function

The emergency stop function is used to remove/prevent a present emergency situation that arises from the behaviour of persons or an unexpected dangerous event.

The emergency stop function is covered by the operating element of the emergency stop button. Actuating the emergency stop facility will stop compressor operation at once; the switching cabinet and control continue to be live.

The button is not on the operating unit of the focus **control** 2.0, but is attached well visibly at the front of the compressor housing.

CAUTION

Compressor damage

Improper use of the emergency stop button e.g. for operational tripping of the compressor, can damage or destroy the compressor.

➔ Use Emergency Stop button only to avert/prevent an emergency situation.

➔ Make sure to actuate the OFF key on the control for operational tripping of the compressor.

Change of parameters / settings

The control controls the compressor via specified parameters/settings. The individual parameters represent the values with which the operating functions of the compressor can be changed (e.g. the pressure range) so that the compressor can produce compressed air on demand. However, wrong settings may also cause faults in the operating process or destruction of the compressor.

CAUTION

Compressor damage

A change of parameters/operation-relevant settings that affect the compressor function and operation may damage or destroy the compressor.

➔ Change of parameters/settings to be carried out by authorised qualified personnel only.

➔ In case of doubt please contact BOGE service prior to changing relevant operational settings.

Data backup

The **focus** control 2.0 saves all data such as settings on the base module. In parallel these data should be backed up in regular intervals on the operating unit of the control:

CAUTION

Loss of control settings

Due to faults and/or a faulty base module control settings can be lost.

➔ Save control settings with the save function "Save settings" on the operating unit (via dialogue window, see also table „Listing of functional key assignments“, page 13).

Save function "Save settings" on the operating unit

The operating unit, as well as the base module, have a remanent data storage on which control settings can be saved with the function "Save settings". Therefore, always use the option of saving the data in the operating unit before and after successfully changing any settings. If the data storage on the base module is defective, the data can be recovered from the memory of the operating unit at any time.

Damages to the operating unit

All keys of the operating unit are actuated by tapping with a finger. Slight tapping on the surface of the operating unit is enough to actuate the individual keys. Never use any pointy or scratching objects for operation. BOGE assumes no liability for damage caused by improper use.

2.3 Owner and personnel

Personnel requirements

Basically only those persons may carry out activities on the control who perform their tasks duly and reliably and meet the following requirements:

Trained personnel

Trained personnel are persons who have been instructed in a verifiable and detailed manner by the owner about their assigned tasks and any potential risks in this conjunction.

Qualified personnel

Qualified personnel are persons who, due to their professional training, knowledge and experience as well as their awareness of the relevant regulations, are in a position to carry out the tasks assigned to them and be able to autonomously identify any potential hazards and to prevent personal injury or property damage.

Qualified electricians

Qualified electricians are persons who, due to their professional training, knowledge and experience as well as their awareness of the relevant standards and regulations, are in a position to properly carry out work on electrical installations, to autonomously identify any potential hazards and to prevent personal injury or property damage caused by electric current.

In these instructions, it is clearly noted what qualifications profile a person must comply with to perform the respective work before describing any work that requires special knowledge.

Owner's obligations

The operator is subject to the statutory obligations for occupational safety and must be informed about the valid health and safety regulations. Furthermore:

- The operator must authorise the electricians for work at the control cabinet.
- The operator must only provide the key for opening the control cabinet to electricians who have been authorised by him to perform work at the control cabinet.
- The operator must authorise specialist staff performing parameter settings/ changing settings of the control.

Obligations of the personnel

The personnel is subject to the statutory obligations for occupational safety and must be informed about the valid health and safety regulations. Furthermore:

- The personnel must have completely read the operating instructions prior to commissioning/operation of the control.
- The same applies to operating instruction(s) for compressor(s) and accessories.
- The staff must have been authorised based on these instructions for any work that they may perform depending on their qualification.

3.1 Function principle of the control

The compressor control is the central operating element of the compressor system.

The compressor control with switch cabinet is integrated into the front of the compressor housing and directly connected to the compressor. This means that it is ready for operation as soon as the compressor is connected to the power supply.

General tasks of the control

The primary task of the control is the monitoring of all functions of the compressor system. Via the control display, information as to the operation of the compressor can be called up and controlled. These include information as to the current operating status of the compressor, servicing dates or operating hours (see „Main displays“, page 15 et seqq.).

The second essential task of the control is adjustment of the functions that are important for demand-oriented use of the compressor. This means that the compressor parameters needed for the compressor to produce compressed air according to individual requirements can be set via the control. This includes, e.g., setting the pressure to be produced or specification of the period in which the compressor is to produce compressed air. (see „Set parameters“, page 57 et seqq.).

Utilisation as higher level control in a multiple compressor system

Furthermore the control offers the possibility to organise the operation of various compressors within a network i.e. to control the compressed air production within a multiple compressor system.

The higher-level **focus** control 2.0 of a compressor operates as Master. Via its switch cabinet up to three additional compressors can be connected by means of their own individual controls. They operate in Slave mode, i.e. they are lower-level controls.

The lower-level controls monitor and control only the settings and operation of their own compressor and must be set up according to the specifications of the higher-level **focus** control 2.0 so that no conflicts with the higher-level control can result. (also see the following figure on page 10).

The coordinating interaction of the compressors in the compressor network and the high efficiency of the compressed air production are only controlled by the higher-level **focus** control 2.0.

Connection of lower level controls

Compressors with the BOGE controls **focus** control 2.0, FOCUS and PRIME can be connected directly to the higher-level **focus** control 2.0 as an example. These compressors are connected with a serial RS485 interface by Modbus-RTU protocol.

Compressors that do not have a control with suitable Modbus-RTU interface (e.g. BOGE base control) are connected to the RS485-interface of the higher-level focus control 2.0 via a Modbus-Interface module (Modbus I/O).

For connected compressors (also compressors connected via a Modbus interface module) the Modbus addresses 2 to 4 are reserved.

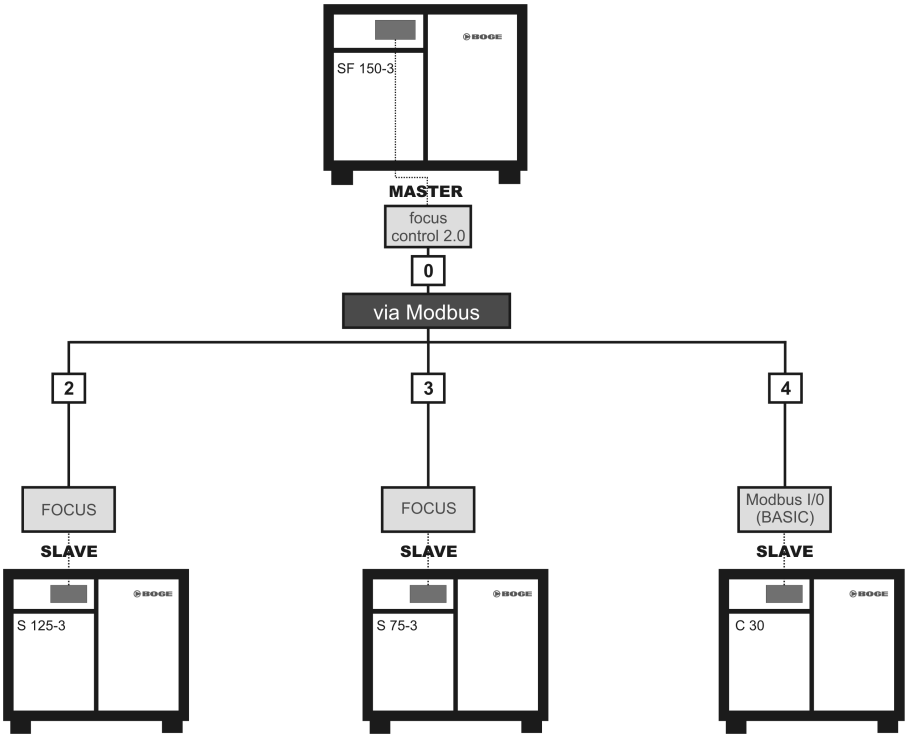


*Fig. 3.1: **focus** control 2.0 as master control in a multiple compressor system – example*

3.2 Design of the operating unit

The operating unit of the focus control 2.0 is designed as follows:

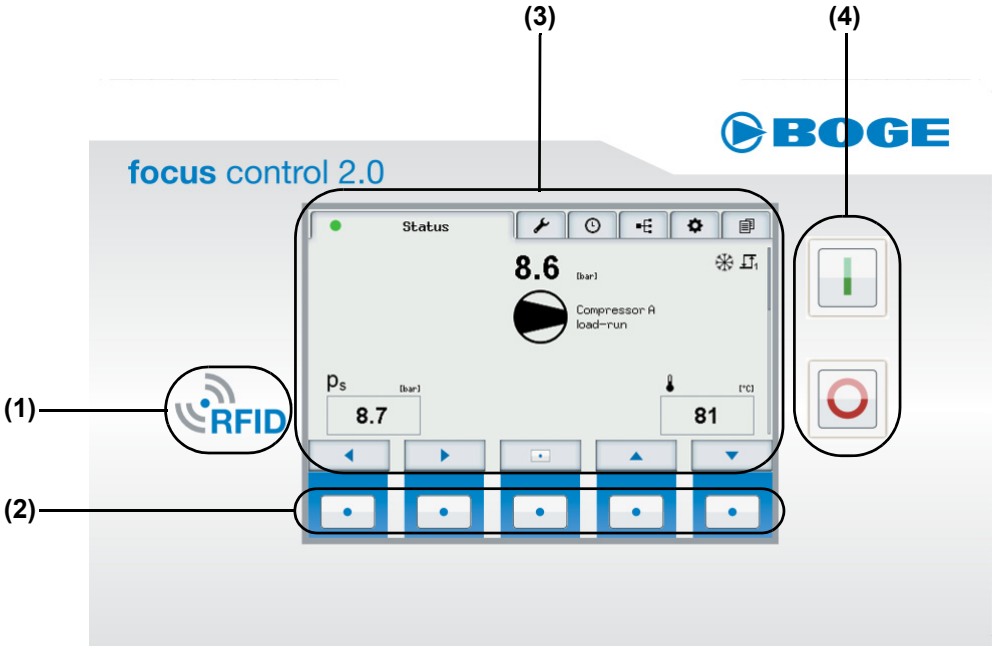


*Fig. 3.2: **focus** control 2.0 – Operating unit*

The operating unit can be structured into four areas that differ from each other due to their function:

Range	Designation	Function
(1)	RFID identification field	User identification via RFID sensor
(2)	Operating area	Operation via 5 functional keys
(3)	Display	Visual user information
(4)	On/Off control panel	Compressor operation via On/Off key

*Tab. 3.1: **focus** control 2.0 – Functional areas*

The individual areas and their functions are described in detail below.

RFID identification field (1)

Together with the control, several access cards (RFID-tags) are delivered. They can differ depending on the user rights filed. To perform certain settings at the control or to confirm messages, the user must release the control with the RFID tag by holding the tag in front of the RFID identification field. Via a sensor in the identification field, the control recognises the user rights stored on the card and releases the rights for access to the control accordingly. Release is possible at all times, no matter the display view in which the user is.

In addition to setting parameters and confirming messages, special actions can be performed via a dialogue window after the corresponding release. The dialogue window can be called after release via the middle function key in the main display "Status".

As soon as the sensor in the identification field recognises and evaluates an RFID tag, the symbol on the top left side of the display shortly flashes.

If no key of the control is pressed for 10 minutes after log in and enabling of user rights, the control logs the user automatically out and the additional user rights are disabled again.

Operating area (2)

By means of the operating area of the control the user can navigate between the individual displays and set the control. For this purpose so-called functional keys are available:

Key	Designation	Function
	Functional key	This key is located five times below the display and can be assigned various functions. The changing function assignments are displayed visually above each function key (see following table).

*Tab. 3.2: **focus** control 2.0 – Functional keys*

Assignment of the functional keys

The functional keys of the control can be assigned as follows:

Symbol	Function/Meaning
	Navigate to the left. In case of permanent actuation navigation speeds up.
	Navigate to the right. In case of permanent actuation navigation speeds up.
	This function is used for selecting the previous (one position above) object. In some cases this function also serves – in case of continuous activation – for fast upward scrolling.
	This function is used for selecting the next (one position below) object. In some cases this function also serves – in the event of continuous activation – for fast downward scrolling.
	Key lock inactive. If this key is pressed for approx. 6 seconds, all functional keys will be blocked. An operation of the control by means of the functional keys is no longer possible.
	Key lock active. If this key is pressed for approx. 6 seconds, all functional keys will be released. An operation of the control by means of the functional keys is possible again.
	To call up a display including more detailed information.
	To increase a value. When the highest value is reached, the lowest value is displayed as soon as the key is pressed again.
	To reduce a value. When the lowest value is reached, the highest value is displayed as soon as the key is pressed again.
	To make a selection/go down one level (e.g., to make a value editable).
	To confirm an input. To acknowledge a message.
	Leave a selection/move one level higher. ((Exit function).
	Terminate an action.
	Only in main display "Status" and after enabling of RFID tag: Call up **dialogue window** for special actions (save settings, start efficiency calculation, start Service-run, start forced idling, log out as user).

Tab. 3.3: Listing of functional key assignments

The key lock has no effect on the switching area of the control. This means that the ON/OFF key can be used even with activated key lock.

The key lock can only be activated/deactivated in the main display "Status".

Display (3)

The display of the control serves to provide you with an overview of the individual functions of the control, monitor compressor operation, to make settings and correct them if required.

The function keys below the arrows  in the display permit navigation through the individual main displays/tabs:

– With the right arrow functional key clockwise.
– With the left arrow functional key anti-clockwise.

Depending on whether you use the right or left arrow functional key you navigate to the individual main displays / tabs:

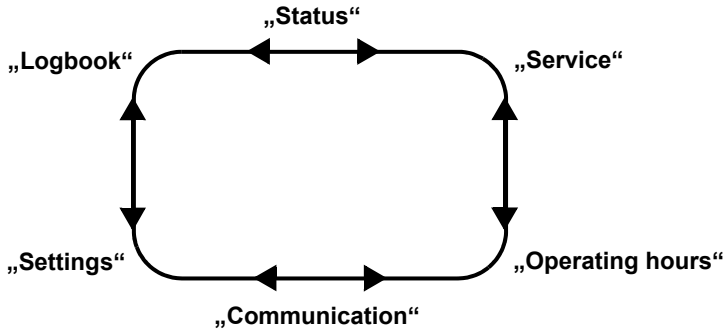


Fig. 3.3: Navigation through main displays

If no key of the control is pressed for 10 minutes the brightness of the screen and display is reduced to save energy and reduce wear.

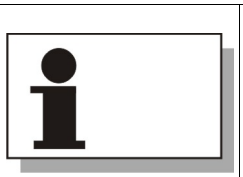
By pressing any key (apart from OFF key) the original brightness of the display is restored.

On/Off control panel (4)

The ON and OFF keys, enabling the On and Off switching of the compressor, are located on the On/Off control panel:

Key	Designation	Function
	On key	– Press 2 times: Switch on compressor.
	OFF key	– Press 2 times: Switch off compressor. – Press 2 times: Enable control (when compressor and control were disconnected from the power supply and are now supplied with power again).

Tab. 3.4: Functions of On/Off key



The functions of the On/Off key relate exclusively to the operation of the compressor.
To switch the control completely off the compressor must be disconnected from the power supply as it supplies the control with power.

4.1 Main display „Status“

In this chapter the six main displays of the control including the meaning of the illustrations and settings are described.

After connection to the power supply **focus** control 2.0 is ready for operation and enabled by pressing the OFF key twice (see also „On/Off control panel (4)“, page 14).

After being enabled the main display "Status" appears on the control. Use arrow functional keys ◄ ► to navigate from this display to each of the other main displays.

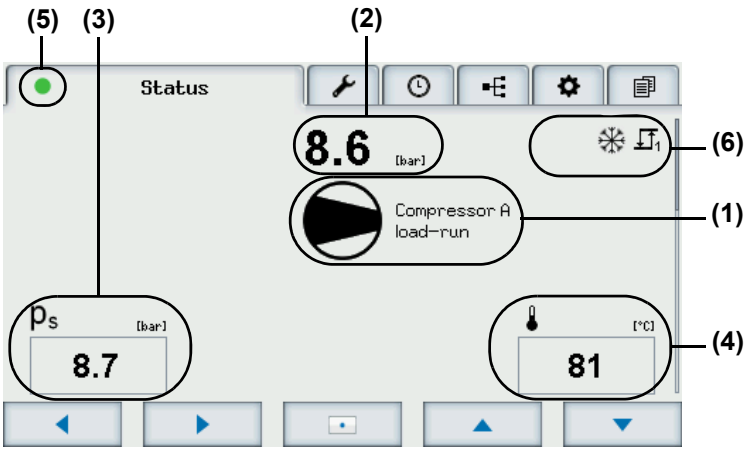


Fig. 4.1: Main display „Status“

For the user to quickly view the most important information on the current operating condition of the compressor, they are displayed in the main display "Status":

The display contains the following information:

– Current operational status of compressor **(1)**
– Current net pressure (p_n) **(2)**
– Current system pressure (p_s) **(3)**
– Current final compression temperature **(4)**
– Higher-level information as to the compressor system **(5)**
– Information as to the active compressor configuration **(6)**
– Current compressor utilisation (only with frequency controlled compressors in main display and main display „Status“ – sub-view I)
– Time diagram of the previous 60 minutes as to the development of the net pressure (see main display "Status" – sub-view I)
– Current differential pressure (see main display „Status“ – sub-view II)
– Dryer tendency (only if built-in dryer is available in main display "Status" – sub-view II)
– Only with multiple compressor system operation: Sub-view Master

Current operational status (1)

In the centre of the display the current operating status of the compressor is shown in symbols. The following symbols may appear:

Symbol	Meaning
	Compressor is switched off
	Compressor in load-run
	Compressor in idle-run
	Compressor ready (for operation)
	Compressor fault
	Communication fault

Tab. 4.1: Compressor operating status – symbols and meaning

Current net pressure (2) and system pressure (3)

The current net and the current system pressure are essential criteria in control of compressed air production. Both values differ in their definition:

Range	Designation	Definition
(2)	Net pressure (p_n)	The term current net pressure p_n refers to the air pressure within the pipeline network, i.e. the pressure with which the compressed air is discharged from the compressor and can be used.
(3)	System pressure (p_s)	The system pressure p_s determines the air pressure inside the compressor up to the point where the compressed air is fed into the line network.

Tab. 4.2: Definition of net and system pressure

Current final compression temperature (4)

This value specifies the temperature, which is measured in the compressed air directly after the compression process.

Higher-level information as to the compressor system (5)

In this area, there is superordinate information on the current condition of the compressor system. The symbol shown here is visible in all main displays. The following symbols may appear:

Symbol	Designation	Meaning
	Green dot	No fault or warning/servicing message are indicated. The compressor is fully operational.
	Yellow message triangle	The control signals a warning/service message. The compressor remains operational.
	Red cross	The control signals a fault. The compressor is switched off.
	User logged in (can be displayed additionally to one of the three symbols above)	Condition: The control is enabled via the RFID tag – one user is logged in. Only then will this symbol flash alternatingly with one of the three upper symbols, no matter the main display you navigate to..
	RFID symbol	The sensor in the RFID identification field has recognised an access card (RFID-tag) and evaluates it. (Symbol flashes briefly).

Tab. 4.3: Information as to the compressor system – Symbols and meaning

Information as to the active compressor configuration (6)

In this area, information on the currently active settings of the compressor system is displayed as symbols. The following symbols may appear:

Symbol	Designation	Meaning
	Anti-freeze active	Anti-freeze function was parameterised and is active. As soon as the compressor works in anti-freeze operation this symbol is flashing.
	Auto-restart activated	Auto-restart function was parameterised and is active.
	User logged in	Control enabled via RFID tag – one user is logged in.
	Pressure range 1 active	Settings of pressure range 1 active.
	Pressure range 2 active	Settings of pressure range 2 active.
	Pressure range 0 bar/psig active	Currently no compressed air production (0 bar/psig). This pressure range can only be set via timer function.
	Timer channel active	The compressed air production is time-dependently controlled by the timer. In this case switch clock channel 1 is active.
	Key switch function active	Symbol appears if **P2.65** is not set to "Local" and the key switch is set to position "Remote".
	External On/Off: Compressor switched on (green symbol)	On/Off function active **(P2.65)**. The compressor is remotely/externally switched on/off. Currently the compressor is switched on.
	External On/Off: Compressor switched off (red symbol)	On/Off function active **(P2.65)**. The compressor is remotely/externally switched on/off. Currently the compressor is switched off.
	External pressure control on demand	External demand (e.g. by master control) is active, currently the compressor produces compressed air.
	External pressure control without demand	External demand (e.g. by master control) is active, currently the compressor does not produce compressed air.
	Frequency control deactivated at higher level	The higher-level control has deactivated the frequency control of the compressor. The compressor runs as fixed machine.
	USB stick connected	USB stick is connected to the control.
	USB stick saves	Connected USB stick records operating data (Logging) and should not be removed. In case the USB stick was removed the symbol is flashing.
	Interface connected	RS485 interface on base module programmed as Slave. Connection exists.
	Interface not connected (symbol with yellow triangle, right-hand side below)	RS485 interface on base module programmed as Slave. Connection does no longer exist (for more than one minute). This symbol does not appear if no connection existed so far or it was interrupted for more than one week.

Tab. 4.4: Currently active compressor configuration – symbols and meaning

The compressor in the example illustration above („Main display „Status““, page 15) is consequently fully operational and in load-run. Currently anti-freeze function and pressure range 1 are active.

Compressor utilisation (frequency controlled compressors)

For frequency-controlled compressors, the main display "Status" contains the current compressor utilisation as additional information. This value is displayed under information on the current operating condition **(1)**:

The compressor utilisation is indicated in % and has the maximum delivery volume as reference value. At a value of 100 %, the compressor conveys its maximum possible output volume; at 75 %, it only conveys 3/4 of the possible output volume.

The main display "Status" has further sub-views. They are called up with the arrow function keys [▲] [▼]:

Sub-view I – Development of net pressure

This sub-view informs about the development of the net pressure within the previous 60 minutes. Thus unusual pressure fluctuations can be registered for example:

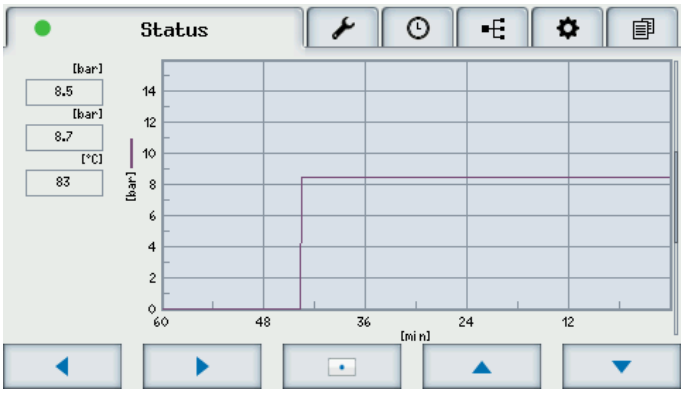


Fig. 4.2: Net pressure development (main display "Status" – sub-view I)

In the left area of the sub-view the current values for net/system pressure and final compression temperature are displayed, corresponding to the main display "Status".

The pressure chart is made up of the time scale (x-axis) and pressure scale (y-axis). The time scale goes from 60 to 0 minutes [min], with the mains pressure value measured precisely one hour ago indicated at point 60 on the pressure scale.

In accordance with this, the right edge of the x-axis shows the currently measured net pressure value on the y-axis at the zero point.

For frequency-controlled compressors, this sub-view contains the current compressor utilisation and the chart shows the development of the compressor utilisation in the least 60 minutes as additional information.

The scale on the y-axis, incl. unit, can be changed between bar/psig and % in this case via the function button below the symbol [i]

Sub-view II – Current differential pressure

This sub-view gives information as to the current differential pressure, i.e. the difference between net and system pressure. The data is presented by the indication of the value and a bar scale below. The currently measured value is displayed by a black line on the bar scale.

As long as the value measurement is not active, the scale is greyed out (e.g. compressor standstill). Precondition for an activation of the value measurement is, that the compressor is in load-run and the system pressure higher than the net pressure. Now the bar scale is coloured.

The farther the black dash moves to the right into the red range, the bigger the difference between net and system pressure. In the critical area, a warning message is output automatically (e.g. when the oil separator is clogged and must be replaced):

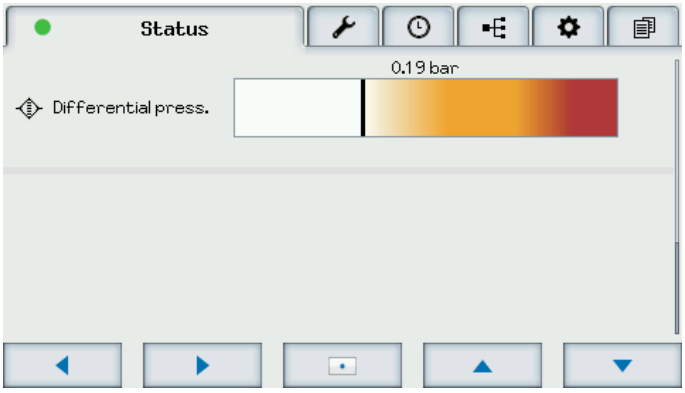
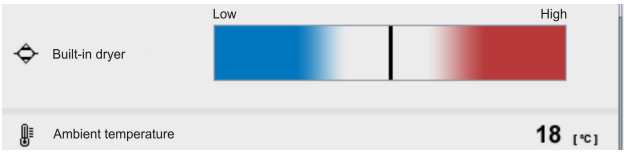


Fig. 4.3: Current differential pressure (main display „Status“ – sub display II)

For compressors with built-in dryer this sub-view offers the calculated relative humidity of the compressed air discharged from the dryer plus the ambient temperature as additional information:



The calculated moisture is displayed via a bar chart. The bar chart has a minimum value (Low) and a maximum value (High). The bar chart has a black dash that shows the determined status.

The dryer works best when the dash is between low and the middle of the bar chart. The moisture of the compressed air flowing out of the dryer is then between 0 and 50%.

If a critical value is exceeded a warning message is created as the dryer is possibly no longer functional.

Sub-view Master for multiple compressor system operation

If the **focus** control 2.0 was installed to control a multiple compressor system on a higher level as Master control, another sub-view is displayed. It provides information about the current operating status of the multiple compressor system:

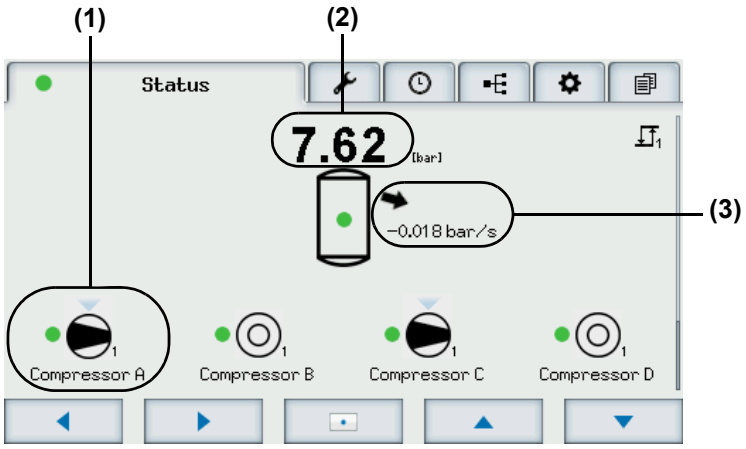


Fig. 4.4: Sub-view Master for multiple compressor system operation

The sub-view includes the following information:

– Current operational status of the compressors in the multiple compressor system
– Current net pressure
– Current pressure tendency

All symbols in this sub-view (apart from the arrow symbols for pressure tendency) have already been explained on page 16 et seqq.

Current operational status of a compressor in a multiple compressor system (1)

In this example compressor A is fully operational (green dot) and currently in load-run (see load-run symbol). It runs in priority group 1 and was demanded by the higher-level **focus** control 2.0 (light-blue triangle above the load-run symbol).

Current net pressure (2)

In this image area the current net pressure, produced by the multiple compressor system, is displayed.

Below the figure value, there is a receiver symbol that symbolises the multiple compressor system operation. In the middle of the receiver symbol, the compressor network status is displayed by a green dot, a yellow notification triangle or a red fault cross.

Current pressure tendency (3)

The current pressure trend is displayed as a numeric value as well as visually with an arrow. The arrow may display the following pressure trends:

Symbol	Meaning
	Pressure remains constant
	Pressure rises
	Pressure rises considerably
	Pressure drops
	Pressure drops considerably

All four compressors of the multiple compressor system, shown in the example picture above, are therefore fully operational. Two compressors (A and C) were activated by the higher level **focus** control 2.0 and operate in load-run in pressure range 1.
Two more compressors were not activated and remain in the status "Ready".
All compressors were assigned to priority group 1

4.2 Main display "Servicing"

The main display "Servicing" can be called up by means of the arrow functional keys  from the main display "Status".

This main display provides a quick overview of the periods until the next pending servicing of the central components of the compressor system. All in all, three service counters and one status information are displayed:

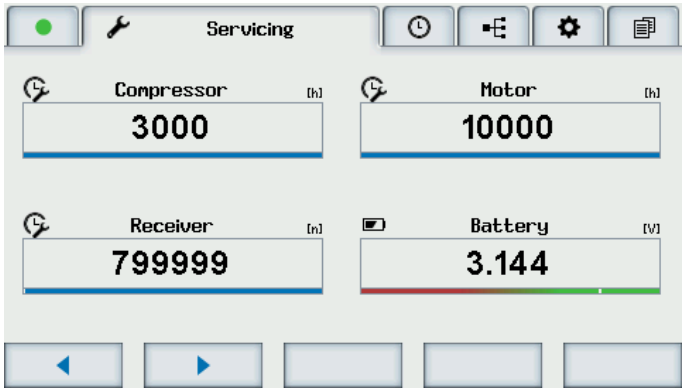


Fig. 4.5: Main display "Servicing"

The following table specifies the content of the main display "Servicing" in detail:

Servicing counter/ status information	Value	Explanation
Compressor	Remaining time until next compressor servicing in hours [h]	This value specifies for how many hours the compressor can still be operated until the next servicing. The compressor should be serviced by BOGE service personnel when the value is 0 at the latest. In this case the control creates a warning message to emphasise the necessity of servicing.
Motor	Remaining time until next motor servicing in hours [h]	This value specifies for how many hours the compressor motor can still be operated until the next servicing. The compressor motor must be serviced by BOGE service personnel when the value is 0 at the latest. In this case the control creates a warning message to emphasise the necessity of servicing.
Receiver	Number of load cycles / load changes until next servicing of oil separator vessel [n]	This values specifies the number of remaining load changes until the next oil separator vessel servicing. The measure for the load change is determined by the changing operating conditions of the compressor. If the compressor switches from load run to idle run (change from "output" to "no output"), a load change has taken place. The number of load changes in this service display is reduced accordingly by one unit. The oil separator vessel must be serviced by BOGE service personnel when the value is 0 at the latest. In this case the control creates a warning message to emphasise the necessity of servicing. Please observe: Independently of this servicing work, operator-side inspections of the receivers must take place according to the national statutory periods.
Battery	Current battery voltage [V]	Specification of battery voltage in the main module of the control. The battery supplies the real-time clock with power, so that the clock remains functional, even if the power supply to the compressor control has been interrupted. This battery guarantees that the time is always displayed correctly. This function is important since all time-dependent operating settings of the compressor are according to the time of the compressor control. If the battery voltage falls below a critical value, the control displays a servicing message to draw attention to the fact that a battery change is required.

Tab. 4.5: Explanation of main display "Service"

In addition to the reducing maintenance counters, the periods to the next servicing are also graphically illustrated by the blue bar below the numeric value. Servicing is pending once the blue bar has completely disappeared:

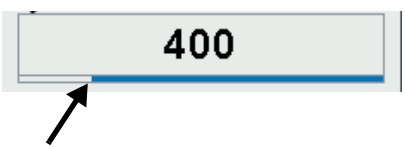


Fig. 4.6: Servicing bar

4.3 Main display "Operating hours“

The main display "Operating hours" can be called up by means of the arrow functional keys from the main display "Servicing".

The main display "Operating hours" is used to monitor the runtimes and efficiency of the compressor to optimise utilisation of the system via the compressor settings if necessary:

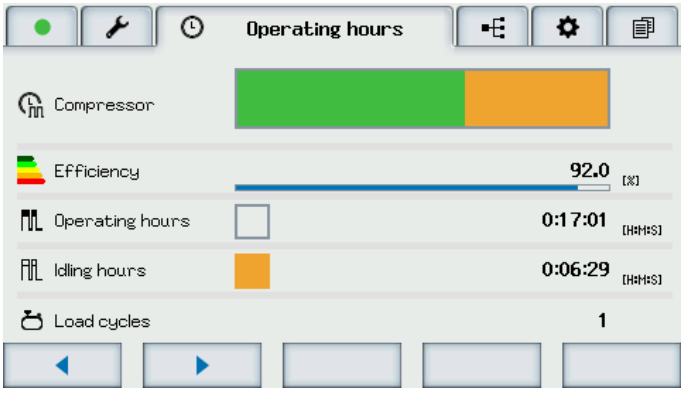


Fig. 4.7: Main display "Operating hours"

The following table specifies the content of the main display "Operating hours" in detail:

Specification	Value	Explanation
Compressor	Bar chart	The bar chart graphically illustrates the ratio of load run (green) and idle run times (orange) of the compressor.
Efficiency	Efficiency energy input in %	This values specifies the ratio of energy consumption for load-runs compared to the overall energy consumption in %. The higher the percentage value the more efficiently the compressors works. A blue bar displays the value graphically.
Operating hours	Compressor operating hours in hours, minutes and seconds	This value specifies for how long the compressor was operated at all. The time is measured from the date of the first commissioning.
Idling hours	Compressor idling hours in hours, minutes and seconds	This value specifies for how long the compressor was operated in idle-run and start up. Point of time of the start of measurement is the first commissioning.
Load cycles	Number of load cycles / load changes	This values specifies the number of load changes, which have occurred in the compressor oil separator vessel.

Tab. 4.6: Explanation of main display "Operating hours"

4.4 Main display "Communication"

The main display "Communication" can be called up by means of the arrow functional key [▸] from the main display "Operating hours".

This main display lists the addresses and installed software versions of the connected modules (base module and operating unit are always available):

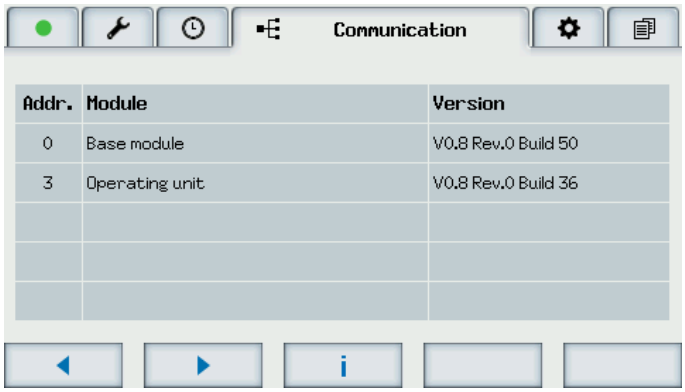


Fig. 4.8: Main display "Communication"

In addition to the base module and operating unit, e.g. frequency converter module (FC-module), dryer module or RS485- module can be listed. If a module that has already been recorded by a control is no longer recognised, it is listed in a red font. This suggests that communication with the module is impaired.

Apart from information as to the connected modules the main display "Communication" offers two more functions:

– Loading of software updates (by BOGE service personnel)
– Logging (Saving of operating data on USB stick)

As long as your compressor or your multiple compressor system work properly, normally no software udates are necessary. If BOGE service recognises the necessity of a software update, it has to be carried out by BOGE service personnel.

As to the updating of software see also „Updating software (updates)“, page 77.

Save operating data (Logging)

The function of logging (saving operating data) by the customer is to facilitate search for errors for the customer if the control does not function perfectly. The operating data can be cyclically recorded via the USB interface of a base module with a commercial USB drive. The saved file then must be forwarded to the BOGE service for precise error analysis.

To save operating data on the USB stick:

WARNING

Danger of electric shock

Live parts are installed inside the switch cabinet. There is a risk of electrical shock when the switch cabinet is opened to connect the USB stick.

➔ All works on the switch cabinet, necessary for the logging, to be carried out by authorised qualified electricians only. These include:

– Opening and closing of switch cabinet.
– Connecting and removing of USB stick.

1. USB stick to be connected by qualified electricians.
2. Call up main display "Communication" on the display of the control.

Start saving process:

3. Press functional key below the symbol  .
   → The sub-view of the main display "Communication" is displayed.
4. Press functional key below the Logging symbol  .
   → An information window with the notification "Logging started" opens.
   → As of now on the operating data are saved cyclically.
   → The Logging symbol changes to  during the saving process.

Stop saving process:

5. Press functional key below Logging symbol  once more.
   → An information window with the note "Logging stopped" opens.
   → The saving process was completed.
   → The Logging symbol changes once more to  .

4.5 Main display "Settings"

The main display "Settings" can be called up by means of the arrow functional key ▸ from the main display "Communication".

The efficient control of the function of the compressor takes place via this main display. All parameters that are necessary for this can be set here:

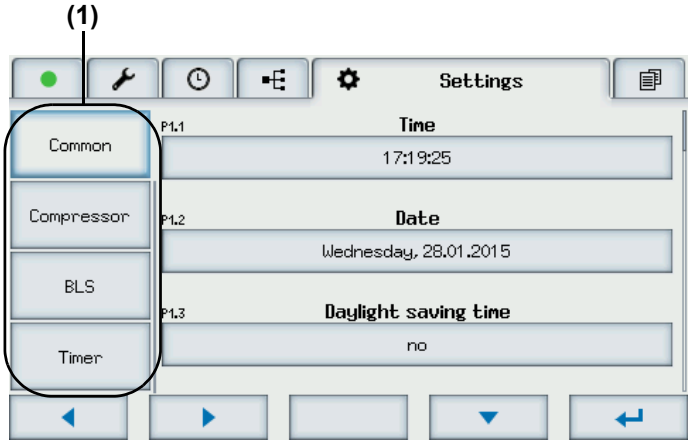


Fig. 4.9: Main display "Settings"

The parameters are distributed into four categories, being displayed and reflected on the left side of the main display, in the lateral functional areas **(1)**. These categories are:

Category	Content
General	General control settings
Compressor	All compressor parameters that refer to operation as a single machine. In this category, settings are necessary when the control and compressor are to be operated in the multiple compressor system.
BLS	Parameters to be set so that the control can operate on a higher-level as master of a multiple compressor system.
Timer	In case os one compressor only: – Time-dependent setting of the compressed air production of a single compressor.
	In case of several compressors: – Time-dependent setting of the compressed air production of several compressors, if the control is operated as higher-level Master within the multiple compressor system.

Tab. 4.7: Parameter categories

Navigate to a certain parameter

To be able to navigate to a certain parameter in one of the four parameter categories:

1. Use arrow functional key [▼] to select the parameter category where the parameter is to be found.

To be able to move to the parameter list level and to navigate through the parameters of the selected category:

2. Press functional key below the symbol [↵].
   → You are on the parameter list level and can navigate to the desired parameter (see figure below). To do so:
3. Use arrow functional keys [▲] [▼] to navigate to the desired parameter.

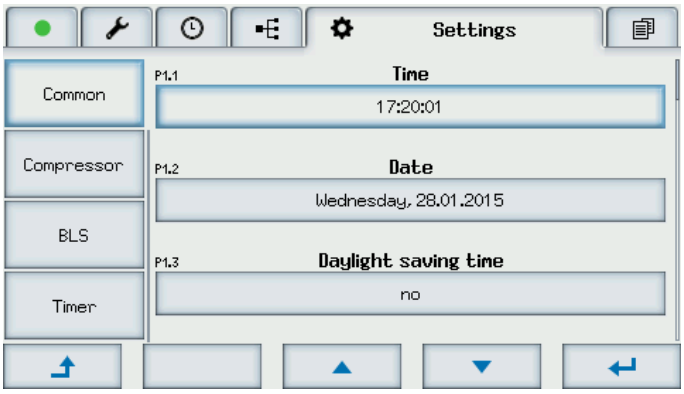


Fig. 4.10: Navigation on the parameter list level

If you are on the level of the parameter categories:
– The currently selected parameter category is highlighted in blue.

If you are in a category on the level of the parameter list:
– The currently selected parameter category and the currently selected parameter are highlighted in blue.

The general procedure to set/change a parameter is described in „General procedure“ on page 57.

The following is the description of the parameters a user can set, who has **standard user rights ("USER")**.

Parameters in category "General"

The category **"General"** includes the following parameters:

No.	Name	Description
P1.1	Time	Setting of current time (Hours:Minutes:Seconds)
P1.2	Date	Setting of current date (Output depending on P1.7: Date format)
P1.3	Summer time	Possibility to switch between summer and winter time.
P1.4	Language	Selection of language in which the texts should be displayed.
P1.5	Units	Options for the units pressure (bar/psi) and temperature (°C/°F)
P1.6	Time format	Choice between 12-hour-counting or 24-hour-counting
P1.7	Date format	Selection of date output: DD.MM.YYYY, DD/MM/YYYY, DD-MM-YYYY; MM.DD.YYYY, MM/DD/YYYY, MM-DD-YYYY; YYYY.MM.DD, YYYY/MM/DD, YYYY-MM-DD

Tab. 4.8: Parameters of the category "General"

NOTE

Disturbances in the operating sequence

Incorrect setting in the parameter category "General" (date/time) may cause interferences in the operating process, since all time-dependent operating settings of the compressor are according to date and time of the compressor control.

➔ Verify that all time and date values are correctly set.

The parameters **P1.1** to **P1.3** in the category "General" can only be changed after releasing user rights via the RFID tag.

The parameters **P1.4** to **P1.7** can also be changed without releasing user rights via the RFID tag.

Parameters in category „Compressor“

The category **"Compressor"** includes the following parameters:

P2.12: Switch-off pressure (1)

With this parameter the upper pressure target value (p_{max}) for pressure range 1 is set. When the net pressure has reached p_{max} the compressor switches from load-run to idle-run.

P2.13: Switch-on pressure (1)

With this parameter the lower pressure target value (p_{min}) for pressure range 1 is set. If the compressor is ready for operation and the net pressure falls below $p_{min,}$ the compressor starts to operate in load-run after a run-up phase.

P2.14: Switch-off pressure (2)

With this parameter the upper pressure target value (p_{max}) for pressure range 2 is set. When the net pressure has reached p_{max} the compressor switches from load-run to idle-run.

Pressure range 2 is only active if corresponding adjustments of the timer have been made or the pressure range selection was made by external contact or data bus or Ethernet. In case of a parallel input of several signals they must be present at the same time to activate pressure range 2.

Settings for p_{max} and p_{min} in pressure range 2 offer the possibility for pressure decreased and should be below the values of pressure range 1.

P2.15: Switch-on pressure (2)

With this parameter the lower pressure target value (p_{min}) for pressure range 2 is set. If the compressor is ready for operation and the net pressure falls below $p_{min,}$ the compressor starts to operate in load-run after a run-up phase.

Pressure range 2 is only active if corresponding adjustments of the timer have been made or the pressure range selection was made by external contact or data bus or Ethernet. In case of a parallel input of several signals they must be present at the same time to activate pressure range 2.

Settings for p_{max} and p_{min} in pressure range 2 offer the possibility for pressure decreased and should be below the values of pressure range 1.

P2.16: Delta p (FC)

With this parameter the pressure target value of machines with frequency converter (FC) is set. The set pressure value is a relative value and always refers to the currently active switch-off pressure.

The addition of the value set here to the switch-off pressure leads to the desired target pressure. This pressure target should be at least 0.3 bar below the switch-off pressure to achieve consistent control. For this, the input for Delta p (FC) must have a negative prefix:

– Example: p_{max} = 10 bar, desired pressure target value = 9.5 bar
  → Settings for Delta p (FC) = **–0.5** [10 + (–0.5) = 9.5]

P2.21: Autorestart time

With this parameter the Autorestart function and time is set.

If this value is set to 0 the Autorestart function is not active.

In this case, the control must be released by pushing the off button twice after a mains voltage drop and recovery of the voltage supply before compressor operation can be taken up again.

If the value is set between 30 and 3600 seconds the Autorestart function is active.

If the compressor has been switched on before a voltage drop, this set time runs as a countdown after recovery of the voltage supply.

After the countdown is finished the compressor returns automatically to the status „Ready". Pressure control is active and the compressor starts to produce compressed air, if required.

P2.31: Minimum run-time

The parameter is used to set the time span that the compressor is to run at least (start-up-load run-after-run), before it switches to the condition "Ready". This value is usually set to zero. For compressors with very short runtimes, however, a minimum runtime may have to be set.

P2.32: Anti-freeze

With this parameter the automatic anti-freeze device can be activated/deactivated.

If the compressor is in the status „Ready“ and the oil temperature (final compression temperature) falls below 5 °C, the compressor starts automatically when anti-freeze is activated and operates in idle-run until the oil temperature has reached 20 °C again.

P2.34: Continous operation

With this parameter continuous operation can be activated/deactivated.

When continuous operation is set, the control will never switch back to the condition "Ready". The compressor continually runs idle while it does not produce compressed air.

Activation of this function is sensible when pressure drops should be avoided in relatively small receivers or a low compressed air network volume.

P2.41: Rotational direction monitoring (optional, additional hardware / component necessary)

As standard this value is set to 0.0 bar and the function is deactivated. If this option is factory installed the correct values have already been preset by BOGE.

Once a value is set higher than 0.0 bar, the control monitors pressure increases within the start-up phase of the motor. When at starting up the machine the set pressure value is reached or exceeded on the suction side of the compressor, the compressor automatically switches off via fault. The control emits a fault message.

P2.42: Booster pressure (parameter for booster compression)

With this parameter the booster pressure is set is supplied to the compressor. In case of possible fluctuations the peak value of the fluctuations must be entered.

For compressors that do not further compress pre-compressed air from the compressed air network, this value is set to 0 bar.

For compressors with booster pressure from a compressed air network, the present booster pressure on the control side must be added to the pressure limits of the rotating direction and venting monitoring.

With the rotating direction monitoring activated **(P2.41),** the current system pressure value is registered at motor start and applied with an adjustable offset.

For the functions system pressure reduction, monitoring, switch-off and start-up lock, a system pressure threshold of 1.3 bar plus the input pressure maximum is considered.

P2.44: Type of message oil filter (optional, aditional hardware/components necessary)

The parameter is used to set the message type of the oil filter differential pressure monitoring, either for maintenance or for fault. If the differential pressure in the oil filter reaches a critical value, a warning/service message or a fault message is output depending on the settings. The selection of the message type affects the compressor mode, since the compressor continues to be operational at warning/service message, but will switch off at a fault message.

P2.50: Device address (1)

This parameter serves as a unique identification for each compressor/bus device that is operated within a multiple system via Modbus RTU protocol. For each compressor/bus device that is integrated into the multiple compressor system a unique address must be assigned (number between 0 and 247). This number has to be set in the corresponding control of each compressor in a multiple compressor system.

FFor compressors operated in a multiple compressor system the addresses 0 (compressor with function as master control/higher-level control) and 2 to 4 (for max. 3 compressors with function as Slave controls/lower-level control) are reserved.

For other applications the address can be matched with the local requirements. All addresses from 1-247 are possible.

If the **focus** control 2.0 is intended to control a single compressor and no visualisation of the operating data via an external device is planned, this parameter must not be considered.

Each address within the bus system may only be assigned once.

P2.51: Bit rate (1)

The value displayed here designates the transmission speed [Bits/s] of the RS485 interface (via Modbus-RTU protocol) of the main PCB for communication with the external bus system, e.g. a higher-level (master) control.

The setting for the bit rate must be the same for all communication participants in the bus system, to allow proper functioning of the data transfer.

If the **focus** control 2.0 is intended to control a single compressor and no visualisation of the operating data via an external device is planned, this parameter must not be considered.

P2.52: Protocol frame (1)

Just as the bit rate the protocol frame of the Modbus RTU protocol of all communication participants within the bus system must be the same, so that the data transfer can function properly.

If the **focus** control 2.0 is intended to control a single compressor and no visualisation of the operating data via an external device is planned, this parameter must not be considered.

P2.53: Device address (2) (optional, additional RS485 module necessary)

If visualisation of the operating data is to take place via an external device, but parameters P2.50 to P2.52 have already been set up to operate compressors in the network (e.g. by base load alternating control), the parameters P2.53 to P2.55 must be used for the correct communication settings of the Modbus RTU protocol for visualisation of the operating data.

If no visualisation of the operating data via an external device is envisaged, the parameters P2.53 to P2.55 must not be considered.

Each address within the bus system may only be assigned once.

P2.54: Bit rate (2) (optional, additional RS485 module necessary)

The setting for the bit rate must be the same for all communication participants in the bus system, to allow proper functioning of the data transfer.

If no visualisation of the operating data via an external device is envisaged, this parameter must not be considered.

P2.55: Protocol frame (2) (optional, additional RS485 modul necessary)

Just as the bit rate the protocol frame of the Modbus RTU protocol of all communication participants within the bus system must be the same, so that the data transfer can function properly.

If no visualisation of the operating data via an external device is envisaged, this parameter must not be considered.

P2.56.1+2+3: IP address+Subnet mask+Standard gateway

If the **focus** control 2.0 is intended to communicate with other controls or external devices via its Ethernet interface within an Ethernet network (in-house network), some network settings are required:

No.	Name	Description
P2.56.1	IP address	The IP address for each network participant must be unique. It must be indicated by the administrator of the Ethernet network.
P2.56.2	Subnet mask	The subnet mask must be indicated by the administrator of the Ethernet network.
P2.56.3	Standard gateway	The standard gateway must be indicated by the administrator of the Ethernet network.

Tab. 4.9: Network settings Ethernet

P2.60: Contact type compressed air treatment

With connected compressed air preparation components, this parameter can be used to individually specify at which contact type of the component the control emits a message.

If the signalling contact is set to "Break contact" the control identifies the compressed air treatment component as suspicious/faulty, when the contact is opened.

If the signalling contact is set to "Make contact" the control identifies the compressed air treatment component as suspicious/faulty, when the contact is closed.

In the relevant circuit diagram this contact is marked as compressed air treatment.

P2.61: Type of message compressed air preparation

With this parameter the message type for the compressed air treatment is set, either to servicing or to fault. If the control has recorded an event to be notified at compressed air preparation according to P2.60, a warning/service message or a fault message is output depending on the settings. The selection of the message type affects the compressor mode, since the compressor continues to be operational at warning/service message, but will switch off at a fault message.

P2.63: Pressure control

This parameter specifies whether and in what manner the compressor is controlled externally. If the compressor is "ready", it will receive its output release or lose it, as specified in the parameter. The compressor will only start when its own switch-on pressure has been undercut as well. The following settings are possible:

Setting	Meaning
Internal release	The compressor controls the compressed air production only according to the specification of its integrated control. This setting also must be chosen for the master control of a compressor network.
Release via contact	The release for the compressed air production of the compressor is remotely controlled and carried out by a contact (e.g. a switch).
Release via bus	The release for the compressed air production of the compressor is carried out by the correctly configurated RS485 interface (e.g. base load switch control **focus** control 2.0).
Release via bus AND contact	Release for compressed air production of the compressor takes place via the query of contact and RS485 interface. The function can only be guaranteed if the signal is pending in parallel via contact and RS485 interface.
Release via Ethernet	The release for the compressed air production of the compressor is carried out by an Ethernet network. Instead of a really existing switch the signal is generated by a software. (e.g. base load switch control **focus** control 2.0).
Release via Ethernet AND contact	The release for the compressed air production of the compressor is carried out by query of contact and Ethernet network.The function can only be guaranteed if the signal is pending in parallel via contact and Ethernet network.

Tab. 4.10: Setting options compressor control

P2.64: Monitoring of pressure control

This function is used for monitoring the external output release. Should the compressor control not function faultlessly and operate the compressors within the set pressure values, the compressor will operate according to its own pressure values.

If the switch-off pressure of the compressor is exceeded the compressor automatically terminates its load-run and generates the message "Continous contact of an external control" (message 20).

If the switch-on pressure of the compressor is fallen below, the compressor automatically starts its load-run and generates the message "Fault of an external control" (message 18).

P2.65: On/Off function

It is possible to switch the compressor on and off remotely as well (e.g. from another operating room than the one in which the machine is set up). For this, the control can, e.g., be electrically connected to a switch in another room. For the control to record the switch command, this parameter must be configured accordingly. The following settings are possible:

Setting	Meaning
Local	The compressor can only be switched on and off via local control. Remote on/off switching is not possible.
Remote (contact)	Remote on/off switching is effected via contact (e.g. switch). The compressor can neither be switched on nor off by means of the local control panel.
Remote (bus)	Remote on/off switching is effected by the correctly configurated RS485 interface. The compressor can neither be switched on nor off by means of the local control panel.
Remote (contact AND bus)	Remote on/off switching is effected by quering of contact and RS485 interface. The function can only be guaranteed if the signal is pending in parallel via contact and RS485 interface. The compressor can neither be switched on nor off by means of the local control panel.
Remote (Ethernet)	Remote on/off switching is effected via an Ethernet network. Instead of a really existing switch the signal is generated by a software. The compressor can neither be switched on nor off by means of the local control panel.
Remote (contact AND Ethernet)	Remote on/off switching is effected by quering of contact and Ethernet network. The function can only be guaranteed if the signal is pending in parallel via contact and Ethernet network. The compressor can neither be switched on nor off by means of the local control panel.

Tab. 4.11: Setting options On/Off function

P2.66: Key switch function

The parameter can be used to parameterise the function of a key switch that is usually attached near or at the control cabinet of the compressor. A key switch can be set to the position "local" or "remote". If no key switch is present, the parameter should be set to "deactivated".

Setting	Meaning
Deactivated	If no key switch is available or its function is to be deactivated, this setting must be selected.
On/Off	If the key switch is set to "Local" the compressor can only be switched On or Off directly by means of the (local) control, even if parameter **P2.65** is parameterised on one of the "Remote" setting. **P2.65** is thus not considered. If the key switch is reset to "Remote", the switching On and Off of the compressor complies again with the settings under **P2.65.** This configuration is reasonable if servicing has to be carried out (e.g.) but the compressor can only remotely be switched On or Off, according to **P2.65**.
Release	If the key switch is set to "Local" the compressed air production of the compressor is solely controlled independently by its integrated control, even if parameter **P2.63** is not parameterised on "Internal release". **P2.63** is thus not considered. If the key switch is reset to "Remote", the compressed air production of the compressor complies again with the settings under **P2.63** so that the compressed air production of the compressor can e.g. be externally controlled.
On/Off AND Release	The two settings described above take effect at the same time.

Tab. 4.12: Setting options key switch

P2.67.1+2: Function of Input 35+delay

With parameter **P2.67.1** the function of digital input 35 is set, which is located on the base module of the control. The following settings are possible:

Setting	Meaning
Oil filter	In case of a connected differential pressure switch of an oil filter, monitoring of the oil filter is active.
Make contact warning	If the contact to the input is closed, a warning message is issued (with any monitoring device).
Make contact fault	If the contact to the input is closed, a fault message is issued (with any monitoring device).
Break contact warning	If the contact to the input is open, a warning message is issued (with any monitoring device).
Break contact fault	If the contact to the input is open, a fault message is issued (with any monitoring device).

Tab. 4.13: Setting options function of input 35

The parameter **P2.67.2** sets the delay time in seconds that elapse after an event occurs via input 35 before the message set under **P2.67.1** is output by the control. For the setting "Oil filter", the delay time under **P2.67.2** is not considered.

P2.68.1+2: Function of Input 36+delay

With parameter P2.68.1 the function of digital input 36 is set, which is located on the base module of the control. The following settings are possible:

Setting	Meaning
Suction filter	In case of a connected differential pressure switch of a suction filter, monitoring of the suction filter is active.
Make contact warning	If the contact to the input is closed, a warning message is issued (with any monitoring device).
Make contact fault	If the contact to the input is closed, a fault message is issued (with any monitoring device).
Break contact warning	If the contact to the input is open, a warning message is issued (with any monitoring device).
Break contact fault	If the contact to the input is open, a fault message is issued (with any monitoring device).

Tab. 4.14: Setting options function of input 36

The parameter **P2.68.2** sets the delay time in seconds that elapses after an event occurs via input 36 before the message set under **P2.68.1** is output by the control. For the setting "Suction filter", the delay time under **P2.68.2** is not considered.

P2.69.1+2: Function of Input 37+delay

With parameter **P2.69.1** the function of digital input 37 is set, which is located on the base module of the control:. The following settings are possible:

Setting	Meaning
Air delivery > MIN	For proportional control of a compressor and connected proportional pressure switch, the monitoring proportional control is active.
Make contact warning	If the contact to the input is closed, a warning message is issued (with any monitoring device).
Make contact fault	If the contact to the input is closed, a fault message is issued (with any monitoring device).
Break contact warning	If the contact to the input is open, a warning message is issued (with any monitoring device).
Break contact fault	If the contact to the input is open, a fault message is issued (with any monitoring device).

Tab. 4.15: Setting options function of input 37

The parameter **P2.69.2** sets the delay time in seconds that elapses after an event occurs via input 37 before the message set under **P2.69.1** is output by the control. For the setting „Air delivery > MIN“ the delay time under **P2.69.2** is not considered.

P2.70.1+2: Function of Input 42+delay

With parameter **P2.70.1** the function of digital input 42 is set, which is located on the base module of the control. The following settings are possible:

Setting	Meaning
Pressure range selection	In case of a connected (external) switch contact the pressure ranges can be switched via actuating the switch.
Make contact warning	If the contact to the input is closed, a warning message is issued (with any monitoring device).
Make contact fault	If the contact to the input is closed, a fault message is issued (with any monitoring device).
Break contact warning	If the contact to the input is open, a warning message is issued (with any monitoring device).
Break contact fault	If the contact to the input is open, a fault message is issued (with any monitoring device).

Tab. 4.16: Setting options function of input 42

The parameter **P2.70.2** sets the delay time in seconds that elapses after an event occurs via input 37 before the message set under **P2.70.1** is output by the control. For the setting „Pressure range switching“, the delay time under **P2.70.2** is not considered.

P2.71.1: Motor coil temperature (warning)

The parameter can be used to specify a critical value for the motor coil temperature for the compressor drive motor. If the temperature of the motor coil reaches the set value, the control emits a warning message.

If the temperature continues to rise above a fixed value, a fault message is issued. In such a case the the compressor is switched off by the control immediately.

This function is intended to protect the compressor drive motor against thermal overload.

In order to use this feature the optionally available hardware for monitoring the motor winding temperature within the compressor system must be installed.

P2.72.1: Motor bearing temperature (warning)

The parameter can be used to specify a critical value for the motor bearing temperature for the compressor. If the temperature of the motor bearing reaches the set value, the control emits a warning message.

If the temperature continues to rise above a fixed value, a fault message is issued. In such a case the compressor is switched off by the control immediately.

This function is intended to protect the drive motor bearings against thermal overload.

In order to use this feature the optionally available hardware for monitoring the motor bearing temperature must be installed.

All parameters in category "Compressor" can be only changed via RFID tag after activation of user rights.

Parameter in category „BLS“

If **focus** control 2.0 is to control a multiple compressor system as Master, parameters have to be set in the category "BLS".

The set parameters in this category are superordinate specifications of the master control. All other lower-level controls (slaves) in the network must follow these specifications.

	All parameters of this category therefore only need to be set in the higher-level control (master) of the multiple compressor system.

The compressors operated within the multiple compressor system are either prioritised by the base load switch control or the timer.

	For base load switching as well as for control via timer parameters have to be set in the category "BLS".

For the **base load switching** control, the compressors of the network produce the required compressed air in alternating priority groups. The alternation takes place only according to a **fixed interval** (e.g. every 13 hours).

The base load switching function is suitable for the operation of compressors with the same or a similar capacity intended for an equal workload.

The time-depending control of the compressed air production via the **timer** can be set individually. In contrast to the base load cycle control, there must **not be any fixed timer intervals** for the conveyor change of the compressors. For example, 2 large compressors can be given priority on 5 working days in a week, but 2 smaller compressors on the weekend of 2 days.

Thus the compressed air production can be set via timer individually as to time and compressed air requirement.

The timer function is specially suitable for the operation of compressors with different capacity.

The categoty **"BLS" (**base load switching) includes the following parameters:

P3.1.3: Number of compressors

With this parameter the total number of compressors is determined which produce compressed air within a multiple compressor system. The following settings are possible:

Setting	Meaning
1	Multiple compressor system operation not active as for a base load switching at least 2 compressors are necessary. If only a single compressor is operated the parameter should always be set to 1.
2	In all 2 compressors in the multiple compressor system. BLS function active.
3	In all 3 compressors in the multiple compressor system. BLS function active.
4	In all 4 compressors in the multiple compressor system. BLS function active.

Tab. 4.17: Setting options number of compressors

P3.2.1: P max (1)

With this parameter the upper pressure target value (p_{max}) for pressure range 1 of the multiple compressor system is set.

A pressure range is based on a minimum and a maximum pressure. p_{max} is the maximum pressure and therefore determines the highest pressure, which can be reached by the multiple compressor system.

P3.2.2: P min (1)

With this parameter the lower pressure target value (p_{min}) for pressure range 1 of the multiple compressor system is set.

p_{min} is the minimum pressure and determines the lowest pressure that may be reached by the multiple compressor system.

P3.2.3: Upper target area distance (1)

Within the pressure band 1, which results from the pressure range between p_{max} (1) and p_{min} (1) the two parameters upper and lower limit target zone (1) (**P3.2.3** and **P3.2.4**) can be used to select the pressure range in which the compressor network usually is to produce compressed air. This pressure range is called the target zone. The pressure value for the **upper target area distance (1)** must be below the pressure value **P max (1)**, **P3.2.1**.

P3.2.4: Lower target area distance (1)

The pressure value for the **Lower target area distance (1)** must be above the pressure value **P min (1)**, **P3.2.2**.

Coherencies between the pressure settings

The chart and table illustrate the connections between p_{max}, $p_{min,}$, the target area distances and the target area (width). The indicated pressure values are example values:

---------- **p_{max}** ---------- (**10 bar)**

---------- **Upper target area distance** ---------- (**9.7 bar)**

(Width of) target area (0.5 bar)

---------- **Lower target area distance** ---------- (**9.2 bar)**

---------- **p_{min}** ---------- (**9 bar)**

Fig. 4.11: Coherency pressure range – target area distance – target area width

Pressure range width	=	$p_{max} – p_{min}$
(Width of) target area	=	Upper target area distance – Lower target area distance

Tab. 4.18: Definition of the values "Pressure range width" and "(Width of) target area"

P3.2.5: Gradient (1)

The parameter can be used to set the maximum permitted speed in which the target area of pressure range 1 builds up pressure, or the maximum permissible speed at which the target area may relieve pressure without compressors being switched off or on without delay.

If, e.g., it turns out during mains pressure development (see main display "Status" – sub-view I) that the value for the maximum measured mains pressure by far exceeds the value P_{max} set for the pressure bands, the pre-set value for the gradients should be reduced.

If the gradient is optimally adjusted, e.g. quick On and Off cycles of the individual compressors can be avoided (e.g. in case of a small volume of a receiver).

To set the gradient optimised with your compressor network, contact your BOGE dealer or the BOGE service under phone number:

Phone: +49 5206 601-140

Parameters for pressure range 2

A second adjustable pressure range offers the possibility to operate, temorarily or via remote contact, with lower pressure values and/or other gradients.

The parameters for pressure band 2 correspond to those for pressure band 1 in their functions (see parameter **P3.2.1** fet seqq.). The table offers an overview:

No.	Name	Description
P3.3.1	P max (2)	Top target pressure value (p_{max}) for pressure range 2
P3.3.2	P min (2)	Lower pressure target value (p_{min}) for pressure range 2
P3.3.3	Upper target area distance (2)	Upper target area distance pressure range 2 (for an explanation see also P3.2.3)
P3.3.4	Lower target area distance (2)	Lower target area distance pressure range 2 (for an explanation see also P3.2.4)
P3.3.5	Gradient (2)	Gradient for pressure range 2 (for an explanation see also P3.2.5)

Tab. 4.19: Parameters for pressure range 2

P3.4.1: Control mode

The parameter ensures the most efficient coordination of the utilisation of compressors or a compressor network. The correct selection of the mode permits consideration of the compressor types of the network (fixed/frequency controlled). The following settings are possible:

Setting	Meaning
A	In this setting, the parameter controls utilisation of the compressors within the priority group depending on the hours to the next servicing
B	In this setting, the parameter controls utilisation between a fixed and a frequency-controlled compressor that are structured in different priority groups.
C	In this setting, the parameter controls utilisation of the compressors within the priority group depending on the operating hours already elapsed.

Tab. 4.20: Setting options of parameter "Control mode"

Setting the control mode to **A** or **C** ensures an even utilisation of compressors within a priority group. For both settings similar machines (with regard to output) should be listed in one group.

When switching to **A**, the utilisation is according to the remaining hours to the next maintenance of the compressors. Thus, the compressor that has the most runtime left to the next servicing is chosen first for a load run when requesting machines of a priority group. This setting ensures that the compressors can be serviced within a priority group at the same date..

When setting to **C**, the utilisation is according to the operating hours number of the compressors. Thus, the compressor that has run the least operating hours is chosen first for a load run when requesting machines of a priority group. This setting ensures balanced operating hours times among the compressors of a priority group.

A and **C** are the standard settings for the regulating mode. They are used for fine coordination and are sensible if compressors of similar power have been structured in a priority group. Since both modes only control within one priority group, the set priority assignment according to timer or fixed interval time continues to be considered by the base load switch (BLS) control.

Control mode **B** is solely intended for the case that exactly one fixed and one frequency controlled compressor are operated in a multiple compressor system. By means of control mode **B** the precision tuning of these different types of compressor can be performed during compressed air production.

Always to be observed:

- To be able to use control mode **B** fixed and frequency controlled compressor must be in different priority groups.
- IIf control mode **B** is active, priorities which have been determined via timer or base load switching are no longer considered. Timer and interval times should not be programmed in this case.

If control mode **B** is activated, the priority group of the fixed compressor is requested first when compressed air is needed. This compressor will switch to load run (base load) even if it is in a lower propriety group than the frequency-controlled compressor. If the fixed compressor can no longer cover the compressed air demand, the frequency controlled compressor will activate next to cover the remaining demand (peak load).

When the compressed air demand drops again, the continuously controllable compressor reduces the delivery output to the minimum specified in **P3.5.4** or **P3.6.4.** At this point, the fixed compressor completely suspends its compressed air production and the continuously variable one now directly increases its own output volume by the share of the fixed machine. If the compressed air demand exceeds the maximum delivery output of the frequency controlled compressor, the fixed compressor is switched on again, and off again when the demand drops. If the compressed air demand drops below the specified minimum utilisation (**P3.5.4 or P3.6.4**) of the frequency-controlled compressor, it is taken out of the load run and the fixed machine will switch to load run alone again.

Control mode **B** prevents energy loss that may arise when there is no coordination between the fixed and frequency-controlled compressor.

All 3 control modes share that the output release with the lowest priority at this time is withdrawn when the specified lower utilisation of a frequency-controlled machine in the network is undercut.

P3.4.2: Concurrently working compressors

This parameter specifies how many compressors of the network may produce compressed air at the same time. This function is especially sensible when the available output of the electrical network is only sufficient for a limited number of the set-up compressors.

The number of compressors that can be set by this parameter ranges between 1 (minimum) and the total number of compressors of the multiple compressor system (maximum 4).

Always to be observed:

This setting offers the situational possibility that no further compressors can be switched on to the compressors with the smallest compressed air capacity, although a high compressed air demand exists.

P3.4.3: Concurrently regulating compressors

If several frequency controlled compressors are integrated into the multiple compressor system it can be specified by these parameters how many compressors really operate as frequency controlled machines. The parameter is preset to the value 1. Thus only one of the compressors operates frequency controlled even if several frequency controlled compressors are available within the compressed air system. The other compressors operate as fixed compressors. This setting is factory recommended as control resonances can occur if several frequency controlled compressor are operating at the same time reducing the effectivity of the compressed air production.

The number of compressors that can be set by this parameter ranges between 1 (minimum) and the total number of compressors of the multiple compressor system (maximum 4).

This parameter is also valid for proportionally controlled compressors integrated into the multiple compressor system.

The feedback signal as to the workload of the proportionally controlled computers must be between 4 and 20 mA.

P3.4.4: Interval

The parameters are used to set a fixed interval according to which the priority of the compressors of the network changes at regular intervals. The value can be set between 0 and 250 (hours); e.g. a change takes place every 12 hours when 12 is entered. If the value is set to 0, there will be no change after a fixed interval. The base load change function is thus deactivated and a priority change can only be set via the timer (also see page 41 et seq., keywords base load switching control and timer).

This function is sensible when the conveyor release is to be granted to several similarly sized base load machines of the network alternatingly at a fixed interval.

The base load machines must be structured in different priority groups for this, since the interval change takes place by priority groups only, rather than among compressors within one priority group. At 2 base load machines, they should therefore be classified in 2 priority groups, e.g. A and B.

P3.4.5: Max. run-time difference

This parameter is only relevant when more than one compressor is maintained in one priority group. If a compressor reaches the maximum runtime difference to another compressor set via this parameter within the priority group (i.e. when it has been in load run for longer by than hours set here), the output release is withdrawn from the running compressor and the switch to another compressor of the property group takes place when the lower target zone limit is reached. Depending on the set control mode, the change takes place according to service or operating hours. The set value is between 10 and 336 hours.

P3.4.6: Min. run-time difference

This parameter is only relevant when more than one compressor is maintained in one priority group. If desired, the operating-time-dependent compressor selection cannot change to any other compressor all too often. The same reference to the control mode is present as in **P3.4.5.** The set value is 0 to 24 hours.

Defaults of the Master control for individual compressors within the multiple compressor system:

The parameters **P3.5.1 to P3.8.4** are specifications of the master control to the individual compressors of the network or their controls. All in all, the higher-level **focus** control 2.0 can control up to four compressors in the network. These four compressors will receive the assignment **A** to **D** in the following parameters.

If e.g. two compressors are operated within a multiple compressor system the parameters **P3.5.1** to **P3.5.4** for the first compressor **A** in the master control. (**A** is always the compressor with the Master control) and **P3.6.1** to **P3.6.4** for the second compressor **B** (**B** to **D** are always compressors with Slave controls) must be set.

The table serves to assure the clear assignment of the following parameters to the individual compressors of the multiple compressor system:

Parameter no.	for compressor/control	≙ Device address in P2.50
P3.5.1 to P3.5.4	A (Master)	0 (Master)
P3.6.1 to P3.6.4	B	2
P3.7.1 to P3.7.4	C	3
P3.8.1 to P3.8.4	D	4

Tab. 4.21: Allocation of parameters P3.5.1 to P3.8.4 to the compressors

P3.5.1: Priority (A)

With this parameter the compressor with the master control (device address 0) is allocated to a priority group.

Each compressor of the network must be assigned to a propriety group. The master control can be used to form up to four priority groups **(A … D)**. The classification in propriety groups offers the option of stressing compressors with priority or at a lower rank. Group **A** is pre-set at all times. If the parameters for propriety of the individual compressors of the network is not changed, all (two to max. four) compressors in the network are maintained in group **A**.

In this case, the master control will ensure even operating times in the scope of the set control mode and the parameterised permitted runtime differences.

When using several priority groups, the compressors of the group with the maximum propriety are charged first before the groups with the next properties are charged if more air is needed. The relief takes place in the reverse order.

Ranking of the priority groups in the output release can either change cyclically via the set interval time, or it can be changed via the timer. The ranking group **A,** group **B**, group **C**, group **D** is pre-set in the timer.

P3.5.2: Maximum load delay (A)

With this parameter the maximum load delay for the compressor with master control (device address 0) is set.

The maximum load delay serves to describe the time which is needed by the compressor in order to build up system pressure to net pressure from standby. The adjustment range is between 0 and 240 seconds.

P3.5.3: Minimum load delay (A)

With this parameter the minimum load delay for the compressor with master control (device address 0) is set.

The minimum load delay serves to describe the time which is needed by the compressor in order to build up system pressure from the smallest idling pressure to net pressure from idle-run. The adjustment range is between 0 and 240 seconds.

P3.5.4: Minimal utilisation (A)

If the compressor with the Slave control (Device address 0) is a frequency/proportionally controlled compressor, the minimum utilisation in % is determined by this parameter. This value should be determined specifically to optimise the utilisation rate.

The feedback signal as to the workload of the frequency or proportionally controlled computer must be between 4 and 20 mA.

P3.6.1: Priority (B)

With this parameter a compressor with Slave control (device address 2) is allocated to a priority group.

For description of parameter 'Priority', see also **P3.5.1**.

P3.6.2: Maximum load delay (B)

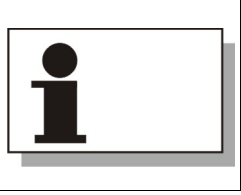
With this parameter the maximum load delay for a compressor with the Slave control (device address 2) is set. The setting range is between 0 and 240 seconds.

P3.6.3: Minimum load delay (B)

With this parameter the minimum load delay for a compressor with the Slave control (device address 2) is set. The setting range is between 0 and 240 seconds.

P3.6.4: Minimal utilisation (B)

If the compressor with the Slave control (Device address 2) is a frequency/proportionally controlled compressor, the minimum utilisation in % is determined by this parameter. This value should be determined specifically to optimise the utilisation rate.



The feedback signal as to the workload of the frequency or proportionally controlled computer must be between 4 and 20 mA.

P3.7.1: Priority (C)

With this parameter a compressor with Slave control (device address 3) is allocated to a priority group.

For description of parameter 'Priority', see also **P3.5.1**.

P3.7.2: Maximum load delay (C)

With this parameter the maximum load delay for a compressor with the Slave control (device address 3) is set. The setting range is between 0 and 240 seconds.

P3.7.3: Minimum load delay (C)

With this parameter the minimum load delay for a compressor with the Slave control (device address 3) is set. The setting range is between 0 and 240 seconds.

P3.7.4: Minimal utilisation (C)

If the compressor with the Slave control (Device address 3) is a frequency/proportionally controlled compressor, the minimum utilisation in % is determined by this parameter. This value should be determined specifically to optimise the utilisation rate.

The feedback signal as to the workload of the frequency or proportionally controlled computer must be between 4 and 20 mA.

P3.8.1: Priority (D)

With this parameter a compressor with Slave control (device address 4) is allocated to a priority group.

For description of parameter 'Priority', see also **P3.5.1**.

P3.8.2: Maximum load delay (D)

With this parameter the maximum load delay for a compressor with the Slave control (device address 4) is set. The setting range is between 0 and 240 seconds.

P3.8.3: Minimum load delay (D)

With this parameter the minimum load delay for a compressor with the Slave control (device address 4) is set. The setting range is between 0 and 240 seconds.

P3.8.4: Minimum utilisation (D)

If the compressor with the Slave control (Device address 4) is a frequency/proportionally controlled compressor, the minimum utlisation in % is determined by this parameter. This value should be determined specifically to optimise the utilisation rate.

The feedback signal as to the workload of the frequency or proportionally controlled computer must be between 4 and 20 mA.

All parameters in category "BLS" can be only changed via RFID tag after activation of user rights.

Category "Timer"

In this category the compressed air production of a single compressor or a complete multiple compressor system can be set on a run time basis.

A weekly repeating period (from Monday, 00:00 hours to Sunday, 23:59 hours) is the time basis for the settings. Within this weekly period, up to 50 time intervals can be specified with different timer settings across the timer channels.

Every set timer channel is active until the real-time click reaches the next set time section (timer channel) within the week period. After a mains failure, the channel with the activation time closest to the current real time clock becomes active.

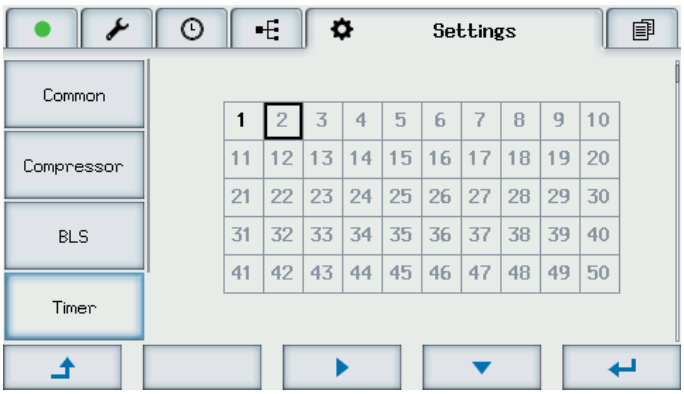


Fig. 4.12: Category "Timer" with 50 switch clock channels

In the top example illustration the 50 timer channels are shown.Timer channel 1 is no longer greyed out. This means it is already assigned/parameterised. The other timer channels are greyed out. This means that they still unassigned and were not parameterised.

Use arrow functional keys [▸] [▾] to select the various timer channels. Use functional keys below the symbol [↵] to check, correct and parameterise the settings for the selected timer channel.

If a timer channel was selected and the functional key below the symbol [↵] pressed, the detailed view of the timer channel appears:

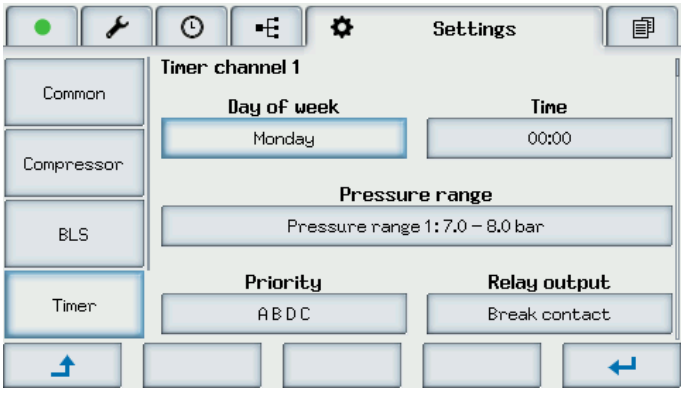


Fig. 4.13: Detailed view timer channel1

At the top edge of the display you can see the timer channel you are in.

A time-dependent setting is possible (i.a.) for weekday and time, pressure range (pressure range from … to …), priorities with which the individual compressors (max. 4) are activated to produce compressed air and the relay output for possible additional functions of the control.

Detailed description of the timer values:

The following is a detailed description of the individual timer values. This is important for the correct parameterisation of the compressed air production control via timer:

– Day of week

  Here, the weekday (Monday to Sunday) on which the selected channel is to be switched to active is set. Timer channels that have not been parameterised yet and therefore are free (greyed out) are pre-set under "Weekday" with the value "**free**". These channels are therefore not considered. They are only considered when a day (Monday to Sunday) has been set.

  If a weekday was set and acknowledged with the functional key below the symbol ✓, the automatic switch to the setting of the time follows next.

– Time

  Here, the time on the pre-set weekday on which the selected channel is to be switched to active is set. Hours and minutes are set separately and confirmed with a function key below the symbol ✓ each.

  If a minute value was set and acknowledged with the functional key below the symbol ✓, the automatic switch to the setting of the pressure range follows next.

– Pressure range

  At this point up to 3 different pressure ranges can be selected. The specified selection possibilities for pressure range 1 and 2 are based on the settings of parameters **P3.2.1** to **P3.3.5** (parameters with which the values for pressure range 1 and 2 were determined)

  Pressure range 3 is permanently set to 0 bar (for phases during which no production of compressed air takes place, e.g. at the weekend).

  Apart from this, the function can be set so that the timer channel should not influence the pressure range (setting „**– – –**“).

If a selection was made and acknowledged by means of the functional key below the ✓ symbol an automatic change-over to edit the priority follows.

Unplanned compressed air demand

If compressed air is unexpectedly needed during a pressure range 3 phase (0 bar), the compressed air production can also be started again at once without changes to the timer parameters (prerequisite: The compressors that are to receive the output release according to the higher-level control must be in the condition "Ready"). For this:

1. Press On key on the higher-level control (Master) twice
   → Compressed air production starts with the settings of pressure range 1.

To stop the non-scheduled production of compressed air:

2. Press OFF key on the higher-level control (Master) twice.
   → Compressed air production stops.
   → The compressor is switched to "Off" status.
3. Press On key on the higher-level control (Master) twice again.
   → The compressors are returned to the condition "Ready"..

– Priority (only with multiple compressor system operation)

  Each compressor of the network must be assigned to a propriety group via the master control. The master control can be used to form up to four priority groups (**A … D**). The classification in propriety groups offers the option of stressing compressors with priority or at a lower rank.

  Under priority in the timer the sequence of the priority groups can be set. The sequence **A B C D** is always preset. The significance of the compressors in this sequence declines from left to right in writing direction. That means: first the compressors of priority group **A** are required for load-run, then the compressors of group **B**, then **C** and at last **D**.

  The sequence can be changed according to requirements, e.g. from **A B C D** to **C D B A**. All in all 23 combination possibilities for the sequence exist.

  If all compressors of a multiple compressor system are solely assigned into two priority groups, e.g. **A** and **B**, only the sequence of these two groups is considered. If, for instance, the sequence **C D B A** was set, **C** and **D** are not considered (as no compressors were assigned into these groups). In this case **B** has the highest priority, **A** the lowest.

  If a priority was set and acknowledged with the functional key below the symbol ✓, the automatic switch to the setting of the relay output follows next.

If the compressed air production of a single compressor is to be controlled by the timer, the timer value "Priority" must not be considered.

– Relay output (optional relay module necessary)

  Here, it is possible to set whether the relay output is to be opened or closed when the set time is reached. The relay output is on an optional relay module. With the selection switch position 7, the relay module is configured as relay output for the timer.

  If a selection was made and acknowledged by means of the functional key below the ✓ symbol, the detailed view of the timer channel is closed automatically. The timer overview with the 50 timer channels is displayed again. The previously set timer channel is no longer greyed out.

In the example illustration on page 51 the settings for timer channel 1 have the following meaning:

– Timer channel 1 selected.
– Activation of switch clock channel 10 starts on Monday 00:00 hrs.
– Pressure range 1 is selected (p_{min} = 7.0 bar, p_{max} = 8.0 bar).
– From that point of time priority group A receives the highest priority, priority group B the second highest, priority group D the third highest and priority group C the lowest priority.
– The relay output "Timer" is opened.

As to the general procedure concerning the timer setting, see also „Set timer“, page 58.

The timer can only be set after release of user rights via the RFID-tag.

4.6 Main display "Log book"

The main display "Logbook" can be called up by means of the arrow functional key ▸ from the main display "Settings".

In this main display all important events which the control has logged are listed up. Important events are:

– Warnings/service messages ▲
– Fault messages ✖
– Changes of parameters/settings ⚙

For each event the time is given when it occurred. Furthermore it is visually displayed if the event has already been acknowledged ☑, if the acknowledgement is still pending ☐ (only warning/servicing or fault messages):

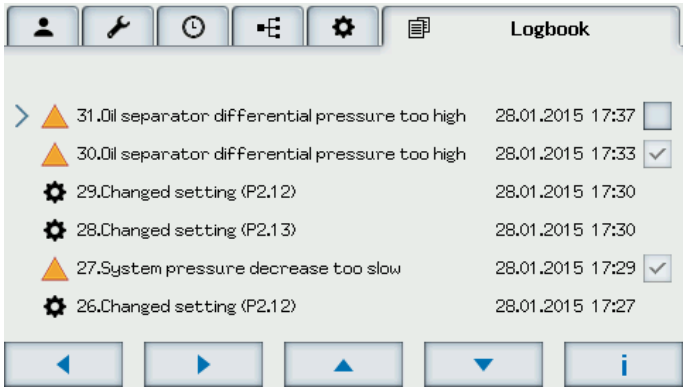


Fig. 4.14: Main display "Log book"

A detailed view for more precise information as to an event can be called up via the functional keys below the symbol [i]. Additionally messages as to the detailed view can be acknowledged:

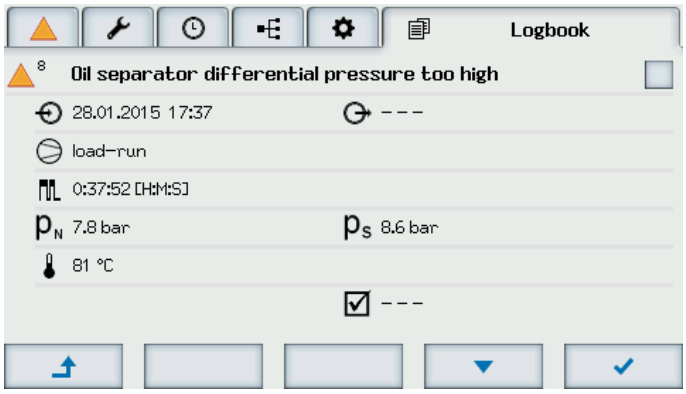
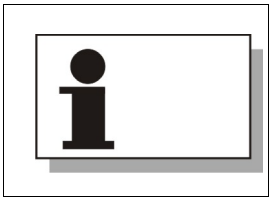


Fig. 4.15: Detailed view of a warning/service message

The following additional information is supplied:

Symbol	Meaning
	Occurrence of the event (date and time)
	End/Remedying of event (date and time)
	Operating status at the time when the event occurred
	Compressor operating hours at the time when the event occurred
p_N	Net pressure at the time when the event occurred
p_S	System pressure at the time when the event occurred
	Final compression temperature at the time when the event occurred
	User right level of RFID tag with which the user, who has acknowledged the event, logged in
	Identification number (ID) of the RFID tag with which the user logged in, who has acknowledged the event
☑ – – –	Event not yet acknowledged.
☑ 24.11.2014 16:30	Event acknowledged (incl. date and time of achkowledgement)
Symbol black	Number of changed parameter (in detailed view only: change of parameters/setting ⚙)
Symbol red	Value prior to change (in detailed view only: change of parameters/setting ⚙)
Symbol green	Value after change (in detailed view only: change of parameters/setting ⚙)

Tab. 4.22: *Meaning of the symbols in detailed view*



To acknowledge a message (warning/servicing and fault) see „Listing of possible messages“, page 76.

5.1 General procedure

All parameters can be set so that the control is best adjusted to the compressor system and the compressed air demand on site.

When setting/changing parameters, there are generally **three different application cases** for which the **focus** control 2.0 is suitable:

– a control that solely controls a single compressor,
– a control which controls several compressors within a multiple compressor system as master control,
– a control which is controlled as lower-level Slave by a higher-level (master) control of a multiple compressor system..

When setting/changing parameters, there are generally three different application cases for which the focus control 2.0 is suitable:

CAUTION

Compressor damage

Settings/Changes of parameters having effects on compressor function and operation can damage or destroy the compressor.

➔ Settings/Changes of parameters to be made by authorised qualified personnel only.

➔ In cases of doubt please contact BOGE service prior to changing relevant operational settings.

To set/change parameters or timer the necessary rights must have been enabled via RFID tag by the user.

Exception: The parameters **P1.4 to P1.7** in the category "General" can also change without releasing user rights via the RFID tag.

Set parameters of the categories "General", "Compressor" and "BLS"

1. Use arrow functional keys ◂ ▸ to navigate to main display "Settings".
2. Use arrow functional key ▾ to select the parameter category where the parameter is to be found.
3. Press functional key below the symbol ↵.
   → You are on the parameter list level and can navigate to the desired parameter. To do so:
4. Use arrow functional keys ▴ ▾ to navigate to the desired parameter.
5. Press functional key below the symbol ↵.
   → The parameter value blinks. That means: It can be changed.
6. Use functional keys below the symbols + – to change the parameter value.

If the value is set correctly:

7. Press functional key below the symbol [✓].
   → The value stopped blinking.

To terminate and save the setting/change successfully:

8. Die Press functional key below the symbol [↵] once.
9. Press either arrow functional key [◂] or [▸].
   → A confirmation prompt window opens.

If the settings are to accepted and saved:

10. Use arrow functional keys [▴] [▾] to select "Yes".
11. Press functional key below the symbol [↵].
    → The setting/change was saved.

It is also possible to collect several parameters in sequence with the action steps 4 to 7 before all changes are saved once with the action steps 8 to 11.

This procedure is less time-consuming then saving each parameter individually.

When setting/changing some parameters, value pairs must be processed in sequence before the parameter can be saved.

Example P1.1 time (Hours:Minutes:Seconds):

Having terminated action step 5 (see page 57) only the value for hours is blinking. When the action steps 6 and 7 have been carried out, the hour value does not blink any longer. Minutes are blinking instead. For the minute value steps 6 and 7 must be carried out again. Having finished these steps seconds are blinking. Steps 6 and 7 must be carried out once more. Only then it is possible to save the time continuing with action steps 8 to 11.

Set timer

The general procedure when setting the timer deviates from the setting/change of parameters of the above categories in some items:

1. Use arrow functional keys [◂] [▸] to navigate to main display "Settings".
2. Use arrow functional key [▾] to select the category "Timer".
3. Press functional key below the symbol [↵].
   → You are on the timer channel level and can navigate to the desired timer channel. To do so:
4. Use arrow functional keys [▸] [▾] to select the desired timer channel.
5. Use functional key below the symbol [↵] to open the detailed view of the selected timer channel .
   → The detailed view of the selected timer channel is displayed.

Set timer values

To set the individual timer values:

6. Press functional key below the symbol ↵ once more.
   → The input for the day of week is blinking.
7. Use functional keys below the symbols + – to select the day, with which the settings of the timer channel are switched to active mode.
8. Press functional key below the symbol ✓.
   → The selected day of week is set.
   → The hours of the timer input are blinking.
9. Use functional keys below the symbols + – to select the time in hours on the determined weekday on which the selected channel is to be switched to active mode.
10. Press functional key below the symbol ✓.
    → The minutes of the time input are blinking.
11. Use functional keys below the symbols + – to select the time in minutes on the determined weekday on which the selected channel is to be switched to active mode.
12. Press functional key below the symbol ✓.
    → The time (in hours and minutes) is set.
    → Pressure range input is blinking.
13. Use functional keys below the symbols + – to select the pressure range that is to be run for the timer channel at the previously specified time.
14. Press functional key below the symbol ✓.
    → The pressure range is set.
    → The sequence of the priority groups is blinking.
15. Use functional keys below the symbols + – to select the sequence for the priority groups valid for the timer channel **(only relevant for multiple compressor system operation)**.
16. Press functional key below the symbol ✓.
    → The sequence of the priority groups is set.
    → The input of the relay output is blinking.
17. Use functional keys below the symbols + – to select the relay output settings for the timer channel (optional relay module necessary).
18. Press functional key below the symbol ✓.
    → The detailed view of the timer channel is automatically closed.
    → Timer overview with the 50 timer channels is displayed.
    → The previously set timer channel is no longer greyed out.
    → The setting must be saved.

Save timer setting

To terminate and sustainably save the timer settings having returned into the timer overview:

19. Press functional key below the symbol once (1x).
20. Press either arrow functional keys or .
    → A confirmation prompt window opens.

If the settings are to accepted and saved:

21. Use arrow functional keys to select "Yes".
22. Press functional key below the symbol .
    → Timer settings/changes were saved.

5.2 Carry out general checks/settings

The **focus** control 2.0 parameters are set in the factory in advance so that its general settings are aligned with the respective machine type.

Nevertheless, BOGE recommends making the following control settings before commissioning the compressors so that the compressor system is adjusted to the conditions on site for smooth operation.

This means that in all three applications named on page 57 the following inspections and possibly necessary changes of settings should be performed:

If you want to operate the compressor **only as a single machine**, you do not usually need to perform any further inspections/settings/changes of parameters before commissioning after completing the following changes.

To set up a control on a higher level as **Master** or on a lower level as **Slave**, some parameters must be adapted in a second step. These adaptations are described in the sections „Multiple compressor system: Set parameter for Master“, page 64 and „Multiple compressor system: Set parameters for Slave“, page 68.

Check/set parameters in category "General"

Complete the following measures in the parameter category "General" so that a smooth operation of the compressor system is ensured:

NOTE

Disturbances in the operating process

Incorrect setting in the parameter category "General" (date/time) can lead to disturbances in the operating process, since all time-dependent operating settings of the compressor are according to the time of the compressor control.

➔ Verify that all time and date values are correctly set.

1. Check time **(P1.1)** and adjust correctly if necessary.
2. Check date **(P1.2)** and set correctly, if necessary.
3. Check **P1.3** and change from summer time to winter time, if applicable.
   → Depending on the setting **P1.1** changes by +/- 60 min.
4. Change language **(P1.4)** if necessary.
5. Change units **(P1.5)** if necessary.
6. Change time format **(P1.6)**, if necessary.
7. Change date format **(P 1.7)** if necessary.
   → The settings in the category „General“ are completed.

Check/set parameters in category "Compressor"

Complete the following measures in the parameter category "Compressor" so that a smooth operation of the compressor system is ensured:

Pressure settings, parameter P2.12 to P2.16

1. Check switch-off pressure (1) **(P2.12)**, reset if necessary.
2. Check switch-on pressure (1) **(P2.15)** and re-adjust if necessary.

NOTE

Disturbances in the operating process

Incorrect pressure settings can lead to disturbances in the operating process.

➔ Do not set switch-off pressure (1) **(P2.12)** above maximum final compression pressure of the compressor.

➔ In case the switch-off pressure is changed, the switch-on pressure must be adapted. For the adaptation the minimum hysteresis **(P2.11)** must always be taken into account.

If you want to install an **optional** second pressure range for a needs-oriented pressure range switch-over depending on the local operating conditions::

3. Set switch-off pressure (2) **(P2.14)**.
4. Set switch-on pressure (2) **(P2.15)**.

NOTE

Disturbances in the operating process

Incorrect pressure settings can lead to disturbances in the operating process.

➔ Do not set switch-off pressure (2) **(P2.14)** above maximum final compression pressure of the compressor.

➔ In case the switch-off pressure is changed, the switch-on pressure must be adapted. For the adaptation the minimum hysteresis **(P2.11)** must always be taken into account.

Only with frequency controlled compressors: Delta p (FC)**, P2.16**:

4a. Check pressure target value on compressors with frequency control and adjust, if necessary, as described under **P2.16** on page 30.

NOTE

Disturbances in the operating process

Incorrect pressure settings can lead to disturbances in the operating process.

➔ The pressure target should be at least 0.3 bar below the deactivation pressure to achieve consistent control.

5. Optional: Activate Autorestart time (P2.21), if applicable.
6. Optional: Deactivate anti-freeze (P2.32), if applicable.

Only with booster compressors: Booster pressure, **P2.42**:

6a. For booster pressure compressors, check the set pressure value and possibly adjust it to the maximum pressure of the input pressure network as described in **P2.42** on 32.

7. Change type of message for oil filter monitoring **(P2.44)** to fault, if applicable, as the factory-set value is always Service.

Only with connected compressed air treatment (e.g. dryer) to the control: Contact type for compressed air treatment **P2.60** and message type for compressed air treatment **P2.61**:

7a. Set signalling contact, as described under **P2.60** on page 34 depending on the contact type of the component.

7b. Change type of message for compressed air treatment **(P2.61)** to fault, if applicable, as the factory-set value is always Service.

8. Set pressure control **(P.2.63)** to "Internal release".

The setting "Internal release" must be selected, if the **focus** control 2.0 is to control a single compressor.

9. Check On/Off function **(P2.65)** and adjust on-site according to operating conditions, as described under **P2.65** on page 36.
10. Check key switch function **(P2.66)** and adjust depending on the on-site operating conditions, as described under **P2.66** on page 37.

If **P2.65** is set to "Local" the function of the key switch cannot be used.

→ The settings in the category „Compressor“ are completed.

If the compressor is **solely** used as a **single machine**:

➔ All checks/settings/changes of parameters prior to commissioning are completed.

➔ Optionally the timer function can be used for a single machine.

Optional: Set timer

Optionally the timer function can be set for a time-dependent control of the compressed air production of single machines.

To set the timer:

- Set timer channels according to the described procedures under "Set timer" from page 58.

Timer function and timer values are described in detail from page 51 onwards. This description is important so that the setting of the timer is carried out correctly.

The setting of timer value "Priority" is not relevant if a single compressor is operated.

5.3 Multiple compressor system: Set parameter for Master

If the **focus** control 2.0 is to be installed on a higher level as **Master** control within a multiple compressor system some parameters have to be adapted in a second step, after completion of the activities described in chapter 5.2.

Prerequisites for the installation of **focus** control 2.0 as Master control are as follows:

– All activities described in chapter 5.2 were carried our beforehand.
– The master control must be connected to the Slave controls directly via RS485 interface or via Modbus interface module.

Set parameter in category „Compressor“

Complete the following derogating measures in the parameter category "Compressor":

Settings for communication via Modbus P2.50 to P2.52

1. Set device address (1) **(P2.50)** to 0 for Master control.
2. Specify bit rate (1) **(P2.51)** for the network.
3. Determine protocol frame (1) **(P2.52)** for the network.
   → The necessary settings for the communication of the master control have been done.

NOTE

Communication faults

Incorrect settings of parameters **P2.50 to P2.52** can lead to communication faults among the compressors of a multiple compressor system.

➔ In parameter **2.50** only the master control is allocated the address 0.

➔ Parameters **P2.51 and P2.52** must be set identically to the Master values for all compressors of the multiple compressor system.

4. Check if parameter for pressure control **(P2.63)** is set to "Internal release".
5. If this is not the case set to "Internal release".

The function "Internal release" must be set, to enable operation of the **focus** control 2.0 as Slave in a multiple compressor system.

→ The settings in the category „Compressor“ are completed. Settings in the category "BLS" follow.

Set parameters in category „BLS“

Complete the following measures in the parameter category "BLS":

1. Set number of compressors **(P3.1.3)** to total number of all compressors in the multiple compressor system (>1 and max. 4).
   → As of now the sub-view „Master for multiple compressor system operation“ (see page 21) is displayed.

Pressure settings multiple compressor system, parameters P3.2.1 to P3.3.5

2. Set maximum pressure value of pressure range 1 which may be reached by the multiple compressor system (**P3.2.1**).
3. Set minimum pressure value of pressure range 1 which may be reached by the multiple compressor system (**P3.2.2**).
4. Set pressure value for upper target area distance of pressure range 1 (**P3.2.3**).
5. Set pressure value for lower target area distance of pressure range 1 (**P3.2.4**).
6. Optional: Set gradient of pressure range 1 (**P3.2.5**).

NOTE

Disturbances in the operating process

Incorrect pressure settings can lead to disturbances in the operating process.

➔ The switch-off pressures (p_{max}) of the individual compressor controls must be above the upper target area distance of the multiple compressor system (Pressure range 1: **P3.2.3**).

➔ The switch-on pressures (p_{min}) of the individual compressor controls must be above the lower target area distance of the multiple compressor system (pressure range 1: **P3.2.4**).

➔ The pressure values for the upper and lower target area distance must be within the pressure range.

➔ **Exception:** If **P2.64** (monitoring of compressor control) is activated, the switch-on pressures (p_{min}) must be set below the lower target area distance of the multiple compressor system.

If you want to install an **optional** second pressure range for a needs-oriented pressure range switch-over depending on the local operating conditions:

7. Set maximum pressure value of pressure range 2 which may be reached by the multiple compressor system (**P3.3.1**).
8. Set minimum pressure value of pressure range 2 which may be reached by the multiple compressor system (**P3.3.2**).
9. Set pressure value for upper target area distance of pressure range 2 (**P3.3.3**).
10. Set pressure value for lower target area distance of pressure range 2 (**P3.3.4**).

11. Optional: Set gradient of pressure range 2 (**P3.3.5**).

NOTE

Disturbances in the operating sequence

Incorrect pressure settings can lead to disturbances in the operating process.

- ➔ The switch-off pressures (p_{max}) of the individual compressor controls must be above the upper target area distance of the multiple compressor system (Pressure range 2: **P3.3.3**).
- ➔ The switch-on pressures (p_{min}) of the individual compressor controls must be above the lower target area distance of the multiple compressor system (pressure range 1: **P3.3.4**).
- ➔ The pressure values for the upper and lower target area distance must be within the pressure range.
- ➔ **Exception:** If **P2.64** (monitoring of compressor control) is activated, the switch-on pressures (p_{min}) must be set below the lower target area distance of the multiple compressor system.

Set the same values for pressure range 2 as for pressure range 1, in case the compressed air production is to be accomplished by one pressure range only.

Control settings for multiple compressor system, P3.4.1 to P 3.8.4

12. Check control mode **(P3.4.1)** for the multiple compressor system and change, if applicable, see also **P3.4.1**on page 44.
13. Optional: Set number of concurrently working compressors **(P3.4.2)**, see also **P3.4.2** on page 46.

Only with several frequency/proportionally controlled compressors in a multiple compressor system: Concurrently regulating compressors, **P3.4.3**:

13a. Optional: Set number of concurrently working compressors **(P3.4.3)**, see also **P3.4.2** on page 46.

14. Optional: Set fixed time interval **(P3.4.4)** so that the output release can be switched within the priority groups of the base load machines on a regular basis, as described under **P3.4.4** on page 47.

If no time interval is set via parameter **P3.4.4** (setting 0) the interval-controlled base load switch function is not active.

This setting must be made, among others, when the time-dependent control of the compressed air production is to be used via the timer function, see „Optional: Set timer“, page 67.

If a timer interval was set via parameter **P3.4.4** (Setting ≠ 0) the timer function can longer be used.

Only if more than one machine is listed in the priority group:

14a. Optional: Adapt maximum **(P3.4.5)** and minimum run-time difference **(P3.4.6)** as value pair, if applicable.

15. Set priority group for each compressor of the multiple compressor system (**P3.5.1**, **P3.6.1**, **P3.7.1**, **P3.8.1** depending on the number of compressors).
16. Set max. output delay for each compressor of the multiple compressor system (**P3.5.2, P3.6.2, P3.7.2, P3.8.2** depending on the number of compressors).
17. Set min. output delay for each compressor of the multiple compressor system (**P3.5.3, P3.6.3, P3.7.3, P3.8.3** depending on the number of compressors).

The values for maximum and minimum load delay must be set individually depending upon size, type and accessories of the machine.

For all frequency or proportionally controlled compressors:

17a. Check minimum utilisation and adjust, if necessary (dependent on **A, B, C, D** being a regulated compressor **P3.5.4, P3.6.4, P3.7.4, P3.8.4).**

→ The settings in the category „BLS“ are completed.The timer setting follows optionally.

Optional: Set timer

When the interval-controlled base load change function has not been activated (setting of **P3.4.4** to 0), the time-dependent control of the compressed air production can be set via the **timer**. This control type is recommended specifically when operating differently sized compressors

To set the timer:

- Set timer channels according to the described procedures under "Set timer" from page 58.

Timer function and timer values are described in detail from page 51 onwards. This description is important so that the setting of the timer is carried out correctly.

→ Setting of the **focus** control 2.0 as master control of the compressor network is completed and the higher-levelled control settings for the compressed air production are stored in it.

5.4 Multiple compressor system: Set parameters for Slave

If the **focus** control 2.0 is to be installed on a lower level as Slave control within a multiple compressor system some parameters have to be adapted in a second step, after completion of the activities described in chapter 5.2.

Prerequisites for the installation of **focus** control 2.0 as Slave control are as follows:

– All activities described in chapter 5.2 were carried our beforehand.
– The Slave control must be connected to the master control via RS486 interface or via Modbus interface module.

Set parameters in category „Compressor“

Complete the following derogating measures in the parameter category "Compressor":

Pressure settings, parameter P2.12 to P2.16:

1. Check pressure settings (**P2.12 to P2.15**) of Slave compressor and align in accordance to higher-level pressure range, if applicable.

NOTE

Disturbances in the operating process

Incorrect pressure settings can lead to disturbances in the operating process.

➔ The switch-off pressures (p_{max}) of the individual compressor controls must be above the upper target area distance of the multiple compressor system (Pressure range 1: **P3.2.3**).

➔ The switch-on pressures (p_{min}) of the individual compressor controls must be above the lower target area distance of the multiple compressor system (pressure range 1: **P3.2.4**).

➔ **Exception:** If **P2.64** (monitoring of compressor control) is activated, the switch-on pressures (p_{min}) must be set below the lower target area distance of the multiple compressor system.

Only with frequency controlled compressors: Delta p (FC), **P2.16**:

1a. Check pressure target value on compressors with frequency control.

NOTE

Disturbances in the operating process

Incorrect pressure target values can lead to disturbances in the operating process.

➔ If several frequency controlled compressors are operated within a multiple compressor system and these machines receive a control release (**P3.4.3**: value >1) the pressure target values of these machines must have the same value.

With activated Autorestart times only:

1b. Check auto-restart time (**P2.21**) and adjust according to the Auto-restart times of other compressors in the multiple compressor system, if applicable.

The adjustment of the Auto-restart times of the compressors of the multiple compressor system must be graduated machine-size-dependently, aligned with the start-up times.

Settings for communication via Modbus P2.50 to P2.52

2. Set device address (1) **(P2.50)** to 2, 3 or 4 for Slave control.
3. Adjust bit rate (1) (**P2.51**) dependent from network (as prescribed by the master control).
4. Set protocol frame (1) **(P2.52)** dependent from network.
   → The necessary settings for the communication of the Slave control have been done.

NOTE

Communication faults

Incorrect settings of parameters **P2.50 to P2.52** can lead to communication faults among the compressors of a multiple compressor system.

➔ The Slave controls receive the addresses 2, 3 or 4 in parameter **P2.50**.

➔ Parameters **P2.51** and **P2.52** must be set identically for all compressors of the multiple compressor system.

5. Check if parameter for pressure control **(P2.63)** is set to "Release via bus".
6. If this is not the case set to "Release via bus".

The function "Release via bus" must be set, to enable operation of the **focus** control 2.0 as Slave in a multiple compressor system.

→ The settings in the category „Compressor“ are completed. One more setting in the category "BLS" follows.

Set parameter in category „BLS“

Complete the following measures in the parameter category "BLS" so that a smooth operation of the compressor system is ensured:

- Set number of compressors (P3.1.3) to 1.
  → Parameterisation of Slave control is finished.

6.1 Types of message

Messages that occur are structured by 2 message types:

No.	Symbol	Type of message	Meaning
1.	⚠	Warning/service message	A warning or servicing message is indicated. The compressor remains fully operational.
2.	✖	Fault message	The control signals a fault. The compressor is switched off.

Tab. 6.1: Types of message

If an event occurs that causes one of the message types, the event is visually displayed at once by the corresponding icon in the top left area of each main display.

6.2 Process message

In case an event occurs, which causes one of the message types, the following procedure is recommended:

1. Call event information with the main display "Logbook" and the subordinate detail view of the corresponding message (see also „Main display "Log book"“, page 54).
2. Try to limit/find the reason for the message by means of the detailed view and the following tabular list.
3. Fault to be rectified by BOGE service personnel, if necessary .

CAUTION

Compressor damage

Fault correction or troubleshooting (incl. servicing and repair work) by unauthorised or unqualified personnel can change or destroy the compressor.

➔ Faults and problems may only be rectified by authorised qualified personnel or BOGE service personnel.

➔ In cases of doubt please contact BOGE service beforehand.

4. Acknowledge message (see page 76).
   → As soon as the cause has been rectified and the message has been acknowledged, the compressor should be fully operational again. In this case the green dot ● is displayed in the top left area of each main display.

6.3 Listing of possible messages

The following table contains a list of possible messages that can be output by the **focus** control 2.0. Each message is applied with a unique number, the message code. Message and message code are assigned to a specific cause that is also listed.

The table serves to limit the causes for messages so that possible faults and problems during the operation of compressors can be eliminated or quickly rectified.

In case of doubts BOGE recommends to contact BOGE service If warning/ service messages occur.

Please contact your BOGE-Service by calling phone number:

Phone: +49 5206 601-140

Type	Code	Message/Cause	Proposals for remedying
✖	1	Final compression temperature too high (>110C°)	Decrease ambient temperature by ventilation.
✖	2	Motor temperature too high	Motor and pressure generation of the compressor to be checked by BOGE service personnel.
✖	3	Fan motor overcurrent	Motor and electrical installation of the compressor to be checked by authorised qualified electricians
✖	4	Incorrect rotational direction	Rotational direction of drive motor (phases of the power cable) to be checked by authorised qualified electricians and changed, if necessary
✖	5	Compressor system pressure too high	– Oil separator and minimum pressure valve to be checked by authorised qualified personnel and to be reolaced, if necessary. – Check position of ball valve.
▲	6	Suction filter differential pressure too high	Have filter cleaned and replaced, if necessary, by authorised qualified personnel.
▲ ✖	7	Oil filter differential pressure too high	– Oil filter to be checked by authorised qualified personnel and to be replaced, if necessary. – Differential pressure switch to be checked by BOGE service personnel and replaced, if necessary.
▲	8	Oil separator differential pressure too high	– Oil separator/net pressure sensor/system pressure sensor to be checked by authorised qualified personnel and to be reolaced, if necessary. – Check differential pressure settings.
▲	9	No output	Compressor to be checked by BOGE service personnel.
▲	10	Motor servicing due	Component to be serviced by BOGE service personnel

Type	Code	Message/Cause	Proposals for remedying
▲	11	Compressor servicing due	Component to be serviced by BOGE service personnel
▲	12	System pressure decrease too slow	– Vent valve/minimum pressure valve to be checked or replaced, if necessary, by authorised qualified personnel – Check hose lines.
✖	13	Frequency converter signals Fault (no release)	– Improve cooling. – Motor/bearing/pressure sensor to be checked by BOGE service personnel and to be replaced if necessary. – Function of frequencyconverterr to be checked by authorised qualified personnel or BOGE service personnel.
✖	14	Temperature too low (<3 °C)	Increase ambient temperature at the installation location.
▲	15	Suction control /proportional control (faulty)	Suction controller /proportional controller to be checked by BOGE service personnel and to be replaced if necessary.
✖	16	Net pressure transmitter faulty	Net pressure transmitter to be replaced by BOGE service personnel
✖	17	System pressure build-up too fast/increase too sharp	Compressor to be completely checked by BOGE service personnel.
▲	18	Fault of an external control	– Settings in parameterisation Master/Slave to be checked by authorised qualified personnel and corrected, if necessary. – Functionality of higher-level control to be checked by authorised qualified personnel or BOGE service personnel, or to be replaced, if necessary. – Wiring between the controls to be checked by authorised qualified electricians.
▲	19	Power-up phases too short, too many motor switching cycles	Compressor and control to be completely checked by BOGE service personnel.
▲	20	Continuous contact of an external control	– Functionality of higher-level control to be checked by authorised qualified personnel or BOGE service personnel. – Check messages of master control and perform troubleshooting, if necessary.
▲	21	Receiver servicing due	Combination receiver and wearing parts to be serviced by BOGE service personnel and load-cyles counter to be reset.
▲	22	HoodTemp_too_high (piston)	– Improve ventilation of compressor installation room. – Temperature sensors to be checked and replaced, if necessary.
✖	23	Cylinder head temperature too high (piston)	– Improve ventilation of compressor installation room. – Temperature sensors to be checked and replaced, if necessary
▲ ✖	24	Oil level crankcase (piston) (too low)	– Oil to be filled in by trained personnel. – Oil probe incl. electric lines to be checked by authorised qualified electricians or BOGE service personnel.

Type	Code	Message/Cause	Proposals for remedying
✖	25	Calibration data fault	Control to be checked by BOGE service personnel and to be replaced if necessary.
✖	32	Net pressure transmitter faulty wire breakage	– Net pressure transmitter and/or data line to be replaced by BOGE service personnel . – Control to be replaced by BOGE service personnel
✖	33	Compressor system pressure transmitter wire breakage	– System pressure transmitter and/or data line to be replaced by BOGE service personnel – Control to be replaced by BOGE service personnel
✖	34	Compressor system pressure transmitter faulty	System pressure transmitter to be replaced by BOGE service personnel
▲	35	Check valve (piston) (differential pressure too high)	– Valve to be cleaned by qualified personnel and replaced, if necessary. – Pressure sensors to be checked and replaced, if necessary, by authorised qualified personnel. – Differential pressure settings to be checked by authorised qualified personnel and corrected, if necessary.
▲	36	Bus life bit faulty	– Hardware/software faults to be rectified by BOGE service personnel, if applicable. – Bus connections to be checked by authorised qualified electricians and repaired, if necessary.
✖	38	Compressor motor overcurrent	– Voltage and electric lines to be checked by authorised BOGE service personnel. – Oil separator cartridge to be checked by authorised qualified personnel and to be replaced, if necessary. – Net and system pressure settings to be checked by authorised qualified personnel or BOGE service personnel and to be corrected, if necessary.
▲ ✖	39	Fault compressed air treatment	Have faults on the connected compressed air treatment component rectified by authorised qualified personnel or BOGE service staff.
✖	40	Communication FC module (faulty)	Function of FC module to be checked by authorised qualified personnel or BOGE service personnel.
▲	41	Battery voltage too low	Have battery replaced by authorised qualified electricians
✖	42	FC module: not calibrated	FC module to be re-calibrated by BOGE service personnel or to be replaced if necessary
▲	43	FC module overflow – Signal too strong	FC module to be checked by BOGE service personnel and to be replaced if necessary
▲	44	FC module underflow – Signal too weak	FC module to be checked by BOGE service personnel and to be replaced if necessary.
▲	46	Watchdog not active	Base module to be checked by BOGE service personnel and to be replaced if necessary
▲	48	TAN identifies internal BUS fault	Base module and operating unit to be checked by BOGE service personnel and to be replaced if necessary

Type	Code	Message/Cause	Proposals for remedying
▲	49	TAN misses data (from base module)	Base module and operating unit to be checked by BOGE service personnel and to be replaced if necessary
▲ ✖	50	Communication dryer module	Dryer module to be checked by BOGE service personnel and to be replaced if necessary
▲ ✖	51	Pressure transmitter at dryer faulty	Pressure transmitter on dryer to be checked by BOGE service personnel and to be replaced if necessary
▲ ✖	52	(Dryer)-Cooling temperature sensor – Fault	Cooling temperature sensor and dryer module to be checked by BOGE service personnel and to be replaced if necessary.
▲ ✖	53	(Dryer)-Ambient temperature sensor faulty	Ambient temperature sensor and dryer module to be checked by BOGE service personnel and to be replaced if necessary.
▲ ✖	54	Pressure at dryer too high (refrigerant)	Function of pressure sensor and dryer to be checked by authorised qualified personnel or BOGE service personnel.
▲ ✖	55	Dryer: pressure dew point too low	Function of dryer to be checked by authorised qualified personnel or BOGE service personnel
▲ ✖	56	Dryer: pressure dew point too high	Function of dryer to be checked by authorised qualified personnel or BOGE service personnel
▲	57	Compressed air outlet temperature (piston) (too high)	– Improve ventilation of compressor installation room. – Cooling fins to be cleaned by trained personnel
▲ ✖	60	Base module recognises TAN error	Operating unit to be checked by BOGE service personnel and to be replaced if necessary.
▲	61	Communication with RS485-Modul faulty	RS485 module to be checked by BOGE service personnel and to be replaced if necessary.
✖	62	Communication with catalyst module faulty	
▲	63	Communication with analogue output module faulty	Analogue output module to be checked by BOGE service personnel and to be replaced if necessary.
First ▲ then ✖	64	Motor bearing temperature too high	Motor,bearing and temperature sensor to be checked by BOGE service personnel, bearing(s) and/or sensor(s) to be replaced, if necessary.
▲	74	Dryer and compressor servicing	Components to be serviced by BOGE service personnel.
✖	76	Booster pressure_too_low (piston)	– Booster settings to be checked by BOGE service personnel and to be reset if necessary. – Booster pressure generation and distribution to be checked by BOGE service personnel. – Solenoid valve (booster pressure) to be replaced by authorised qualified personnel or BOGE service personnel, if necessary.
✖	77	BoosterPressFault (piston)	Booster transmitter to be checked by authorised qualified personnel or BOGE service personnel and to be replaced if necessary.
First ▲ then ✖	82	SystemP_TransmError	Key net pressure transmitter/key net pressure module to be checked by BOGE service personnel and to be replaced if necessary.

Type	Code	Message/Cause	Proposals for remedying
First ▲ then ✖	83	SystemP_ModComError	Key net pressure module to be checked by BOGE service personnel and to be replaced if necessary
First ▲ then ✖	84	SystemP_ModCalibError	Key net pressure module to be checked by BOGE service personnel and to be replaced if necessary.
▲	87	Emergency stop actuated	Information message only: Emergency Stop function was activated with running machine and p_s >1,3 bar.
▲ ✖	91	Input 42	Via input 42 a message is triggered. Relevant component to be checked by authorised qualified personnel or BOGE service personnel.

Tab. 6.2: Listing of possible messages

6.4 Acknowledge message

After the cause of a message has been found and then removed, the message must be confirmed with the main display "Logbook" to ensure that the compressor is ready for operation without limitation again. A message is confirmed as follows:

1. Use arrow functional keys ◂ ▸ to navigate to main display "Log book".
2. Use arrow functional keys ▴ ▾ to select the message to be acknowledged.
3. Press functional key below the symbol i.
   → The detailed view of the message is displayed.

If it is ensured that the reason for the message was eliminated:

4. Press functional key below the symbol ✓.
   → The symbol ✓ is shown in the top right area of the detailed view.
   → The event was acknowledged.
   → As soon as all messages listed in the main display "Logbook" have been acknowledged, the green dot ● is displayed in the top left area of each main display.
   → The compressor is fully operational again.

7.1 Clean display

Use a slightly damp but not too wet cloth to clean the display. In case the display is contaminated with oil put additionally a few drops of household cleanser onto the cleaning cloth.

7.2 Replace battery

Voltage of battery in main module must be checked in regular intervals. The voltage can be checked on the main display "Servicing" (see page 22). If the battery voltage falls below a critical value, the control displays a servicing message to draw attention to the fact that a battery change is required.

NOTE

Disturbances in the operating process when using timer

Low battery voltage in the main module of the control can lead to faults in the operating process.

➔ Check voltage of battery in main module in regular intervals.

➔ When outputting a servicing message due to too-low battery voltage, have the battery replaced by authorised electricians at once.

7.3 Updating software (updates)

The software (for the basic module/operating unit, etc.) of the control is updated by BOGE service staff. Description of performance of updates is therefore not part of these operating instructions.

If the software is upgraded, BOGE service personnel will keep you informed about any changes as to the functions of the control in such cases.

8.1 General data as to external connections

Base module

Terminals	Type of terminal	Function	Description	Rating
1/2	Spring connection	Relay output	Ready for operation: Make contact	2 A 30 V DC/250 V AC with ohmic load; 0,6 A 250 V AC 50/60 Hz with inductive load (Power factor = 0.4)
3/4/5	Spring connection	Relay output	Fault-free: Grouping terminal 3, Break contact terminal 4 and make contact terminal 5	2 A 30 V DC/250 V AC with ohmic load; 0,6 A 250 V AC 50/60 Hz with inductive load (Power factor = 0.4)
6/7	Spring connection	Relay output	Operation: Make contact	2 A 30 V DC/250 V AC with ohmic load; 0,6 A 250 V AC 50/60 Hz with inductive load (Power factor = 0.4)
8/9	Spring connection	Relay output	Load run: Make contact	2 A 30 V DC/250 V AC with ohmic load; 0,6 A 250 V AC 50/60 Hz with inductive load (Power factor = 0.4)
10/11	Spring connection	Relay output	Servicing: Make contact	2 A 30 V DC/250 V AC with ohmic load; 0,6 A 250 V AC 50/60 Hz with inductive load (Power factor = 0.4))
34	Spring connection	Digital input	Monitoring compressed air treatment Terminal 34 (against terminal 31 (+24 V))	24...31 V DC, 10 mA, Input resistance 3 kΩ
40	Spring connection	Digital input	Output release Terminal 40 (against terminal 31 (+24 V))	24...31 V DC, 10 mA, Input resistance 3 kΩ
41	Spring connection	Digital input	Remote Start/stop switch Terminal 41 (against terminal 31 (+24 V))	24...31 V DC, 10 mA, Input resistance 3 kΩ
42	Spring connection	Digital input	Switch-over pressure range Terminal 42 (against terminal 31 (+24 V))	24...31 V DC, 10 mA, Input resistance 3 kΩ
51	Spring connection	External RS485 interface	Earth (GND)	
52	Spring connection	External RS485 interface	Signal A	Input differential voltage max –12 V
53	Spring connection	External RS485 interface	Signal B	Input differential voltage max. +12 V

Tab. 8.1: Data terminals base module

Analogue output module

Terminals	Type of terminal	Function	Description	Rating
1/2	Spring connection	Analogue output	Actual frequency value: 4...20 mA (terminal 1) against terminal 2 (GND)	max. 28 mA, max. load 400 Ω

Tab. 8.2: Data terminals base module

RS485-Module

Terminals	Type of terminal	Function	Description	Rating
1	Spring connection	External RS485 interface	Earth (GND)	
2	Spring connection	External RS485 interface	Signal A	Input differential voltage max. –12 V
3	Spring connection	External RS485 interface	Signal B	Input differential voltage max. +12 V

Tab. 8.3: Data terminals RS485 module

Analogue input module

Terminals	Type of terminal	Function	Description	Rating
6/7	Spring connection	Analogue input	External system pressure measurement	4-20 mA (terminal 7) (+24 V terminal 6) max. 22 mA DC, input resistance 150 Ω Separated from external supply voltage due to double insulation

Tab. 8.4: Data terminals analogue input module

8.2 Wire cross sections of external connections

For external connections the following conductor cross sections are to be used:

Spring connections base module

Conductor type	Type of connectable conductor cross sections (min...max)
Single wire/fixed	0.2...1.5 mm²
Stranded wire/flexible	0.2...2.5 mm²
Stranded wire/flexible with ferrule	0.25...1.5 mm²
AWG	24-16

Tab. 8.5: Wire cross sections of spring-type connections

Spring connections additional modules

Conductor type	Type of connectable conductor cross sections (min...max)
Single wire/fixed	0.5...1.5 mm²
Stranded wire/flexible	0.5...1.5 mm²
Stranded wire/flexible with ferrule	0.5...1.5 mm²
AWG	26-14

Tab. 8.6: Wire cross sections of spring-type connections