



Operating instructions

FOCUS compressor
control for
screw compressors



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Installation

FOCUS is a compressor control unit.

It is installed into the switch cabinet as part of the compressor and serves as a compressor control device.

Prior to commissioning and before accomplishing any kind of maintenance or servicing work please read the functional descriptions of both control and compressor carefully. First and foremost observe the **Safety notes in Chapter 1 of the functional description of the compressor.**

Power input

Terminals A1 and A2 for 24V AC/DC

Rating: 24V +/-10% 50/60Hz 15W
24V DC +/-10% 0,4A

An interruption of the power supply is effected by means of the mains disconnecter of the compressor.

Modules

The basic equipment of the FOCUS consists of a basic module and a keypad/display unit (TAN).

Amongst others the following modules are optionally available:

- for frequency regulated compressors
- with a 4-20mA output for master controls, suitable for frequency regulated compressors
- with a (second) RS485 interface for the connection of additional compressors if the first interface is used otherwise
- for compressors with built-in dryers

Interconnection of the modules may only be completed using the provided leads supplied with the equipment.

Control unit

The display unit comprises a graphic display and 3 LEDs for an additional illustration of the operating modes.

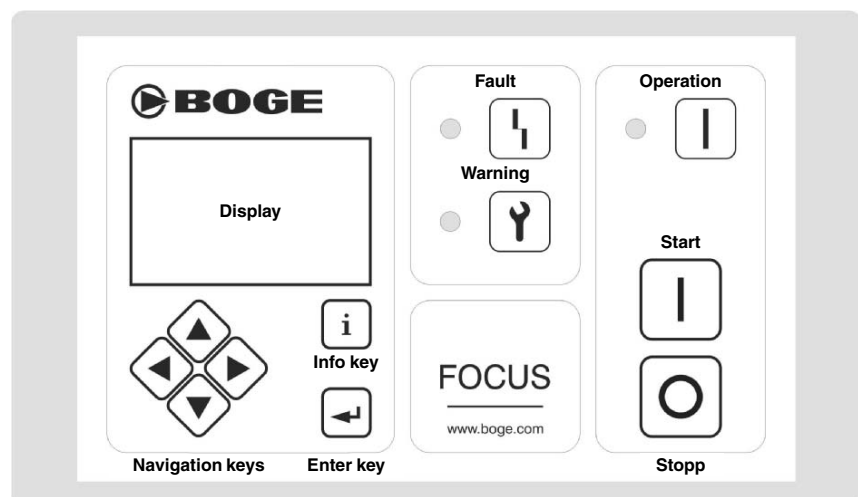


Fig. 1.1: FOCUS operating panel

◀ ▶ Navigation keys:

Navigation in the menu, scrolling the displays, scrolling of pages in the parameter display.

▼ ▲ Navigation keys:

Navigation in the menu, displays, dryer status, navigation in the the parameter display, setting of values.

**Info key**

Display of faults, warnings or maintenance messages, log book, quitting of settings.

**Enter key**

Confirmation of inputs, selection of parameters, forced idling, setting of FC (*frequency converter*) parameters.

**Off(0) key**

Acknowledging when switching on the control, switching off the compressor, switching off forced idling.

**On(1) key**

Switching on the compressor, forced idling.

**● Warning/Maintenance (LED- orange)**

Flashing: Pending warning; compressor is working – as yet.

Lit: Warning already acknowledged; compressor is working – as yet.

**● Fault (LED- red)**

Flashing: Upcoming fault, compressor is switched off.

Lit: Fault already acknowledged; compressor remains switched off and cannot be restarted until the fault has been rectified.

**● Operation (LED - green)**

Flashing: Compressor in idling operation

Lit: Compressor is switched on.

Emergency-Stop pushbutton



The Emergency-Stop pushbutton interrupts the power supply for the contactor coil. The control is still energized and generates a corresponding display.

Operation

Prerequisite: The compressor must be electrically and pneumatically connected, the power supply voltage must be turned on and the ball valves and/or balanced disc stop valves between compressor and compressed air receiver must be opened.

Switch on the control

Having connected the compressor to the power supply and having switched on the main switch, if applicable, the version display is shown (if neither Auto Restart nor Remote control are parameterized) on which the name of the control, the name of the manufacturer and the version number are shown.

First a parameter adjustment between basic module and TAN is performed resp. and if applicable the registration of connected and not yet registered additional modules. When this procedure has been finished the symbol for the -key is flashing. Press -key to acknowledge and exit the display.

Otherwise – Auto restart and/or Remote-On-Off is activated:

After the recurrence of the power supply (net power failure) the display shows a countdown, starting with the set Auto Restart time [s]. When this time is expired the compressor switches to **Ready** status and starts automatically, as soon as the prerequisites are fulfilled.


In case faults occur when the compressor is powered up they are displayed immediately after the parameter reconciliation. The fault has to be acknowledged to get to the main display (see also Warning message / Fault message).

Switch on the compressor

At first **OFF** should be displayed in the bottom frame – the status display of the compressor.

If **EMERGENCY-OFF** is displayed for the compressor status the Emergency-Stop button has to be unlocked first.

If the status display shows **Fault**, the control is faulty and the malfunction has to be corrected first (see also Warning message / Fault message).

Once this has been accomplished and the display shows the **OFF** status the compressor can be put into the **Ready** status by pressing the -key.

A green LED signals that the compressor is ready for operation and the pressure control is active – as long as no "Timer-Off" is due or an external pressure control was parameterized.

Ready

If the compressor status **Ready** is displayed, the compressor is in the "ready-for-operation" status. That means that the compressor automatically (re)starts pressure and/or time controlled – as long as the conditions to do so are fulfilled.

Run-up phase

The compressor motor is started and run up as already described under 'Ready'. The status display changes from **Ready** to **Run-up**.

To be able to do so the system pressure at the compressor must be decreased and the motor spinning time finished. Furthermore no limitation of the motor switching cycles is allowed.

Otherwise in the motor status display the display **Ready** is shown!

For the star/delta contactor combination applies: First the star contactor and 20ms later the mains contactor is switched on. The display **Run-up** signals the corresponding status of the control.

Load operation

The **Run-up** resp. **Star phase** is finished after termination of the run-up time by switching of the control into the **Load run** status.

When changing into the Load run the control switches on the delivery valve.

Compressors which are controlled accordingly now change into the delta switching.

Frequency controlled machines display the percentage workload of the frequency converter as a bar diagram.

Idling

If the set maximum pressure of the compressor is reached in the load run the control switches to **Idling**. Accordingly **Idling** is shown in the status display. As a result an automatic system pressure decrease is effectuated.

If no after-running time is set (default: 0sek) the **Idling** phase is finished as soon as the system pressure value drops below 1.3 bar (if applicable + parameterized max. booster pressure) – provided the automatic limitation of start numbers allows it – and the compressor changes into the **Ready** status.

If the compressor is switched off via the maximum pressure and the net pressure drops below the set minimum pressure (P_{min}) during the idling time, the compressor control automatically switches from **Idling** to **Load run** – and the compressor continues with the output.

If the compressor is switched off however during a load run or idling phase by means of the Off-key resp. Remote-Off it waits with a flashing green LED in the idling phase (as described above) until the system pressure is decreased before it changes into the **Off** status.

Switch off the compressor

With the -key or via Remote-Off the compressor is switched off.

The pressure control is deactivated. If this happens when the motor stands still or is just operating in the Run-up phase, **Off** is displayed at once in the compressor status display and the green LED goes out. Otherwise an idling phase with flashing green LED is completed beforehand, as already described in the chapter 'Idling' – last passage.

Maintenance

When operating the control the battery voltage has to be checked from time to time. If the voltage drops too far a warning message is created. In this case the battery has to be replaced.

The display of the TAN has to be cleaned with a damped yet not wet cloth from time to time. As detergents customary household detergents for greasy surfaces can be used.

No further maintenance is required for the control.

Main display



Fig. 1

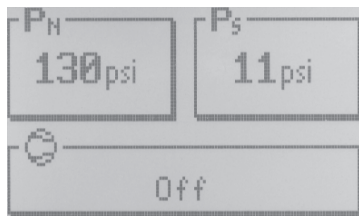


Fig. 2

This is the main display in the control menu. Here the net pressure, the final compression temperature and the compressor status are displayed (Fig. 1). By pressing the **arrow key ▶** the system pressure (Fig. 2) is displayed instead of the final compression temperature!

Net pressure	P_N	Shows the current net pressure.
System pressure	P_S	Shows the current system pressure.
Final compression temperature		Shows the current final compression temperature.

Compressor status	Meaning
Off	Compressor is switched off.
Ready	Compressor is Ready and starts automatically as soon as the conditions are fulfilled.
Run-up	Compressor is in star phase.
Load operation	Compressor runs in delta phase, the solenoid valve is closed.
% Converter workload	Display of the workload of frequency controlled compressors. The solenoid valve is closed.
Idling	Compressor runs in delta phase, the solenoid valve is opened.
Fault	A fault has occurred on the compressor / compressed air purification, the compressor is switched off. The fault has to be rectified prior to a restart.
Emergency-Stop	The Emergency-Stop button has been actuated.

If a dryer module is connected, the actuation of the **▼▲-keys** in display 1 or 2 of the main display effectuates that instead of the compressor status the tendency display of the dryer is displayed.

The tendency display is an indicator for the relative humidity of the compressed air.

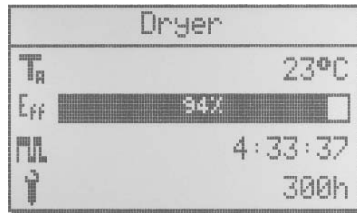
With a relative humidity of 25% the display is exactly in the centre.

If the cooling temperature drops to <= 0°C it is entered into the calculation. The display then moves to the left with decreasing temperatures (into the direction LO).

If the arrow key **▲** is pressed, the compressor status is displayed again.

Pressing of the arrow keys **◀ ▶** leads to the next display.

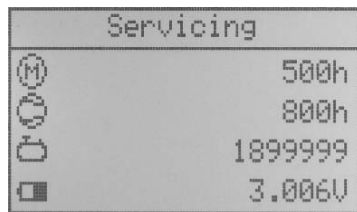
Dryer



When connecting the dryer module to the control, an additional page with the headline "Dryer" is displayed in the menu sequence. On this page the operating data of the dryer are displayed.

Room temperature	Current ambient temperature
Dryer efficiency display	Ratio between load time and total running time in %
Operating hours	Shows the operating hours of the dryer
Service interval counter	Shows the operating hours until the next servicing counter

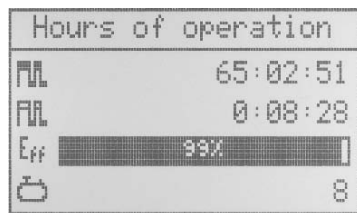
Servicing



With the next actuation of the ►-key you get to the servicing display. Here the information concerning the servicing times are displayed.

Next motor servicing (h)	Shows the operating hours until the next motor servicing.
Next compressor servicing (h)	Shows the operating hours until the next compressor servicing.
Next receiver servicing	Shows the number of load changes until the next receiver servicing.
Current battery voltage	Shows the current voltage of the battery for the real-time clock in the main module.

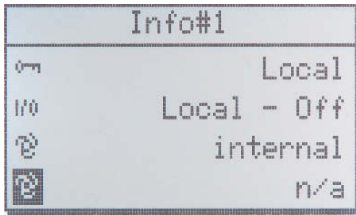
Operating times



With the next actuation of the ►-key you get to the operating times display, on this menu page the operating times of the compressor are displayed.

Motor running time	Shows the total operating time of the compressor motor in hours, minutes and seconds.
Idling	Shows the share of time in which the compressor was idling in hours, minutes and seconds.
Efficiency display	Shows the ratio of load energy compared to total operating time energy since the preceding Reset.
Load cycles of internal receiver	Counts the effected load cycles of the internal combination receiver. (One cycle consists of 1 x output and 1 x no output each)

Info # 1

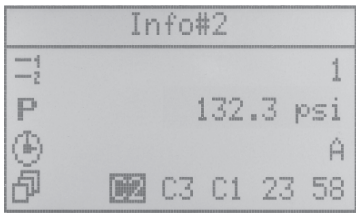


Here the information as to the compressor settings is displayed.

Key switch	Local: keyboard Remote: Remote-On-Off and/or external output release n/a: not installed
On/Off	Local: via keyboard Remote: via contact and/or Bus On: Compressor is switched on Off: Compressor is switched off
Output release	Internal: via internal pressure sensor External: Output release via contact and/or Bus Yes: Output release enabled No: Output lock is active
Auto Restart	n/a: No Auto Restart after (control) power failure Time: Auto Restart active, Auto Restart time

Changes to the displayed settings have to be accomplished by means of the parameter settings, if applicable, (see also parameter settings) or by changing the automatically registered configuration.

Info # 2



The information to the control settings as master control resp. the current status of the integrated timer are displayed here.

Pressure range	Activated pressure range
Net pressure	Current net pressure
Timer	- A-Z active timer channel - n/a no channel active
Priority sequence (time until change of priority)	Set priority sequence, active compressors and time in h and min until next change of priority.

The priority sequence is only displayed if the number of compressors in the basic load switching is above 1. In case the number of compressors in the BLS is set to 1, **n/a** is displayed here.

The display of the priority sequence shows the currently effective sequence for selecting the compressors. Depending on the setting the priority sequence is specified either by the basic load switching or by the timer. For each parameterized compressor the current output signal status, the current priority level and the time until the next priority change, with switched-on BLS, is displayed. If only the timer is active (cyclic changing time set to 0) no time is displayed.

Meaning:

C1 C2 C3 means, that the compressors 1–3 are connected and the sequence 1, 2, 3 is chosen – in this case none of the compressors receives an output signal.

C1 C3 C2 means as in the first example, that the compressors 1–3 are parameterized although they are selected in the sequence 1, 3 und 2 and furthermore compressor 1 receives an output signal in this case.

The output signal status is shown by means of a black background in the graphical presentation of the compressors in the display.


Changes to the displayed data have to be accomplished by means of the Basic Load Switching or Timer settings (see also: parameterizable settings).

Date / Time


This menu page shows the current setting of the real-time-clock.


The time is displayed in hours, minutes and seconds and the date with day of the week, day, month and year.




In case of a switched-off power supply the real-time-clock is operated by its battery – provided the plug-in jumper contacts arranged next to it are connected and their voltage is sufficient (see also chapter servicing).


To be able to set time and date only the -key has to be pressed. The cursor jumps to the time display and the place value for hours starts blinking.

This value can only be adjusted by means of the  -keys.



With the -key the input is acknowledged and the cursor moves to the next field.

Proceed the same way with all other place values until all values are correctly adjusted. In case a value has to remain unchanged just actuate the -key, to jump to the next value.


To leave the time adjustment, actuate -key until none of the place values is blinking any longer. Actuate -key to reach the previous page or actuate the  arrow key to go to the next page.



If the -key is actuated while adjustments are made to the real-time-clock, this setting is left without accepting the parameterized changes.

Display of version

The version display can be reached in the menu by pressing the  or  keys.

Here the name of the control, the software number and the manufacturer are displayed.

If the  key is pressed now you get to the **Module Info** display.

Here the addresses and the installed software versions of the connected modules are shown. The first display refers to the basic module (Address: 0), all other connected modules can be displayed by actuating the   keys.

Basic module: – 0, TAN: – 1, FC module: – 10, Dryer module: – 20, RS485 module: – 30, analogue output module: – 4X.

If the display of a module is flashing the communication with this module is faulty.

You can leave Module Info by actuating the -key.

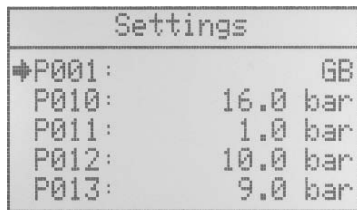
Entering of codes in general

1. Actuating the arrow key ◀ leads from the main display 1 to the **version display**.
2. If now the ⏏-key is actuated, a display is shown asking you to enter a 5-digit code (see code list.)
3. The first place value of the code is blinking. By means of the arrow keys ▼ and ▲ a digit can now be changed.
4. By actuating the ⏏-key or the ▶-key the cursor jumps to the next value and the value can be changed accordingly.
5. Once the last digit has been set the code is acknowledged by actuating the ⏏-key.
According to the entered code either windows for various settings or a parameter list opens. When entering the second ... fifth digit actuating the ⏏-key causes an erasing of the previous digit, so that it can be entered again.
Actuating the ⏏-key when entering the first digit the code setting is left and you return to the version display.

CODE	Meaning
17391	User- Code / parameter list
00000	Parameter display / access previous code
00111	Setting/Resetting servicing intervals
00988	Parameter restoring
00798	Timer settings
00832	BLS settings

If the user code, service code or BOGE code is entered it is possible to return to the previously left parameter list within 15 minutes after having left this list, without having to enter the code once more.

Parameter list



If one of the codes for the parameter list is entered (User code, Service code, BOGE code) it depends on the entered code which of the parameters can be processed.

An arrow at the beginning of the line shows where the cursor is currently positioned and if a value under this code can be changed.

If only the outline of the ⇐ arrow is displayed, the value under this code cannot be changed, if the arrow is completely filled →, the value can be changed.

In the parameter setting actuating the ▼ and ▲-keys makes the cursor move one parameter forwards or backwards. Use ◀ and ▶-keys to scroll to the previous/next page.

To leave the parameter list actuate ⏏-key and you get back to the main display.

If you are in the adjustment range of a parameter, it can be left again by actuating the ⏏-key. You have to actuate the ⏏-key once more to close the list.

Set parameters

1. Opening of the parameter list by means of the desired code (User code, Service code, BOGE Code)
2. If the cursor points at the parameter which is to be changed, e.g. maximum pressure in the pressure range 1 (P012), this selection is acknowledged by actuating the \square -key.
3. If a digit (e.g. 9 bar) is blinking on the right side of the parameter, the desired value can be set (e.g. 10 bar) by actuating the $\blacktriangledown/\blacktriangle$ -keys.
4. By actuating the \square -key this input is acknowledged and stored!
Actuating the \square -key at this place causes a leaving of the setting without accepting the changes.
You can proceed with every parameter in the same way.

Parameters

The setting of the parameters can be accomplished as described above.

P001 Language

Here the language for the control can be selected; at the moment German (D) and English (GB) are supported.

P012 P_{\max} Pressure range 1

Pressure range 1 is the default pressure setting for the compressor.

Here the upper pressure target value for pressure range 1 is set. As soon as the net pressure has reached P_{\max} the compressor changes from load run to idling.

P013 P_{\min} Pressure range 1

Pressure range 1 is the default pressure setting for the compressor.

Here the bottom pressure target value for pressure range 1 is set. If the compressor is in the Ready state and the net pressure drops below P_{\min} , the compressor starts with the output.

If the pressure range selection is effectuated by a master control or the external contact you have to observe when setting the pressure ranges, that in case of a power failure or fault of the master control, the compressor control eventually falls back on this pressure range.

P014 P_{\max} Pressure range 2

Pressure range 2 offers the possibility for pressure decreases – the value must not be set above that of pressure range 1.

Here the upper pressure target value for pressure range 2 is set. As soon as the net pressure has reached P_{\max} the compressor changes from load run to idling.

Pressure range 2 is only active if corresponding adjustments of the timer have been made and/or the external contact for the pressure range selection is active.

P015 P_{\min} Pressure range 2


Pressure range 2 offers the possibility for pressure decreases – the value must not be set above that of pressure range 1.

Here the lower pressure target value for pressure range 2 is set. As soon as the net pressure drops below P_{\min} , the compressor starts with the output.

Pressure range 2 is only active if corresponding adjustments of the timer have been made and/or the external contact for the pressure range selection is active.

P020 Auto Restart

Switching On/Off of the Auto Restart function (network independent on-off memory).

Normally the version display is shown after a power failure, which must be acknowledged by actuating the -key, before the control displays the Off-status and the alarm relay returns to the status "no fault".

If the Auto Restart function is active and the compressor was previously switched-on an adjustable count down is started after power recovery (Auto Restart time P021).

When this time is elapsed the compressor automatically returns to the Ready status. The pressure control is active and on demand the compressor resumes the output.

If P020 is set to the value **1** and Auto Restart is **activated**. If the value **0** is set the Auto Restart is **deactivated**.

When switching-off the compressors with the Emergency-Stop button the Auto Restart function is not active.

P021 Auto restart time

The time set in seconds is the time that elapses after a power failure, before the compressor starts again with activated Auto Restart or Remote On/Off.

P022 Short stop time limiting value

The time set in seconds is the time that should elapse at least after a motor stop before the switch-on pressure value of the air supply network is reached or dropped below again.

To be able to do so the FOCUS control constantly monitors the air supply network and "learns" the necessary data. Thus these data are automatically kept in case of net structure changes.

The default value should only be changed if agreed upon with BOGE Service beforehand.

P031 After-running time

Interval during which the compressor remains at least in the idling phase after a load run, before it switches to **Ready** or **Off** status.

This value is normally set to zero. Under special circumstances increased after-running times may be necessary, which can be set at this place.

P032 Anti freeze protection

Here the automatic anti freeze protection can be rendered inoperative.

If the compressor is in **Ready** status and the oil temperature (final compression temperature) drops below 5°C, the compressor starts automatically and runs in idling until the oil temperature reaches 20°C again.

If P032 is set to the value **1** the automatic anti freeze protection is **deactivated**, if the value **0** is set the anti freeze operation is **active**. The value 0 is given as default value.

P034 Continuous operation

If pressure losses have to be avoided at any cost in case of relatively small receivers or compressed air net volumes, a continuous operation can be activated here.

In case of an activated continuous operation the control never switches back to the **Ready** status. The compressor constantly runs in **Idling** if it is not delivering compressed air.

The value **1** means that the continuous operation is **active**, **0** means that the continuous operation is **deactivated**.

P044 Message type for oil filter

By this parameter it can be declared whether a pending message of the oil filter monitoring is defined as a warning or as a fault. This adjustment has effects on the properties of the control. Whereas for a warning only a message is created, the compressor is additionally cut off at once as soon as the parameter is defined as a fault.

In this case the setting 1 means Fault and the setting 0 Warning!

P050 Modbus address

The set value 0-248 indicates the Bus address of the RS485 interface on the basic module for the communication with an external Bus system – e.g. a master control.

For the settings of the integrated BLS the value 0 is available for the master. Additionally connected compressors have to be specified with the values 2 – 4. For other applications the address can be matched with the requirements. All addresses from 1-248 are possible

P051 Modbus baud rate

The value shown here indicates the data signalling rate [Bits/s] of the RS485-interface of the main board for the communication with an external Bus system – e.g. a master control.

P052 Modbus frame

The protocol frame is determined here. 8 data bits are transmitted and the parity can be selected (O = Odd, E = Even or N = None), as well as the number of stop bits. (1 or 2)

P053 Modbus address (module)

The set value 0-248 indicates the Bus address of the RS485 interface on the basic module for the communication with an external Bus system – e.g. a master control.

0 stands for master, additionally connected compressors have to be specified with the values 2 – 4.

P054 Modbus baud rate (module)

The value shown here indicates the data signalling rate [Bits/s] of the RS485-interface of the module for the communication with additional compressors.

P055 Modbus frame (module)

The protocol frame is determined here. 8 data bits are transmitted and the parity can be selected (O = Odd, E = Even or N = None), as well as the number of stop bits. (1 or 2)

P060 Contact type for compressed air purification

By this parameter it can be declared whether the signalling contact for the compressed air purification is a break contact or a make contact.

0 Break contact

1 Make contact

P061 Message type for compressed air processing

With this parameter it is determined whether the pending message of the compressed air processing is defined as a warning or as a fault. This setting has an influence on the performance of the control. Whereas in case of a warning only a message is released, the compressor is additionally switched off at once when this parameter is defined as a fault.

In this case setting 1 means fault and setting 0 warning!

P063 External release

The kind of external release is set by this parameter.

Setting	Meaning
0	Internal release
1	Release via contact
2	Release via contact and an external BUS

If a RS485 module is used and parameterized to an address above 0 – its rotary switch must point to zero in any case – it serves automatically as an external output release.

P064 Monitoring of an external release appliance

The parameter P064 is relevant if the pressure control is effectuated externally via the digital input and compressed air has to be available continuously – i.e. no switch-off during the night or on weekends seems to be sensible.

If the parameter P064 is set to the value **0** the monitoring of external output release is **deactivated**, if the value **1** is set, the monitoring is **active**.

In case of activated monitoring the FOCUS automatically switches to internal pressure control and outputs an appropriate warning message as soon as a fault of the external control is registered.

P065 Remote Start-Stop

This parameter determines the ON/Off switching function of the control via Tan, a potential-free contact or the Bus. In case the parameter is selected unequal 0, a switching On or Off via Tan of the FOCUS is no longer possible.

Setting	Meaning
0	The On/Off switching is effectuated solely by the control keyboard (local)
1	The On/Off switching is effectuated solely by the input Remote-Start-Stop-switch (continuous contact)
2	The On/Off switching is effectuated solely by the BUS interface
3	The On/Off switching is effectuated solely by the continuous contact – release function – and via the BUS interface, however not via the control keyboard.

In case of Remote-On-Off the Auto Restart time (P021) after a power failure is used for an automatic start delay.

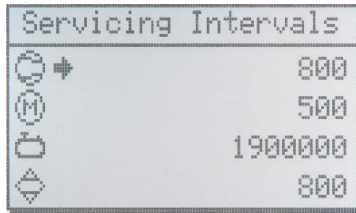
P066 Key switch

The function of the key switch is set here:

Setting	Meaning
0	The key switch has no function, it is deactivated.
1	When actuating the key switch, the function Remote-Start-Stop is activated.
2	When actuating the key switch the external output release is activated.
3	When actuating the key switch both the external output release as well as the Remote-Start-Stop function are enabled.

The settings for external output release (P064) and Remote-Start-Stop (P065) have to be effectuated separately under the corresponding parameter numbers.

Servicing interval



If the code 00111 is entered, a display for the servicing intervals is opened.

The servicing intervals for the compressor, the motor and the receiver are set here. If a dryer module is connected the servicing interval for the dryer can be set here as well.

The servicing interval for compressor, motor and dryer are specified in hours, for the receiver the load cycles of the internal receiver are counted (One cycle consists of 1 x output and 1 x no output each).

With the ▼▲-keys the corresponding servicing interval is selected and acknowledged by means of the ⏏-key. Now the digit starts blinking and can be changed using the ▼▲-keys. Only after having acknowledged and entered the value by means of the ⏏-key the new servicing interval is accepted and the corresponding down counter restarted.

By means of the ⏏-key this setting can be left without saving the changes or the counter reading.

The display of the servicing intervals can also be left by means of the ⏏-key.

With the setting of 2.000.000 receiver load cycles this down counter is deactivated.

Parameter factory setting

In case somebody has changed any parameters and wants to recover a functionally safe status the factory setting resp. commissioning setting can be restored.

To do this the compressor must be in the OFF status.

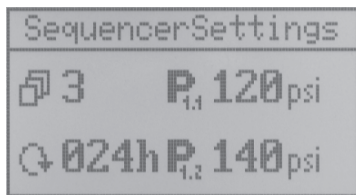
Only then the code 00988 can be entered.

In the displayed window you can read: **Restore** and you can select either **Yes** or **No**.

Should the saved parameters be restored, you can use the ▼▲-keys to select **Yes** and acknowledge by means of the ⏏-key.

Now the current data on the basic module are overwritten with the factory-set values.

Base load switch with additional compressors



If the code 00832 is entered you get to the settings for the integrated basic load switching.









The BLS controls at least 2, and a maximum of 4 compressors.

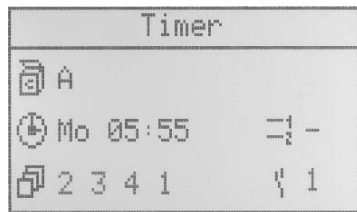
In adjustable time intervals (1-250 h) the priority sequence of the compressors changes. The BLS is designed for compressors of the same size.

Display:






On the top left the number of compressors is displayed, below the interval time, and on the right hand side P_{\min} (P1.1) and P_{\max} (P1.2) of pressure range 1. By actuating the ▼-key P_{\min} (P2.1) and P_{\max} (P2.2) of pressure range 2 (pressure decrease values) are displayed.

Setting:


- For setting the values you first have to press the -key. Now the number of compressors starts blinking.
- By means of the -keys the number of compressors can be changed and acknowledged using the -key.
If the number of compressors is set to 1 the BLS is deactivated and only the number of compressors can be changed.
Only if a minimum of 2 compressors is selected further settings can be made to the BLS.
- By pressing the -key the cycle time starts blinking and a value from 1-250 hours can be set by using the -keys.
If the cycle time is set to 0, no cyclic change takes place. The priority sequences then can be changed via the timer (see corresponding chapter).
- Another actuation of the -key brings the cursor to P1.1 the lower pressure target value of the first pressure range, which now can be set to the desired value.
The pressure values set here must now be adjusted to the pressure target values of the first pressure range (Parameter P012 and P013) of the compressor.
- The settings for the second pressure range P2.1 and P2.2 (pressure decrease) are effectuated as for the first one. These pressure values must not be higher than the corresponding pressure value in pressure range 1 and furthermore they have to be adjusted to the parameters P014 and P015 of the compressor.
As soon as all necessary settings have been made you can return to the display of the settings by pressing the -key. Pressing the -key makes you leave the BLS settings and brings you back to the main menu.

Timer



By entering code 00798 the timer can be adjusted.

- Having entered the code you get to the selection of the switch channels. This is shown by the blinking of the first letter in the top line. 26 channels from A-Z are available. The channel can be selected using the -keys.
- First the weekday starts blinking. The desired weekday can be selected using the -keys. One timer channel is **deactivated**, if two dashes (--) are set instead a weekday.
- By pressing the -key the input is acknowledged and the cursor jumps to the display of the hours. Using the -key this value can now be set as well and acknowledged by means of the -key. The same applies to the minutes.
- Next the priority sequence of the compressors (see chapter Basic-Load-Switching with additional compressors) can be selected. Each combination of the numbers 1 – 4 is possible.

The priority sequence '0000' effectuates that from the corresponding point of time the output signal is cancelled for all compressors, until a new priority sequence is generated by another timer channel.


If compressed air is needed during the time when the priority sequence is set to 0000, the compressor system can be started by pressing the -key on the control with the Bus address 0. The control then has access to the priority sequence of channel A. For this reason the priority sequence **0000 must not be saved** under channel A.


The display '— —' effectuates that the timer with this channel does not influence the priority sequence but only accomplishes other functions (see below). Thus it can be used with other cyclic changes according to the chapter 'Basic Load Switching with additional compressors'.


5. By actuating the -key the cursor now jumps to the selection of the pressure range. 1, 2 or "-" ranges are available and the selection can be acknowledged pressing the -key.

The pressure ranges 1 and 2 can be set by means of the parameter P012 – 15, "-" means that no pressure range is changed by this timer channel. Either the pressure range of the previously active channel is kept or a new channel is selected via an external contact.

6. Last the potential-free contact of the basic module terminals '14/15' can be switched. Available are: 1 (contact closed) or 0 (contact open).

By actuating the -key the display for the channel starts blinking again and by using the ◀ ▶-keys another channel can be selected and adjusted as described above.

If during the setting of a channel the -key is actuated, this setting is left without accepting the changes.

In the modus 'Selection of the switching channel' the actuation of the -key brings you back to the main display.

Motor switching limitation

Motor switching limitation is only active when the air requirement makes it necessary, i.e. after the "Motor start count per time base" is reached before time.

Only then does it switch from intermittent to a limited continuous operation or an automatic or remote restart after a power failure is delayed correspondingly. The control unit calculates the through time so that on the one hand the maximum allowed switch count per hour can not be exceeded, and unnecessary idling times can be saved as well.

The minimum time base is 12 minutes. It is created automatically by the control unit according to the given maximum switch cycle rate per hour.

Power failure cycle protection

If the function "Auto-Restart" or "Remote-On-Off" is activated it is registered after an automatic motor restart following a short power failure (control voltage), if the motor start number would be too high after another start at the current moment and a possible start would probably be delayed. For the calculation the power failure times – provided the real-time-clock is connected (via plug-in jumper of the basic module) and its voltage (see also chapter servicing) is sufficient – are considered.

This is shown in the Countdown display by means of a once increased Auto Restart time.

Motor spinning time

For motors with less than 15 switching cycles per hour the control unit reserves a spinning time of 20s during contactor operation after switching off the motor contactors. A switching-on of the motor is disabled within this period of time.

Star phase time control

To reduce starting current when starting the motor by contactors it is first operated load-free in star phase control and after a short time in delta control. The star time is fixed for each compressor type and stored in the control unit. It can be changed using parameter P033.

Pressure range selection

Besides the selection of the pressure range via the timer the digital input of the basic module terminal '42' (common inputs – reference terminal: 31) is available to select the pressure range.

In case the contact for the external selection of the pressure range has never been active before, an influence on the selection of the pressure range is not given.

The input is only considered if it has been closed once.

After that the **open contact** always means the selection of the **first pressure range**, and a **closed contact** the selection resp. release of the **second pressure range**.

In case the timer and the external contact (if registered by the control) require different pressure ranges, pressure range 1 is active.

Pressure range 2 becomes active if selected by the external contact and the timer or if the external contact is closed and no pressure range selection is made by the timer.

Parameterization of frequency converter

As soon as the **[I]**-key has been pressed, the frequency converter is energized and the compressor motor starts.

If the frequency converter is to be parameterized during an absolute motor standstill the **[M]**-key has to be actuated when the compressor is in the OFF status, with view of the main display. The converter supply contactor picks up but the motor remains switched-off – the green LED is off.

This status is illustrated as **FC-(frequency converter) Parameter** in the status display.

By actuating the **[C]**-key the converter supply contactor drops out.

TAN test

If the **[▲]**-key is pressed for three seconds during the display of the boot image you get to the display **TAN-Test**.

A test is selected by means of the **[▼▲]**-keys and by actuating the **[M]**-key. The **TAN-Test** can be left by pressing 'back' or by actuating the **[I]**-key.

The **TAN-Test** offers a selection of three tests!

Screen: The screen becomes dark and is continuously set up again by means of dark vertical stripes, so that all pixels are activated and deactivated. Leave the **Screen-Test** by pressing the **[I]**-key.

Keys: A display is shown where all keys of the TAN are displayed. If a key is actuated it gets a dark background. After all keys have been pressed the display goes back to the selection display.

In case one of the keys is defective a count down of 30 seconds is started. When this time is elapsed the display changes automatically back to the selection display.


LED: If this option is chosen the LEDs are activated and deactivated in a variable sequence. As an additional control the symbols of the three LEDs are displayed and shown with a black background when activated, so that it is clear which of the LEDs should be illuminated. You leave the **LED-Test** by pressing the **[I]**-key.


Warning message / Fault message



As far as pending messages are concerned there is a difference between warning and fault messages. Depending whether an input is defined as fault or warning either only the warning is displayed or the compressor is switched off at once via a fault message. All warning and fault messages are saved by the control in the LogBook together with operating states and time.

Warning message

In case of a pending warning or servicing message the compressor remains in operation and this status is visible by means of an orange coloured blinking LED on the control.


By actuating the -key the message is displayed and by means of the message code list it can be identified.


By actuating the -key once more the compressor states are displayed at the time of the warning.

This warning can be acknowledged by pressing the -key. In case you are in the status display the acknowledgement can be effectuated by actuating the -key two times.

If various warnings are pending at the same time, they can only be displayed and acknowledged when the reason for the first warning has been eliminated.


If a warning is pending when the control is powered up this is signalled at once by means of the flashing orange-coloured LED.

In this case the boot display can be left by pressing the -key, or you can get to the main menu by displaying and acknowledging the warning.

Even if you leave the boot display via displaying the warning, **nevertheless the -key has to be actuated once** before the control resumes its normal function.

Pre-acknowledgement

If a message is acknowledged and the reason for it is not(yet) eliminated, the corresponding LED remains continuously illuminated.

As long as a fault or warning is signalled by the LED, the fault message can be displayed again by pressing the -key.

Acknowledgement of message 45 (Watchdog timer reset)


This message must be pre-acknowledged first. Afterwards the compressor can be operated again.


For a complete acknowledgement of the message (switch-off of the orange-coloured LED) the control must be de-energized for a short time.

Fault messages

In case of a fault message the compressor is switched off at once – without idling phase.

A red blinking LED signals a pending fault message and the display shows the corresponding message number at once.

By actuating the -key the operating states at the time of the fault are displayed.

Actuating of the -key leads to the leaving of the operating states display and pressing the key once more acknowledges the fault.

The red LED is continuously illuminated after the acknowledgement of the fault and the compressor status display shows **Fault** until the fault has been rectified. Only then the compressor can be started again.

Basic module

Terminals	Type	Function	Description	Rating
1/2	Tension spring terminal	Relay output	Ready for operation: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
3/4/5	Tension spring terminal	Relay output	Failure-free: Grouping terminal 3, break cont. term. 4 and make contact term. 5	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
6/7	Tension spring terminal	Relay output	Operation: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
8/9	Tension Spring terminal	Relay output	Load operation: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
10/11	Tension Spring terminal	Relay output	Servicing: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
12/13	Tension spring terminal	Relay output	Pre-selection Remote: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
14/15	Tension spring terminal	Relay output	Timer: Make contact	2A 30V DC/250 V AC with resistive load; 0,6A 250 V AC 50/60Hz with inductive load (Power factor = 0.4)
34	Tension spring terminal	Digital input	Monitoring compressed air purification Terminal 34 (against terminal 31 (+24V))	24...31V DC, 10mA, input resistance 3K Ω
40	Tension spring terminal	Digital input	Output release Terminal 40 (against terminal 31 (+24V))	24...31V DC, 10mA, input resistance 3K Ω
41	Tension spring terminal	Digital input	Remote Start/Stop switch Terminal 41 (against terminal 31 (+24V))	24...31V DC, 10mA, input resistance 3K Ω
42	Tension spring terminal	Digital input	Switchover pressure range Terminal 42 (against terminal 31 (+24V))	24...31V DC, 10mA, input resistance 3K Ω
51	T. spring terminal	External RS485 interface	Earth (GND)	
52	T. spring terminal	External RS485 interface	Signal A	Input differential voltage max. +12V
53	T. spring terminal	External RS485 interface	Signal B	Input differential voltage max. -12V

Analogue output module

Terminals	Type	Function	Description	Rating
1/2	Tension spring terminal	Analogue output	Actual frequency value: 4-20mA (Terminal 1) against terminal 2 (GND)	Max. 28mA, max. Bürde 400Ω

RS 485 module

Terminals	Type	Function	Description	Rating
1	T. spring terminal	External RS485 interface	Earth (GND)	
2	T. spring terminal	External RS485 interface	Signal A	Input differential voltage max. +12V
3	T. spring terminal	External RS485 interface	Signal B	Input differential voltage max. -12V

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

Screw terminals:

Fixed / flexible min	0.2 mm ²
Fixed / flexible max	2.5 mm ²
Flexible with ferrule (with/without plastic sleeve) min.	0.25 mm ²
Flexible with ferrule (with/without plastic sleeve) max.	2.5 mm ²
AWG/kcmil min	24
AWG/kcmil max	12
2 conductors with identical cross section fixed min.	0.2 mm ²
2 conductors with identical cross section fixed max.	1 mm ²
2 conductors with identical cross section flexible min.	0.2 mm ²
2 conductors with identical cross section flexible max.	1.5 mm ²
2 conductors with identical cross section flexible w. AEH (ferrule) without plastic sleeve min.	0.25 mm ²
2 conductors with identical cross section flexible w. AEH (ferrule) without plastic sleeve max	1 mm ²
2 conductors with identical cross section flexible w. TWIN-AEH without plastic sleeve min	0.5 mm ²
2 conductors with identical cross section flexible w. TWIN-AEH without plastic sleeve max	1.5 mm ²

Tension spring terminals:

Capacity of terminals	0.5...1.5 mm ²
Single wire	0.5...1.5 mm ²
Stranded wire	0.5...1.5 mm ²
with ferrule	0.5...1.5 mm ²
AWG- conductor	26-14

List of fault messages

Error No.	Meaning	Compressor switch-off
1	Final compression temperature too high (>110°C)	X
2	Motor temperature too high	X
3	Fan motor	X
4	Wrong rotational direction	X
5	Compressor system pressure too high	X
6	Suction filter differential pressure too high	
7	Oil filter differential pressure too high	parameterizable (P044)
8	Oil separator differential pressure too high	
9	No output	At first warning then fault
10	Motor servicing due	
11	Compressor servicing due	
12	System pressure decrease too slow	
13	Frequency converter signals fault (no release)	X
14	Temperature too low (<3°C)	X
15	Suction regulation / Proportional control	
16	Net pressure transmitter faulty	X
17	Pressure build-up too fast/ increase too sharp	X
18	Fault of an external control	
19	Power-up phases too short, too many motor switching cycles	
20	Continuous contact of an external control	
21	Receiver servicing due	
25	Data reconciliation error	At first warning then fault
26	Control unit OFF-key does not open	X
27	Control unit ON-key does not open	X
28	Control unit INFO-key does not open	
29	Control unit ENTER-key does not open	X
30	Control unit UP-key does not open	
31	Control unit DOWN-key does not open	
32	Net pressure transmitter wire breakage	X
33	Compressor system pressure transmitter wire breakage	X
34	Compressor system pressure transmitter faulty	X
36	Bus live bit faulty	
38	Excessive current compressor motor	X

Error No.	Meaning	Compressor switch-off
39	Fault compressed air processing	parameterizable (P061)
40	FC-(frequency converter) module error	X
41	Battery voltage too low	
42	FC-(frequency converter) module not calibrated	X
43	FC-(frequency converter) module overflow	
44	FC-(frequency converter) module underflow	
45	Watchdog timer Reset	
46	Watchdog not active	
47	f-clock resp. f-CPU discrepant (clock frequency)	X
48	TAN identifies internal BUS fault	X
49	TAN misses data (from basic module)	X
50	Dryer module Fault	parameterizable via P061
51	Pressure transmitter faulty at dryer	parameterizable via P061
52	Cooling temperature sensor – Fault	parameterizable via P061
53	Ambient temperature sensor faulty	parameterizable via P061
54	Pressure at dryer too high (coolant)	parameterizable via P061
55	Pressure dew point dryer too low	parameterizable via P061
56	Pressure dew point dryer too high	
57	Temperature compressed air outlet	parameterizable
58	Control unit LEFT-key does not open	
59	Control unit RIGHT-key does not open	
60	Basic module recognizes TAN error	X
61	Communication with RS485 module faulty	
62	Communication with converter module faulty	X
63	Communication with analogue outlet module faulty	
97	Side duct ventilation – excess current	X

Param. no.	Meaning	Adjustment range	Code level
P001	Language selection	German / English / Italian	all
P012	Max. pressure for pressure range 1	0psi, 58psi – maximum pressure of compressor type	User
P013	Min. pressure for pressure range 1	44psi – maximum P012 less minimum hysteresis	User
P014	Max. pressure for pressure range 2	0psi, 58psi – maximum pressure of compressor type	User
P015	Min. pressure for pressure range 2	44psi – maximum P012 less minimum hysteresis	User
P020	Auto restart (Automatic restart after power failure)	0 = Off; 1 = On	User
P021	Auto restart time; time until restart after power failure	30s – 3600s	User
P022	Short stop limiting value	0 – 3600s	User
P031	After-running time	0s – 600s	User
P032	Anti-freeze protection; Compressor starts when final compression temperature drops below 5°C and switches off as soon as 20°C are reached	0 = On; 1 = Off	User
P034	Continuous operation; Compressor does not switch off but stays continuously in idling operation	1 = On, 0 = Off	User
P044	Type of message oil filter	1: Fault, 0: Warning	User
P050	Modbus address	0 for Master, 2 – 4 for additional compressors, 1 – 248 for other applications	User
P051	Modbus baud rate	1200 – 115200	User
P052	Modbus communication parameter	8Even1, 8None1, 8None2, 8Even2, 8Odd1 and 8Odd2	User
P053	Modbus address (module)	0 for Master, 2 – 4 for additional compressors, 1 – 248 for (pure) control applications	User
P054	Modbus baud rate (module)	1200 – 115200	User
P055	Modbus communication parameter (module)	8Even1, 8None1, 8None2, 8Even2, 8Odd1 und 8Odd2	User
P060	Contact type compressed air purification	0: Break contact, 1: Make contact	User
P061	Type of message for compressed air purification	1 : Fault, 0 : Warning	User
P063	External output release	0 ... 2	User
P064	Monitoring of external output release	0 ... 1	User
P065	Remote/Start/Stop	0 ... 3	User
P066	Key switch	0 ... 3	User

Parameters can be processed as described under "Parameter Settings".