Operating instructions

Control for
several compressors

trinity

Zertifiziert nach
ISO 9001
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BOGE

Operating instructions

trinity

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Index

Part 1: General

Non-compliance with the following safety instructions may lead to physical injury and damage to the control unit.
In addition to the instructions in this manual, the general safety and accident prevention rules must always be followed!

Safety instructions for operating the control unit

1. The control unit may only be put into operation after these instructions have been read and properly understood.
2. The control unit may only be used for the purpose described in these instructions.
3. The user/owner must ensure
   – that only trained and and authorised staff use the control unit.
   – that the operating personnel are thoroughly familiar with and follow all safety instructions.
   – that the control unit is only used in a safe operating condition.
4. The unit may only be used with the options recommended or approved by the manufacturer.
5. The unit may never be used if one or more parts are damaged, not operating correctly, or if damage can be seen or is suspected.

trinity integrated into the compressor

If the control voltage of the compressor is switched off all the other compressors (electrically connected to the trinity) are released at the same time.

Exception "Pressure sensor inside compressor switch cabinet"

Normally the separately shipped pressure transmitter of the trinity is installed directly to the central compressed air receiver of the compressed air network. Should, as an exception, the pressure transmitter of the trinity be installed in the switch cabinet of the compressor (like the compressor pressure transmitter) and not on the external receiver, the following steps are to be observed: If the compressor with the integrated trinity is shut off the compressed air network (e.g by shut-off valve or ball valve) the pressure transmitter can no longer obtain any information from the compressed air network and all compressors connected to the trinity are no longer controlled correctly. It is absolutely necessary that the pressure transmitter of the trinity is always impinged with network pressure!

Safety instructions for repair of the control unit

1. Adjustments, troubleshooting and repairs may only be carried out by qualified systems electricians (see DIN VDE 0100 or DIN VDE 0113, EN 60204).
2. Before carrying out repairs:
   – switch off the voltage
   – check that none of the parts are under power.
3. Work on components and and facilities under power is not allowed. The exceptions to this are specified in the appropriate rules, e.g., DIN VDE 0105.
4. Only the original spare parts approved by BOGE may be used for repair work.

The purpose of these operating instructions is to describe the operation and possible applications of the control unit.

These instructions contain important information describing how to use several compressors safely, economically and correctly, with the aid of a **trinity** control unit.
Compliance with these instructions helps to avert danger, reduce repair costs and down-times, and increases the reliability and service life of the compressors.
The instructions contain important information about necessary parameters and their adjustments. They are also a source of assistance in the case of malfunctions.
These instructions must be available to the operating staff at all times at the place the control unit and compressors are used.
The instructions must be read and followed by all persons who carry out the following work on the control unit:

– operation, including troubleshooting
– commissioning

Correct usage

The BOGE Multisystem control unit together with its options is solely designed for controlling several screw and piston compressors made by BOGE. The unit may only be operated and adjusted by trained and authorised persons.

Prerequisites for the compressors to be controlled:
If the **trinity control** is ordered with the compressors, we install the interface in the compressors at the factory (mandatory option). If the compressors are already on site, the machines must be prepared for connection to the **trinity**.

These prerequsites are normally:
two terminals in series with the operating switch installed in the compressor or a suitabel connection (digital input) for a master pressure control.

Care must be taken with equipment from different makers; please always obtain approval from the factory.

Inadmissable usage

This BOGE Control is not explosion-proofed.
It may not be used in areas potentially endangered by explosive material!

The following are not allowed:
- Excessive or insufficient voltages.
- Use of the control unit by untrained or unauthorised persons.
- Connection to unsuitable compressors.
- Excessive room temperatures > 45°C.

Transport damage

BOGE bears no liability for breakage and transport damage. Please check your control unit immediately after delivery and report damage to the last carrier – even if the packaging is not damaged! To secure claims against carriers we recommend that you leave machinery, equipment and packaging material in the condition it was in when you discovered the damage.

Please notify us of all other complaints within six days of delivery.

Customer service

The BOGE Customer Service is always pleased to help you in case you have any questions. Please call:

Telephone: ++49 / 52 06 / 6 01-0

Please always provide the following information about your control unit in order to prevent delays:

1. Circuit diagram no.
2. Order no.
3. Machine-no.
4. Type
5. Year of manufacture
6. Software-no.

NOTE!
During the warranty period the only persons allowed to commission or adjust the control unit are BOGE service technicians or those authorised in writing to do so by BOGE. Otherwise the warranty is invalidated!

Hardware

The module is mounted to the carrier rail inside the switch cabinet of the compressor or in a separate housing.

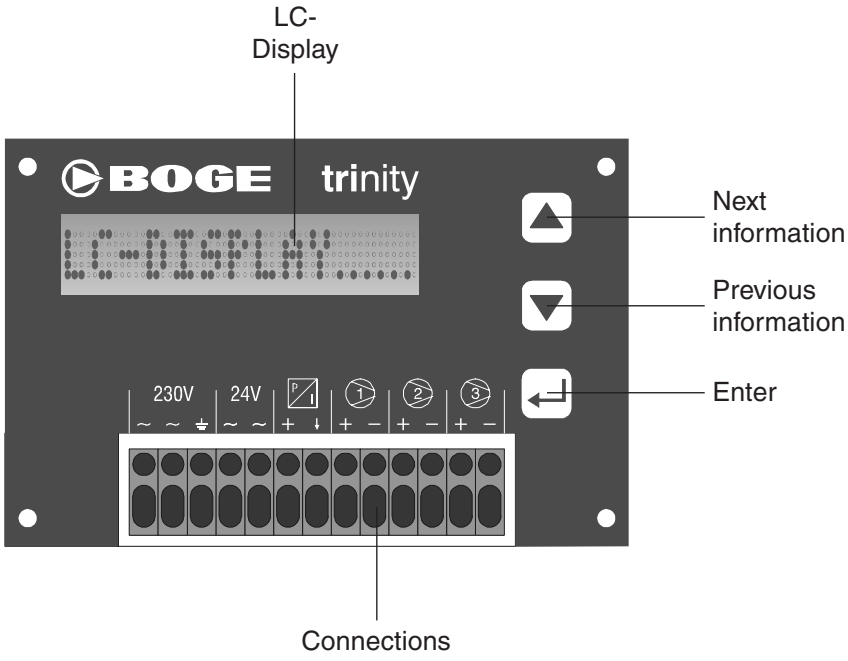
Mains breakdown safe EEPROM – memory for all parameters, switch times and cycle rest time when the mains fail.

Time-operation – capacitor for > 10 h.

Operating and control panel

Single-line 16 digit background luminous alphanumeric LC display.

3 keys: ↓, ↑ and ↵ ("Return" / "Enter")



Electrical connections

13 connecting terminals in tension spring technology – can be operated from above:

1. Two alternatively useable inputs for the two supply voltages '230V 50/60 Hz' (1, 2) and '24 V 50/60 Hz' (4, 5).
2. Support terminal for PE conductor (3).
3. Analog input for one pressure transmitter 4...20 mA in two-wire technique (+ = 6, input = 7).
4. Three short-circuit resistant transistor outputs 20 mA for couple relay (coil connection A1 = + and A2 = –)
   - Compressor 1: + = 8 and – = 9.
   - Compressor 2: + = 10 and – = 11.
   - Compressor 3: + = 12 and – = 13.

10-pole plug for transmission of software and parameters (ISP interface) – **may only be used in connection with 230 V** supply, because otherwise a rectifier would be bridged → damage to microprocessor!

Software

1. Two of the needed pressure switch points (highest and lowest) must be set. The others are automatically calculated.
2. The number of compressors is to be set to 2/3.
3. For same size compressors: adjustable cyclic priority change – every 1...1250 hours possible – in the case of each periodic change – if the actual pressure value is not above the switch off pressure values – all compressors first get output releases.
4. For different compressor use: week-switching time mode can be parameterized (set cyclic priority change time to '0 h') → – 26 switch points (A...Z) can be used.
   All possible priority combinations including total-output lock can be set.
5. Integrated clock with operation reserve (>10 h) in case of power failure.
6. Pressure display combined with display of actual output compressors possible – example: 10.0 bar C1 C_C3
7. Pressure display combined with display of actual compressor priority sequence possible – example: 10.0 bar C3 → C1 → C2. If (during timer operation) the compressor is shut off, 'C1...C3: _' or 'C1+C2: _' is displayed. In case of an error message, 'C1..C3: I' or 'C1+C2: I' is displayed – this message may not disappear before the next priority change (can be eliminated at once by manipulation during timer operation).
8. Pressure display combined with display of actual cycle rest time – in h with three decimal places possible (number procedure can be observed, if not in timer operation) – Example: 10.0 bar 1.234 h.
9. Pressure display combined with display of actual time (day-no hh:mm) possible – example: 10.0 bar 2 08:23 h.
10. Display of set lowest and highest pressure switch point possible – example: P<10.50> 9.50 bar.
11. Display of exact time (day-no. hh:mm:ss) possible – example: 1..7 → 2 08:23:45 h.
12. Display of software version possible – example: BOGE V 1 –
    (see also 'Parameter change under Fundamental Procedures').
13. Operator friendly automatic branching to necessary sequence settings: as soon as the cycle time has been set to 0 h, the switching time appears automatically at first and then the time setting (without a further request for another code).
14. If the timer function has been selected, the time display blinks when the operating reserve period has been exceeded after an extended interruption of electricity supply.

To show the displays in 8 – 13, press one of these arrow keys: ↑ and ↓ – repeatedly if necessary.

Fundamental Procedures

1. Use the arrow keys to display software version.
2. Press '↵' key → a three digit number, of which the first number flashes, appears in the place of the software version.
3. Use the arrow key to input the first place of code.
4. Press '↵' key → the second number of the three digit number flashes in the place of the first.
5. Input the second place of the code via the arrow key.
6. Press '↵' key → the third number of the three digit number flashes in the place of the second.
7. Use the arrow key to input the third place of the code.
8. Press the '↵' key, → corresponding to the selected code, the parameter display appears with a flashing value – in the case of invalid code, the display, mentioned above under 6.) appears '**Pressure + compressor selection**'.

Pressure range

1. Input code 360, as described in 'Fundamental Procedures' → in the display appears for example: **P<10.00> 9.50 bar**, whereby the left number (here '10.00') blinks.
2. Use the arrow keys to bring the upper pressure value to the desired value, use the '↵' key to quit → now the right number blinks (here '9.50').
3. Use the arrow keys to bring the lower pressure to the desired value and then use the '↵' key to quit → now the display mentioned in 10.) appears **'Pressure Target Values'** – All other (those in between) pressure switch points are automatically calculated by the microprocessor.

Number of compressors and interval period "Priority Change"

The control can be used as follows for 2 or 3 compressors. Independently of this, if the compressors are the same size, a cyclical (cycle time greater than 0) or if the compressors are different, a time-dependent (cycle time to 0) priority time change can be carried out as follows:

1. Input Code 832, as described in 'Fundamental Procedures' → In the display appears for example: **3 x 002 h**, and the left number (here '3') blinks.
2. Use the arrow keys to set the number of compressors to be considered, then use the '↵' key to quit, → now the right number blinks (here '002').
3. Use the arrow keys to set the priority change interval time to the desired value and then use the '↵' key to quit, → the display changes according to the following criteria:
   a) If the selected **interval time is greater than zero**, the display mentioned in 8.) appears **'Pressure + Time to next priority change'**
   b) **otherwise** the text under **'Switching Times'** appears and as soon as the switch time input is completed text under **'Time'** appears.

Switching times

As soon as the cycle time has been set to 'zero', the control considers the switching times, which are input, as described, in the 26 timer channels A...Z.

1. Input code 798, as described in 'Fundamental Procedures' → For example: **A 0 00:00h = 123**, appears in the display and the left letter (here 'A') blinks.
2. Use the arrow keys to select the desired switching **channel (A...Z)** and use the '↵' key to enable its change, → now the left number blinks (here '0' means: this switching canal is not active).
3. Use the arrow keys to input the desired **Switching -day -No.** (1...7) and use the '↵' key to change to **Switching hour,** set it and change to **Switching minute** and to priority sequence →
   - **sequence 000** means 'Output release will be removed for all compressors from the set time'.
   - **sequence 123** means: From the switching time onwards 'Compressor No. 1 takes the base load, Compressor No. 2 the middle load and Compressor no. 3 the peak load'.
   - **sequence 312** means: From the switching time onwards 'Compressor no. 3 takes the base load, Compressor no. 1 the middle load and Compressor no. 2 the peak load'.
4. Use the '↵' key to assign the selected **Priority sequence** to this switching canal → the display of the next switching canal blinks (here 'B').
5. If all desired switching channels were parameterized the same way (and the letter of the next **canal blinks**) you can **leave** the setting area of the switching channel by **holding down the '↑' key and pressing the** '↵' key. After first parameterization (by setting the interval time to zero), the display automatically changes to the area described in the section Time, otherwise the display described in 9.) appears 'Pressure + Day +Time'.

Time

1. Input code 010 as described in 'Fundamental Procedures' → For example: **1 00:00:00 h**, appears in the display and the left number (here '1') blinks.
2. Use the arrow keys to select the actual **day** (Monday = **1**, Sunday = **7**) and the '↵' key to change time input, → now the second number from the left blinks (here '00').
3. Use the arrow keys to input the actual **hour (00...23**) and the '↵' key to select **minute** (00...59), set it and then change to **second selection,** set and when the set time (and set day) **agrees** with the actual time, **press** the '↵' **key,** → the time is set and now the exact time display appears as described in 'Software point 11'.

Messages

Appears on the display !!!*** xx ***!!!
(xx = blinking number), this is an error message according to the following table:

Number	Meaning	Solution	Others
16	Pressure transmitter is defective, replace	Replace pressure transmitter	
25	Balance storage	Repeat software loading	Replace control
32	Pressure transmitter line break	Correctly connect pressure transmitter (+24 V to 1)	Replace pressure transmitter or its plug

By pressing the "↵"-key when the specific message is displayed, the message is acknowledged and the previous display reappears – presupposed the reason responsible for the message has been eliminated.

Parameterization codes

Parameter type	Code	Remark	Page
Pressure target values	360	Highest + lowest switching point	1.7
Number of compressors + Interval time	832	Set interval time to 0 h = timer operation	1.7
Switching times	798	All priority sequences can be set, 000 = general output lock return: Hold ↑ and then press ↵ at the same time.	1.8
Time	010	Day: 1 = Monday, 7 = Sunday	1.8

Set pressure range

1. Use arrow key(s) to display Software-Version (BOGE V x).
2. Press '↵' key → a three digit number, of which the first number flashes, appears in the place of the software version.
3. Use the arrow keys to input the first place (3) of code 360.
4. Press '↵' key, → the second number of the three digit number flashes in the place of the first.
5. Use the arrow keys to input the second place (6) of the code.
6. Press '↵' key → the third number of the three digit number flashes in the place of the second.
7. Press '↵' key to acknowledge the third place (0) of the code → corresponding to the selected code, the parameter display (P<*xx.xx*>*yy.yy* bar) appears with a flashing value xx.xx.
8. Use the arrow keys to bring the upper pressure value to the desired value, use the '↵' key to quit → now the right number blinks (*yy.yy*).
9. Use the arrow keys to bring the lower pressure to the desired value and then use the '↵' key to quit → now the display **'Pressure Target Values'** appears. – All other (those in between) pressure switch points are automatically calculated by the microprocessor.

Set number of compressors and interval period "Priority Change"

1. Input Code 832, as already described → For example: **3 x 002 h,** appears in the display, whereby the left number (here '3') blinks.
2. Use the arrow keys to set the number of compressors to be considered, then use the '↵' key to quit, → now the right number blinks (here '002').
3. Use the arrow keys to set the priority change interval time to the desired value and then use the '↵' key to quit, → the display changes according to the following criteria:
   a) If the selected **interval time is greater than zero**, the display **'Pressure + Time to next priority change'** appears.
   b) otherwise a **'Switching Times'** appears – for further steps when using the timer see functional description.

Messages

Appears on the display !!!*** xx ***!!!
(xx = blinking number), this is an error message according to the following table:

Number	Meaning	Solution	Others
16	Pressure transmitter is defective, replace	Replace pressure transmitter	
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