



# CONDOR

## Operating Instructions

### Base load changeover controller

# GLW 4 and GLW 4-S..



**Please observe the safety instructions in Chapters 2 and 4.2!**

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## CONTENTS

1	Introduction	3
2	Safety instructions	3
2.1	Identifying instructions in the operating instructions	4
2.2	Important	4
2.3	Additional documents	5
3	General	5
4	Hardware	7
4.1	Procedure for recording pressure	7
4.2	Remote release input (GLW 4: I51; <u>GLW 4-S and GLW 4-SK: X2-4</u> )	8
4.3	Compressor inputs (GLW 4: I11 to I42; <u>GLW 4-S and GLW 4-SK: X2-6 to 9</u> )	8
4.4	Alarms inputs (GLW 4: 51/ 52/ 54; <u>GLW 4-S and GLW 4-SK: X2-1 to 3</u> )	8
4.5	Timer	9
4.6	Bypassing the timer (GLW 4: I 61 and I52/I62; <u>GLW 4-S: X2-5 and X1-N</u> )	9
4.7	Ball valve/Output K4	9
4.8	External pressure measurement (GLW 4: p+ / p-; <u>GLW 4-S and GLW 4-SK: X2-10 and 11</u> )	10
5	Programming	10
5.1	Getting started	11
5.2	Front view	11
5.3	Main menu	12
5.3.1	Menu: Main menu	12
5.4	Operating hours	13
5.5	General Settings	13
5.5.1	General Settings: Operating mode profiles	13
5.5.2	General Settings: The external input function	13
5.5.3	General Settings: Alarm pressure, alarm time, alarm relay	14
5.5.4	General Settings: Logic inputs	14
5.5.5	General Settings: Buzzer	14
5.5.6	General Settings: Ball valve/Output K4	14
5.5.7	General Settings: Switch to load change immediately	14
5.5.8	Menu: General settings	15
5.6	Timer program	16
5.6.1	Menu: Timer program	17
5.7	Profile selection	18
5.7.1	Waiting time	18
5.7.2	Load change time	18
5.7.3	Monitoring time	19
5.7.4	Menu: Profile 1 to maximum Profile 6	20
6	Power-on delay	21
7	Factory settings	21
8	Quick guide to GLW 4, for use with 230V-AC	21
9	Terminal assignment GLW 4	22
10	PC interface	22
11	Technical data	23
12	Conformity	24
13	Terminal connection diagram GLW 4	25
14	Terminal connection diagram GLW 4-S	26
15	Terminal connection diagram GLW 4-SK	27
16	Programming example	28



## 1 Introduction

As soon as several compressors are installed in a compressed air network, it is advisable to add a higher-level base load changeover controller for regulation. For many years, this control was provided by CONDOR type GLW 16 and the [GLW 4](#) (with many extended functions such as a timer, ball valve, base load/load changing etc.) has been on the market since June 2004. Since 2005, the type [GLW 4](#) is also available in two pre-wired control box variants: type [GLW 4-S](#) (control box wired on internal top hat rails) and type [GLW 4-SK](#) (control box wired on internal top hat rails, with additional front toggle switches and indicator lights).

A base load changeover controller regulates the uniform distribution of the respective compressors' operating hours, thus ensuring the optimal and economic operation of several compressors. The individual sets of parameters for the compressors can be programmed in up to six different profiles, which can then be regulated by the internal timer subject to the general settings.

## 2 Safety instructions

This operating manual refers exclusively to the controller. It contains important instructions and warnings, therefore it is essential that these operating instructions are read by the fitter and the responsible operator before installation and commissioning.

You must not only observe the general safety warnings given in the main "Safety" section, but also the special safety warnings included under the following main points.



## 2.1 Identifying instructions in the operating instructions

The safety instructions given in this operating manual, which may cause danger to persons if not observed, are



marked with the general danger symbol.



The warning of electrical voltage is marked with this symbol.

## 2.2 Important

The specification and instructions in this operating manual refer to the variants [GLW 4](#), [GLW 4-S](#) and [GLW 4-SK](#).

These operating instructions do not include all design details and variants, nor do they take into account all the possible contingencies and events that could possibly occur during installation, operation and maintenance.

The use of trained personnel is a prerequisite for operating the controller (see EN 50 110-1).

If there are some instructions and information that you cannot find in this operating manual, please ask the manufacturer, Condor Pressure Control GmbH (for address see p. 21).

Condor Pressure Control GmbH accepts no liability arising from a failure to comply with the operating instructions.



The connection and maintenance of the control unit may only be undertaken by suitably qualified personnel. To operate the [GLW 4](#), it must be installed in a suitable housing. At start-up, precautions must be taken to ensure that:

- the complete system is de-energised and secured against being switched on again during installation and maintenance,
- the connection terminals of the [GLW 4](#) or der [GLW 4-](#) are properly connected,



- the technical characteristics of the connected compressors and special settings of the **GLW 4** are matched to each other,
- the connections have been carried out correctly and professionally and that
- the system has been properly fused.

### 2.3 Additional documents

Depending on the equipment, other documents and manuals may be attached which must be observed in addition to these operating instructions. These may include:

- Circuit and terminal drawings
- Programming examples

## 3 General

As soon as several compressors are used for a compressed air network, it is sensible to assign the base load and peak load operating modes to the compressors.

Base load operation is the operation of a compressor with low air consumption. If air consumption rises to such an extent that one compressor can no longer compensate for the consumption, a second compressor is then added, which then covers the peak load.

The **GLW 4** controls up to four compressors in **base load changeover mode!**

With the Types **GLW 4-S** and **GLW 4-SK** the GLW 4 is already mounted inside a plastic box ready for installation!

All settings such as the load changeover time and the switching thresholds can be configured without special programming knowledge via three buttons next to the display screen. All special compressor data is programmed in 'profiles'. The internal timer can control up to six different profiles.

It is not yet necessary to connect the compressed air network for programming.



### **Other benefits**

There is a programmable switch-on and switch-off threshold for each compressor.

For example, if only two compressors need to be controlled, the other two circuit hystereses are available for further monitoring.

In addition to the base load changeover control function, the following special functions are also available:

- Freely programmable **integrated timer**.
- Free assignment of **base load and load change function**.  
That means that the base load compressor is always running, and only the load change compressors are changed.
- Free programming of a **ball valve function**, for up to three compressors.
- Four separate inputs for power-on duration or operating hours or number of faults or number of switching cycles.
- The next compressor is switched on after the elapse of an adjustable **waiting time**, – if desired, even without reaching its switch-on threshold.
- The function '**remote release input**' switches off the **GLW 4** when it reaches the next switch-off threshold, e.g. during a maintenance shutdown.
- **Program protection**: Programming is only possible if you know the password!
- All settings are **separately switchable!**
- Free programming of a potential-free changeover contact as an **alarm output**.

The **GLW 4** from CONDOR PRESSURE CONTROL GMBH provides an electronic solution of a base load changeover controller for a maximum of four compressors. The **GLW 4** has to be clipped on to a 35mm-wide top-hat rail conforming to the standard DIN EN 50022. The system is equally suitable for controlling piston compressors as well as screw compressors.

Changing the set switching points enables the equal loading of all compressors. The switching points are automatically changed by inputting 'LOAD CHANGE TIME'. The load change time is adjustable between 0 to 999.9 h. If the input 'Off' is entered, load changing is omitted. When 'BASE LOAD' is entered, the connected compressor is not taken into account during load change.



Load changing only takes place after the load change time has elapsed and the upper switch-on pressure has been reached (can be switched off, see section 'Load change time').

It is possible to adjust all compressors to have the same switch-off pressure. It is not possible to have a setting with the same switch-on pressures.

## 4 Hardware

The Type **GLW 4** is a pressure control unit with an integrated relative pressure transducer (0 to 16 bar, plug-in connection for pressure recording) for mounting on a top-hat rail, 6 optocoupler inputs, 5 potential-free changeover contacts, an analogue input (twisted pair cable, 4 to 20 mA) for external pressure measurement, an LCD graphic display, three-button operation and a V24 interface. Programming is operated via three buttons with the help of an LCD display.

The following technical aspects must be observed:

### 4.1 Procedure for recording pressure

The **GLW 4** can record pressure by two different methods of measurement:

a.) Internal pressure transducer

The control unit is directly connected to the compressed air network by a plug-in connection for a 6 mm compressed air hose (e.g. FESTO Type PAN 6X1). Measuring range: 0 to 16 bar

b.) External pressure transducer

A standard pressure transducer (twisted pair cable, 4 to 20 mA) can be connected to the p+ and p- device terminals.

This must be activated in the main menu under the General Settings 'EXTERNAL pressure measurement'.



The internal pressure sensor is approved for the measurement range 0...16 bar.  
The terminal polarity must be observed when connecting to an external pressure transducer.



## 4.2 Remote release input (GLW 4: I51; GLW 4-S and GLW 4-SK: X2-4)

In operating mode a voltage of 230V-AC must be applied to input I 51 (GLW 4-S and GLW 4-SK: X2-4)! As soon as the voltage on I 51 (GLW 4-S and GLW 4-SK: X2-4) is switched off (e.g. night shutdown via a control room), the GLW 4 switches off when the switch-on threshold 1 is exceeded. As soon as the voltage is reconnected on I 51 (GLW 4-S and GLW 4-SK: X2-4), the **GLW 4** continues to operate. With this function all times are retained and continue to run after the restart.

GLW 4-S and GLW 4-SK: If the remote release input is going to be used in the application, **the red jumper on terminal X2-4 must first be removed**. The connection for the external release contact can now be made on terminal X2-4.

The corresponding reference potential must be applied to the terminal I 52/ I 62 (GLW 4-S and GLW 4-SK: N) (usually this is the N-conductor).

## 4.3 Compressor inputs (GLW 4: I11 to I42; GLW 4-S and GLW 4-SK: X2-6 to 9)

The connected compressors can be additionally monitored with the input terminals I11 to I42 (operating hours or error count or operating frequency).

The logic of the inputs (NO or NC) can be changed in the menu in General Settings – ‘Logic inputs’.

NO = An action occurs only when a voltage is applied.

NC = An action occurs only when a voltage is removed.

The precondition for this function is that the respective compressor inputs are connected.

## 4.4 Alarms inputs (GLW 4: 51/ 52/ 54; GLW 4-S and GLW 4-SK: X2-1 to 3)

If the network pressure drops below the set alarm pressure and the set monitoring period has elapsed and the alarm relay in the menu is ‘ON’, an error message is generated via an alarm output (potential-free changeover contact).

Furthermore, an error message is generated when the respective switch-off pressure is exceeded as soon as the monitoring time has elapsed and the alarm relay is activated in the menu (ON).





## 4.5 Timer

Timer functions are very often required in compressor applications.

The timer function is activated as soon as the Profiles operating mode 'Clock' is selected in General Settings. This means that the profiles selected in the timer program are now being processed.

First, the date and time must be checked or updated in General Settings.

Note: There is no automatic changeover from daylight saving time to wintertime and vice versa.

## 4.6 Bypassing the timer (GLW 4: I 61 and I52/I62; GLW 4-S: X2-5 and X1-N)

The timer function is switched off as soon as the 230 V-AC operating voltage is connected to input I 61 and the reference potential (usually the N-conductor) is applied on terminal I52/I62 and the then running profile has been programmed in General Settings, Function, External input.

GLW 4-S: If the 'Bypass timer' function in the application is to be controlled by an external switch, the jumper between terminal blocks X2-4 and 5 must be removed.

Then remove the lead (F2) from terminal X2-5 and connect it to X2-4.

Please also refer to Chapter 4.2 – Remote release input.

## 4.7 Ball valve/Output K4

As soon as the Ball valve/Output K4 function 'ON' has been entered in General Settings, only three other compressors can be controlled and the fourth connection is used for ball valve actuation. This means that the fourth potential-free changeover contact can be used to actuate an electric ball valve (e.g. for weekend shutdown) while the compressors are switched off. This reduces the energy costs caused by leaks in the compressed air network.



#### 4.8 External pressure measurement (GLW 4: p+ / p-; GLW 4-S and GLW 4-SK: X2-10 and 11)

As soon as pressure measurement is programmed to 'External' in General Settings, the internal pressure transducer is switched off, and the externally connected pressure transducer indicates the measured compressed air value (twisted pair cable, 4-20 mA). The corresponding measurement range end value must then be programmed.

All standard pressure transducers with twisted pair cables 4 to 20mA, U<sub>B</sub> 18-21V-D can be used.



The terminal polarity must be observed when connecting to an external pressure transducer!

## 5 Programming

The unit is programmed using the three buttons on the device.

The password must be entered to change a parameter!

The **password '0190'** is pre-programmed in the delivery state (factory setting).

The password can be changed in General Settings and is recommended only with due care.

A reactivation can only be carried out by CONDOR WERKE Gebr. Frede GmbH & Co. KG.

After the supply voltage has been connected the CONDOR logo appears (there is a brief acoustic signal), with the type designation **GLW 4** and details of the software version. The main status display appears as soon as any one of the three buttons is pressed.





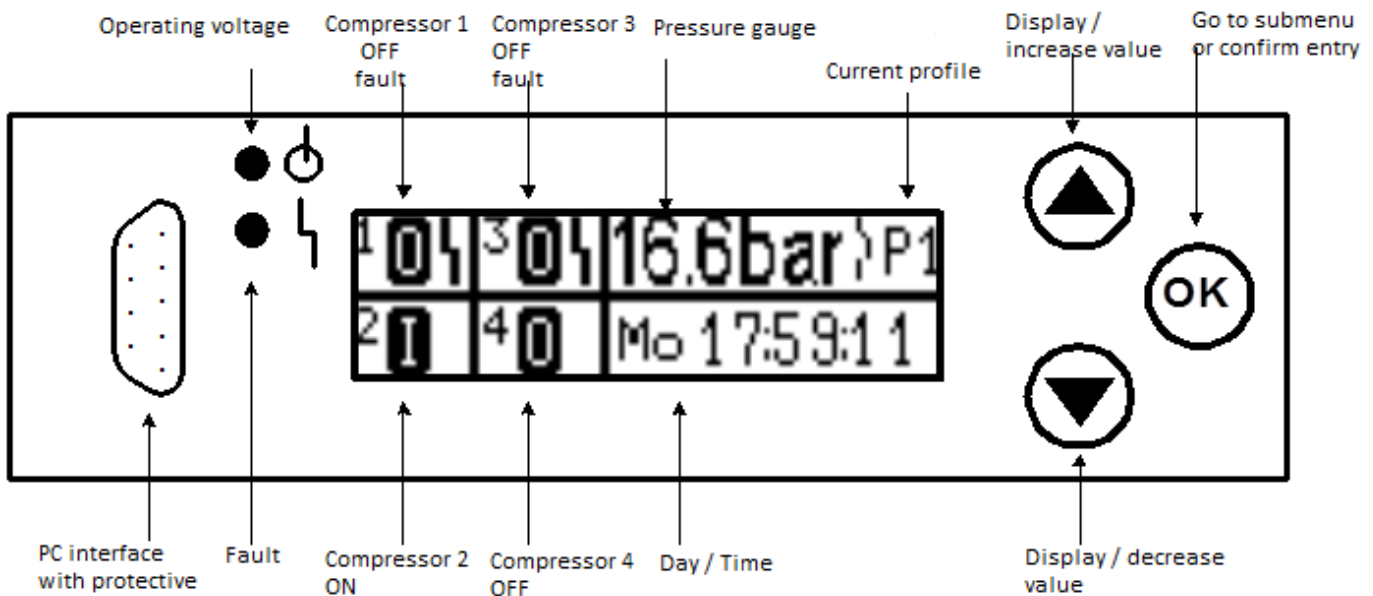
Pressing the OK button (if present) displays the device status in plain text and any errors that have occurred.

Pressing one of the arrow buttons moves you through the main menu. Pressing the OK button takes you into the corresponding sub-menu, and you can move through the selected menu with the arrow buttons.

## 5.1 Getting started

All the basic settings can be programmed in the General Settings menu. First, the 'General Settings' must be configured including: pressure measurement; units; language; password; operating mode profiles, i.e. via the timer or only one particular profile; external input function; date, time; alarm settings; logic inputs of the compressors; ball valve function; direct load change or only after reaching the shutdown points and buzzer on or off. Then, first the timer settings are configured in the 'Timer program' menu and the corresponding profiles specified. Finally, the corresponding profile data are programmed. Up to six different profiles can be programmed, provided the timer has been activated and various profiles have been selected in the timer program.

## 5.2 Front view

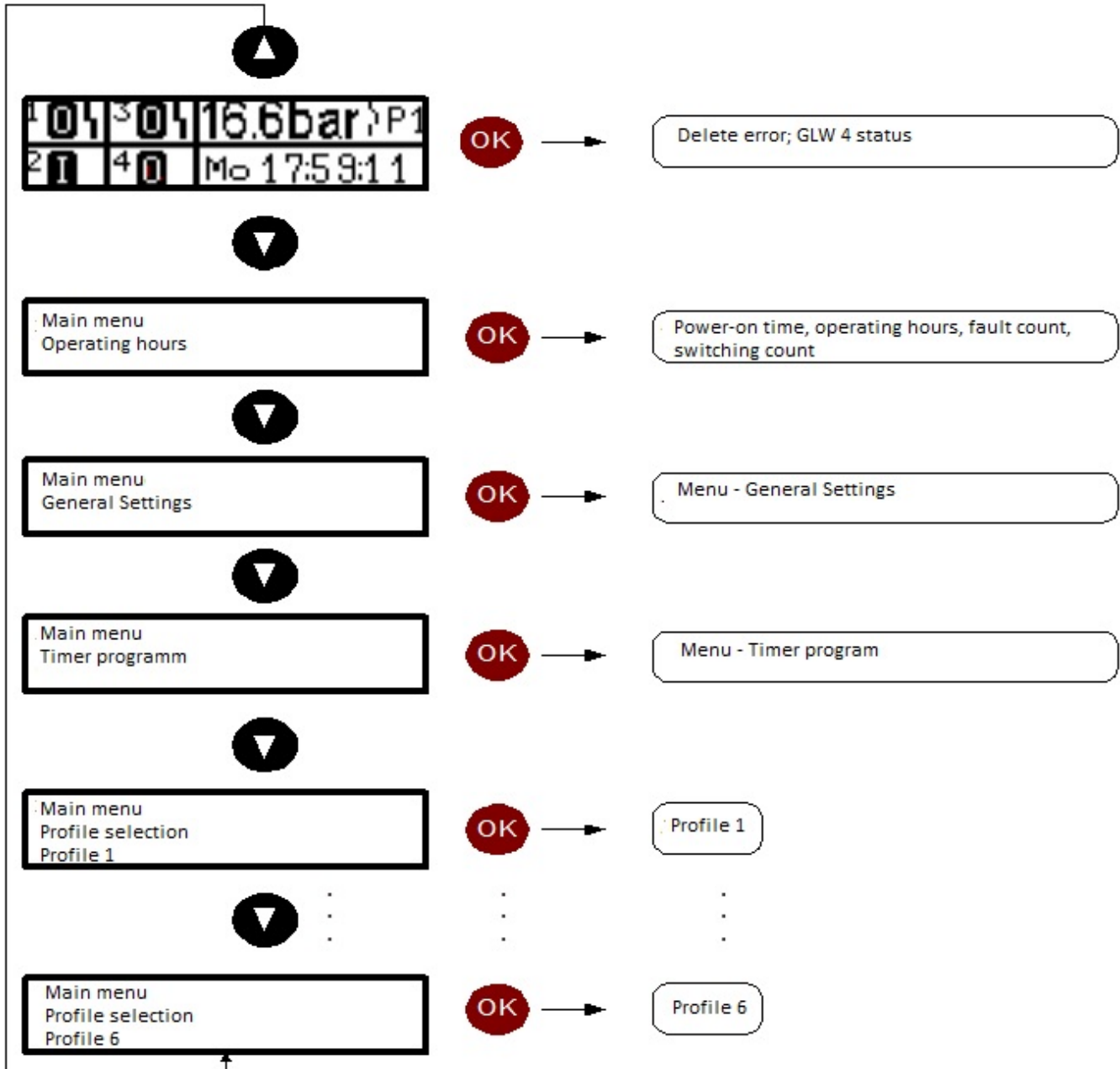




### 5.3 Main menu

Pressing the arrow buttons moves you through the main menu. As soon as the OK button is pressed, you enter the selected sub-menu or confirm the selected setting.

#### 5.3.1 Menu: Main menu





## 5.4 Operating hours

As soon as you press the OK button in Operating Hours in the main menu, it is possible to read off the corresponding monitoring data (network power-on duration, operating hours, error count, operating frequency). That is provided the corresponding inputs have been wired and the respective logic has been programmed.

Pressing all three buttons simultaneously deletes the corresponding monitoring data.

## 5.5 General Settings

All basic settings are entered in General Settings. All special settings are explained in detail under the following subheadings:

### 5.5.1 General Settings: Operating mode profiles

The basic logic of the rule is programmed in this menu:

- Off**            The control unit is switched off.
- P1 to P6**      Only the selected profile is processed.
- Clock**        The control unit processes the settings stored in the timer program.

### 5.5.2 General Settings: The external input function

The external input function determines the logic of the 'Bypass timer' input:

- No Function**      The function is switched off.
- P 1 to P 6**        When the operating voltage is connected (usually 230V-AC), only the selected profile is processed without the timer.
- Off**                The GLW 4 switches off as soon as the operating voltage is connected (usually 230V-AC).



### **5.5.3 General Settings: Alarm pressure, alarm time, alarm relay**

Under Alarm Pressure the alarm level is defined, how long the alarm continues and whether the potential-free alarm relay is active. An alarm signal is triggered as soon as the alarm time has elapsed and the alarm level is still below the set value.

### **5.5.4 General Settings: Logic inputs**

Here the logic of the inputs can be programmed for network power-on duration, operating hours, errors and operating frequency recording.

### **5.5.5 General Settings: Buzzer**

The 'On' setting activates the internal device buzzer when an alarm signal is triggered.

### **5.5.6 General Settings: Ball valve/Output K4**

With the 'On' setting, only up to three compressors can be controlled. An electric ball valve can then be actuated with the fourth contact (e.g. for a weekend shutdown).

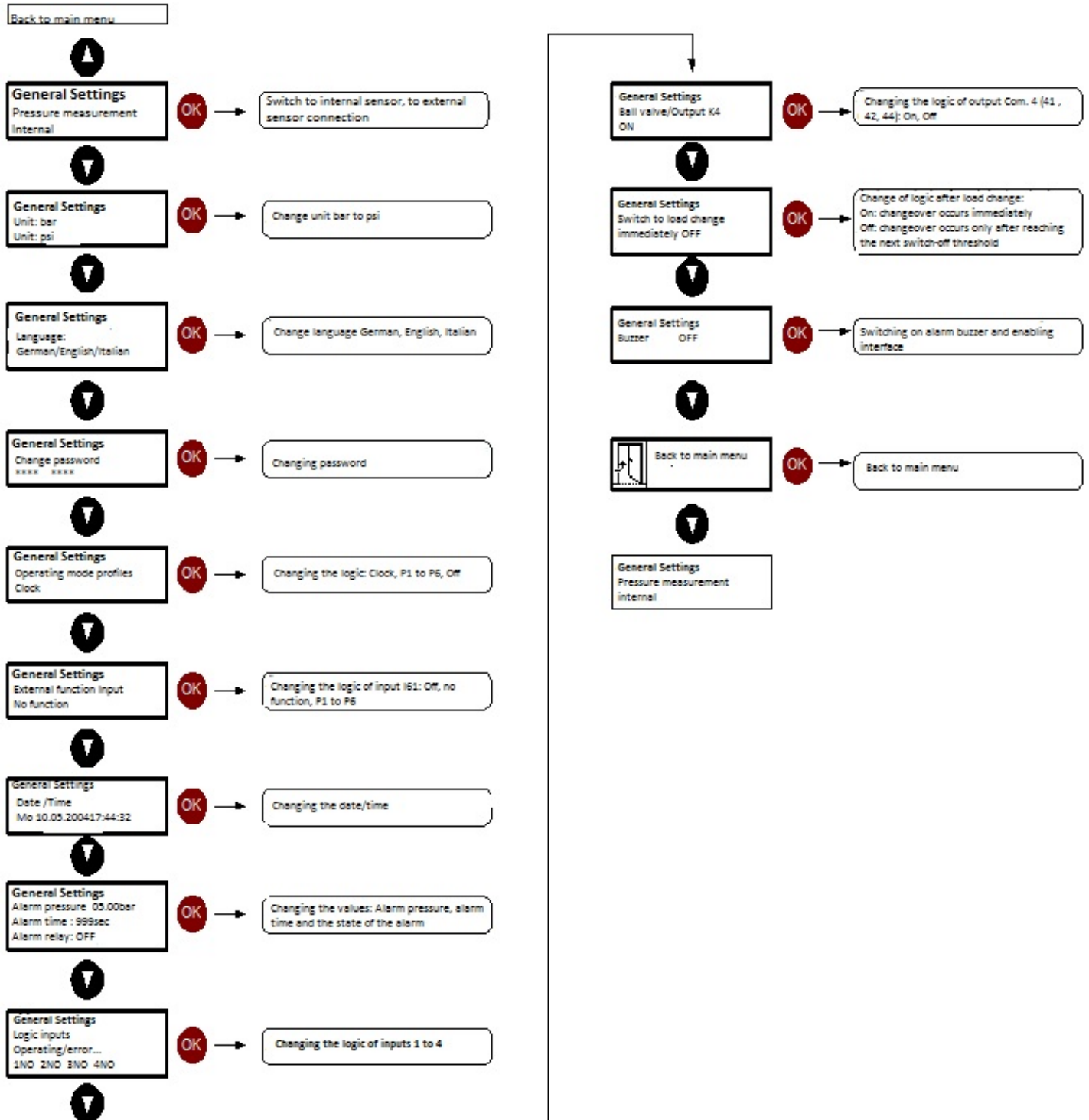
### **5.5.7 General Settings: Switch to load change immediately**

After the load change time has elapsed and the upper switch-off threshold has been reached, the order of the compressors changes.

The 'On' setting triggers an immediate load change, without reaching the upper switch-off threshold.



## 5.5.8 Menu: General settings





## 5.6 Timer program

All specific compressor settings are configured in a so-called profile. The timer function is activated as soon as 'Operating modes profiles' is selected in General Settings.

In the timer program there is a fixed daily timetable for a complete week. By programming the desired times and the assignment of the desired profiles, the **GLW 4** only operates according to the timer specifications.

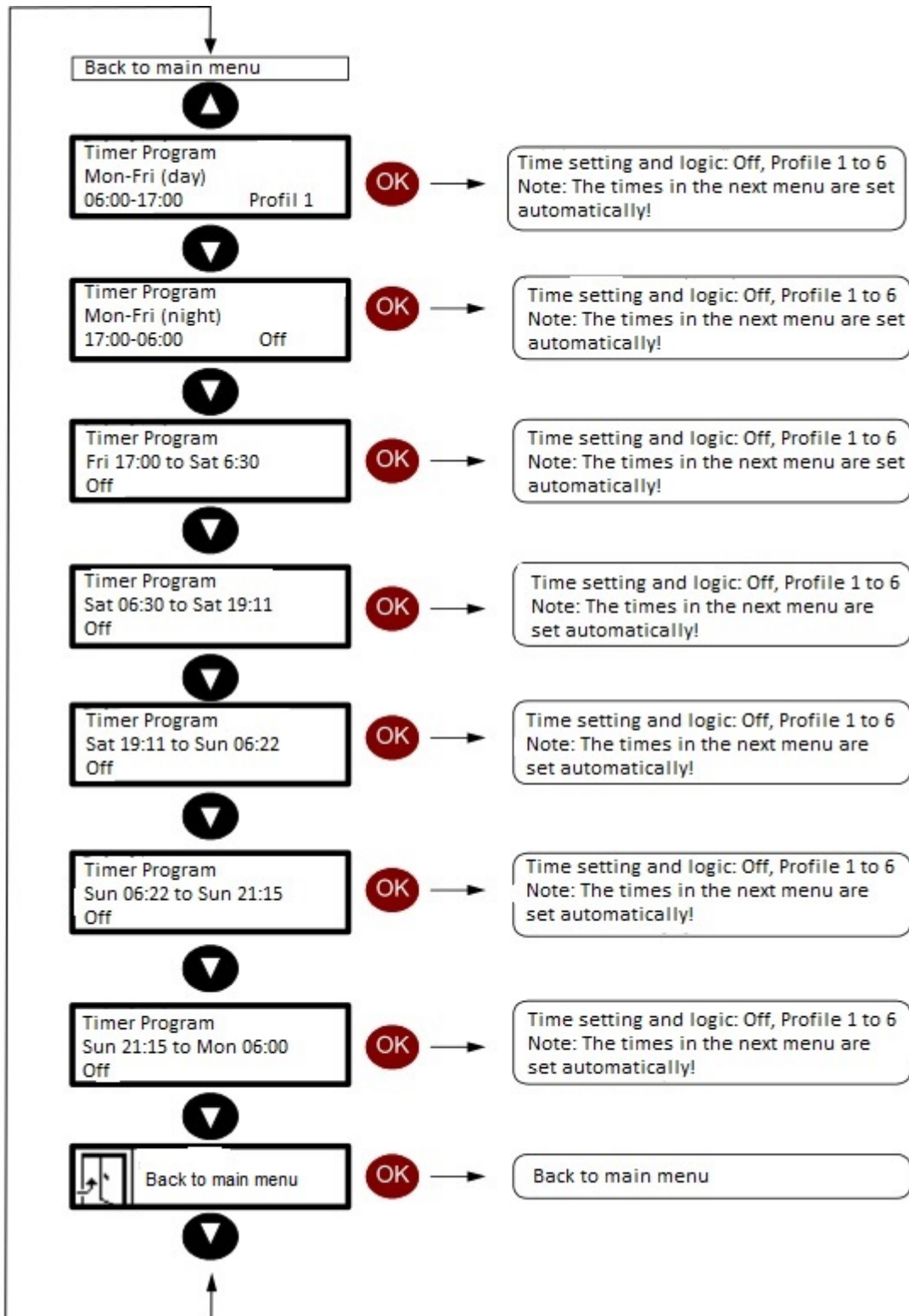
The end time and start time of the following period are always the same. The start time in the subsequent menu is set automatically.

Switching to a profile (P1 to P6) in General Settings, 'Operating mode profiles' switches off the timer function and only the selected profile is executed.





### 5.6.1 Menu: Timer program





## 5.7 Profile selection

In the 'Profile selection' menu, the individual compressor parameters are entered into the desired profile. Up to six different profiles can be created.

The operating mode distinguishes between BASE LOAD (the compressor does not participate in load change), LOAD CHANGE (the compressor participates in load change) and OFF (no compressor is connected or switched off). The respective switch-on and switch-off pressures of the respective compressor must then be programmed. All special settings are explained in detail under the following subheadings:

### 5.7.1 Waiting time

If the relevant compressor has not reached the desired switch-off pressure after the waiting time has elapsed (0 to 999 minutes), the next compressor is automatically switched on. Setting the waiting time to 'Null' omits this function.

### 5.7.2 Load change time

The load change time determines the actual time of the load change between the connected compressors!

The load change time is the period in which Compressor 1 is actuated. This means that the load change does not take place after the elapse of say, 24 hours, but only when the relevant compressor has been actuated for 24 hours. After the load change time has elapsed, the base load supply switches to the next compressor. The load change time is adjustable between 0 and 999 h. If in General Settings, 'Switch to load change immediately ON' is selected; the load change occurs immediately. If the OFF setting is selected, load change only occurs after the upper switch-on time has been reached.



Please note that the load change time is only the time in which the compressor is actuated!

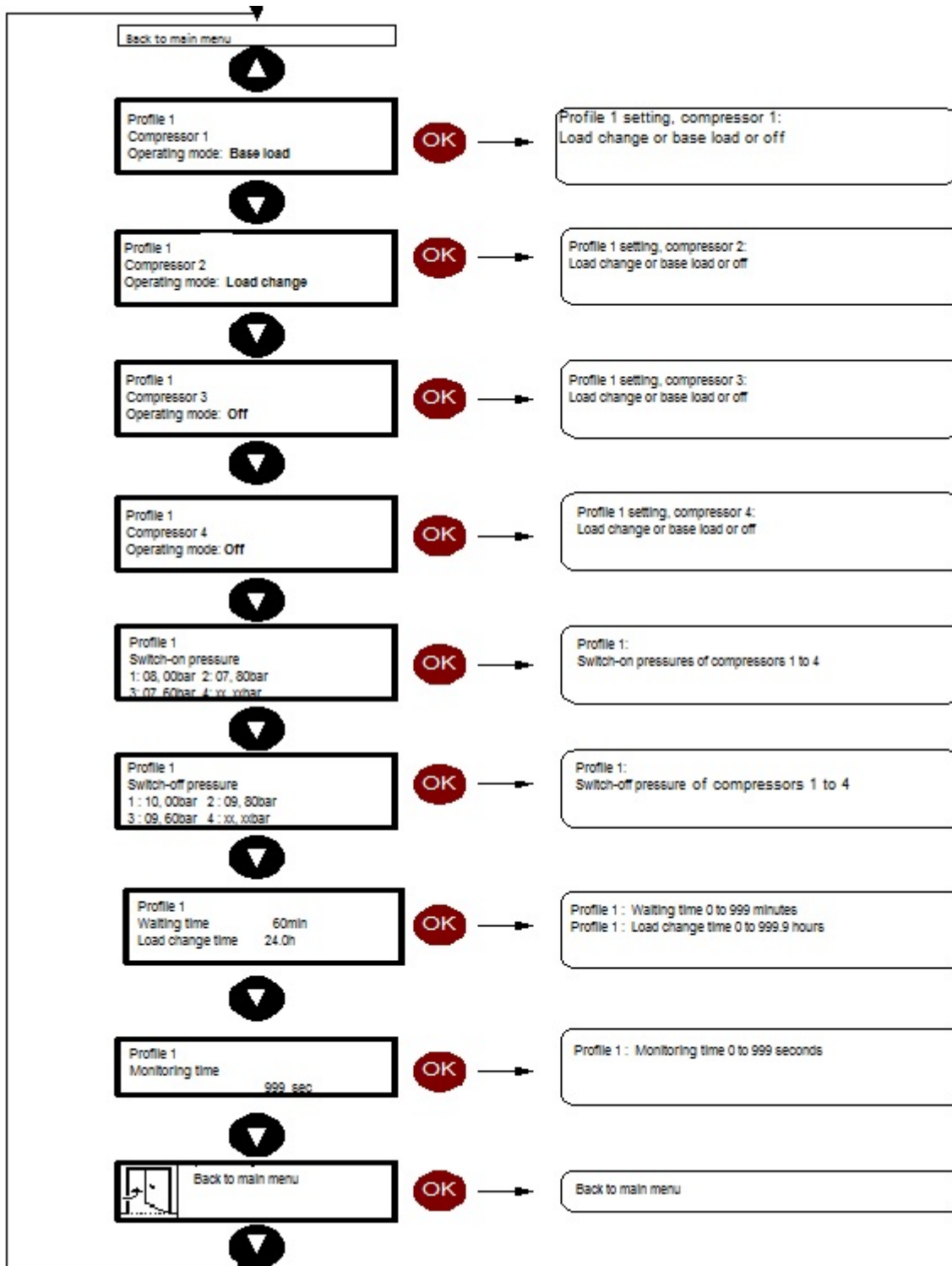


### 5.7.3 Monitoring time

The monitoring time starts if the connected network pressure drops below the set alarm pressure or exceeds the upper switch-off threshold. If the network pressure is still below the set alarm level after the monitoring time has elapsed (or above the upper switch-off threshold), the alarm output is activated.



### 5.7.4 Menu: Profile 1 to maximum Profile 6





## 6 Power-on delay

Due to existing safety regulations, during commissioning (network pressure: 0 bar) all programmed compressors are switched on with a 10-second delay. This setting cannot be switched off.

## 7 Factory settings

In its as-delivered state, the timer, pressure transducer and ball function are not activated. Please remember that the changeover from daylight saving time to wintertime and vice versa must be performed manually.

## 8 Quick guide to GLW 4, for use with 230V-AC

For an initial operation, the following steps must be completed and observed as a minimum:

- 1.) GLW 4: Connect A1 and I51 to the 230V-AC supply!
- 2.) GLW 4: Connect A2 and I52/62 to N!
- 3.) Connect the compressed air supply!
- 4.) Select Profile 1, using the password 0190 (factory setting)!
- 5.) The load change time is the pure duty cycle of the compressors!
- 6.) Inputs I 11 to I 41 can only be used for the functions operating hours display etc. The compressors are actuated via the respective potential-free changeover contact (GLW 4: e.g. terminals 11/12/14 for Compressor 1 and terminals 21/22/24 for Compressor 2).



For questions and technical problems please contact:



## 9 Terminal assignment GLW 4

### *Terminal/Function*

<i>Connecting terminals</i>	<i>Function</i>
A 1	Connection 230 V-AC operating supply
A 2	Connection N-conductor
I 11	Compressor 1
I 12	Reference point input I 11 (N-Conductor)
I 21	Compressor 2
I 22	Reference point input I 21 (N-Conductor)
I 31	Compressor 3
I 32	Reference point input I 31 (N-Conductor)
I 41	Compressor 4
I 42	Reference point input I 41 (N-Conductor)
I 51	Remote release input
I 52 / I 62	Reference point input I 51 / I 61 (N-Conductor)
I 61	Timer bypass
11 / 12 / 14	Potential-free output compressor 1
21 / 22 / 24	Potential-free output compressor 2
31 / 32 / 34	Potential-free output compressor 3
41 / 42 / 44	Potential-free output compressor 4
51 / 52 / 54	Potential-free alarm output
p+ / p-	External connection Pressure transducer (twisted pair cable)

## 10 PC interface

The Type **GLW 4** has a V24 interface, which allows PC programming of the set values and much more besides. The interface is fitted with a protective cap.

This function is not yet active in the software version V1.01.



## 11 Technical data

The **GLW 4** is a pressure control unit with an integrated relative pressure transducer (plug-in connection for pressure recording) for mounting on a top-hat rail, 6 optocoupler inputs, 5 potential-free changeover contact, an analogue input (twisted pair cable, 4 to 20 mA) for external pressure measurement, an LCD graphic display, three-button operation and a V24 interface (not yet functional). Programming is operated via three buttons with the help of an LCD display.

### Internal compressed air connection (relative pressure transducer)

Hose diameter	6 mm, suitable hose: FESTO PAN 6X1
Switch-on and switch-off pressure in bar	1 to 16 bar
Max. permitted pressure	25 bar
Error (at 25°C)	typically +/- 2% FS +/- 1 digit

### Operating data

Supply voltage (A1/A2)	230 V-AC (+/- 10%), 50/60 Hz
Duty cycle	100% continuous operation
Permitted ambient and media temperature	0°C to + 40°C
Permitted ambient humidity	10–90% RH, non-condensing
Permitted storage temperature	0°C to + 50°C
Creepage and clearance distances	DIN VDE 0110-1
Operating position	Any
Power consumption	max. approx. 10 VA

### Housing data:

Dimensions	140 x 90 x 59 mm
Material	PC – GF, light grey
Fixing	snap-on mounting on top-hat rail EN 50022
Housing protection class	IP 40
Touch protection	in accordance with VBG 4
Number of terminals	32 pcs
Connection type	captive plus-minus terminal screws DIN EN 60 999
Max. connection cross-section	2 x 2.5 mm <sup>2</sup> 2x 1.5 mm <sup>2</sup> stranded wire
	DIN 46 228-1/-2/-3/-4



Max. current rating (relay contacts)

max. 250V-AC / 5A AC1  
max. 30V-DC / 2A

**Digital inputs**

opto-decoupled, **230V-AC**

**Analogue input for external pressure sensor**

UB 18 to 21 V-DC, twisted pair cable, 4 to 20 mA

## 12 Conformity

The Type GLW 4 base load changeover controller complies with the following directives:

EMC – Directive

89 / 336 / EEC  
EN 61000-6-3 (2001)  
EN 61000-6-1 (2001)  
EN 61000-3-2 (1995)

Low Voltage Directive 73 / 23 / EEC

EN 60204-1 (1997)



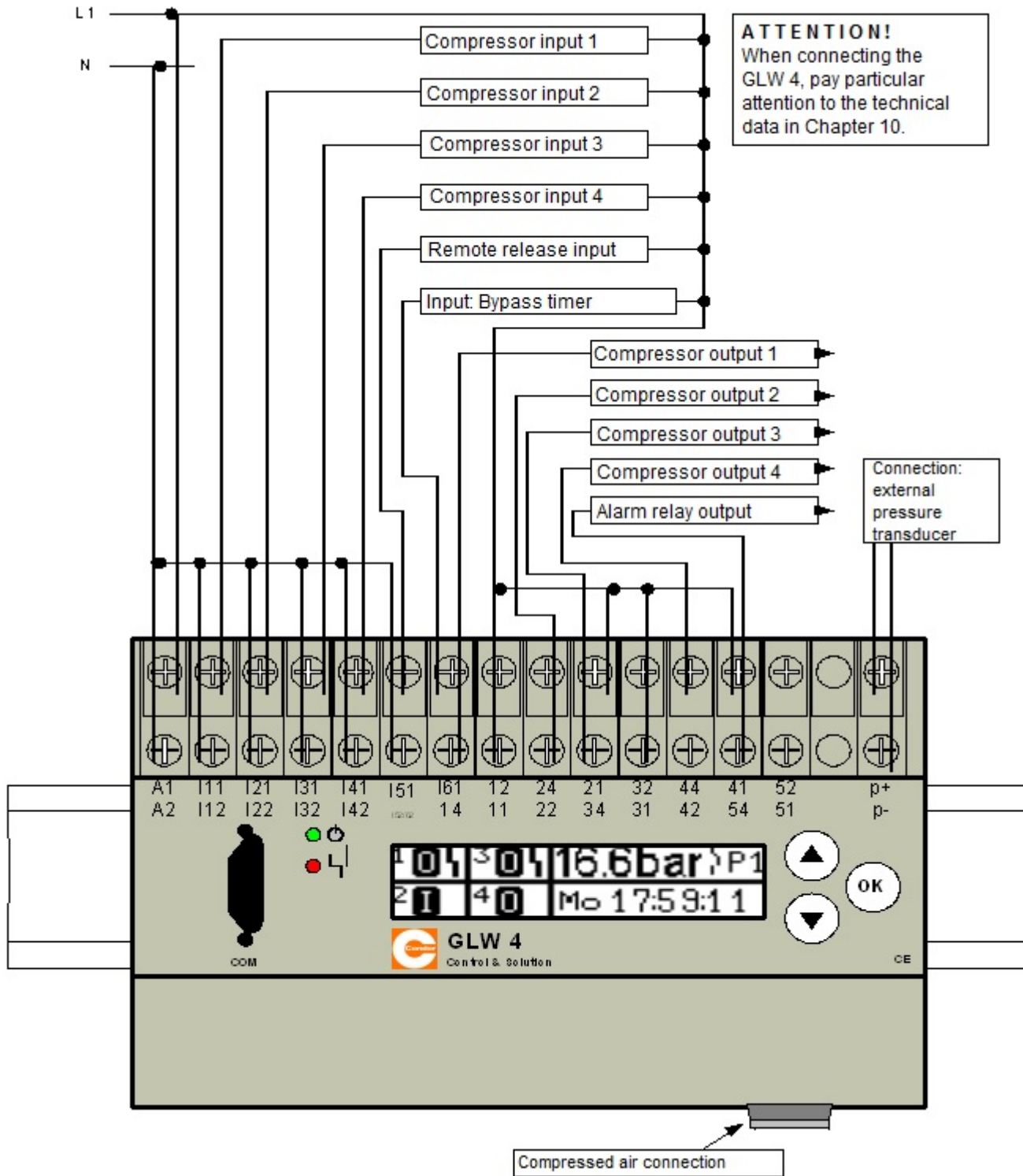
We want you to work only with products that are state of the art.

We therefore reserve the right to make technical changes.



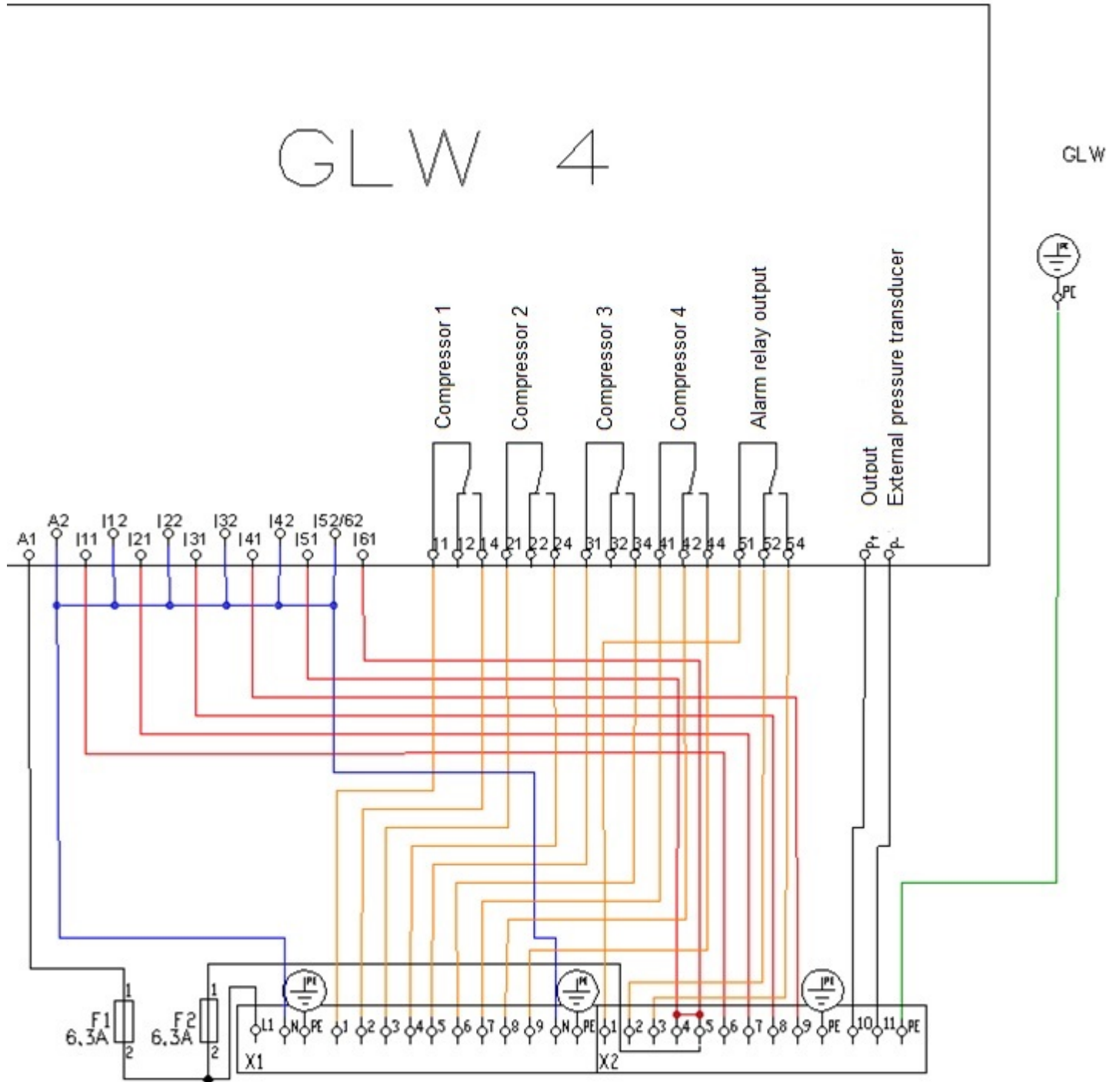


### 13 Terminal connection diagram GLW 4



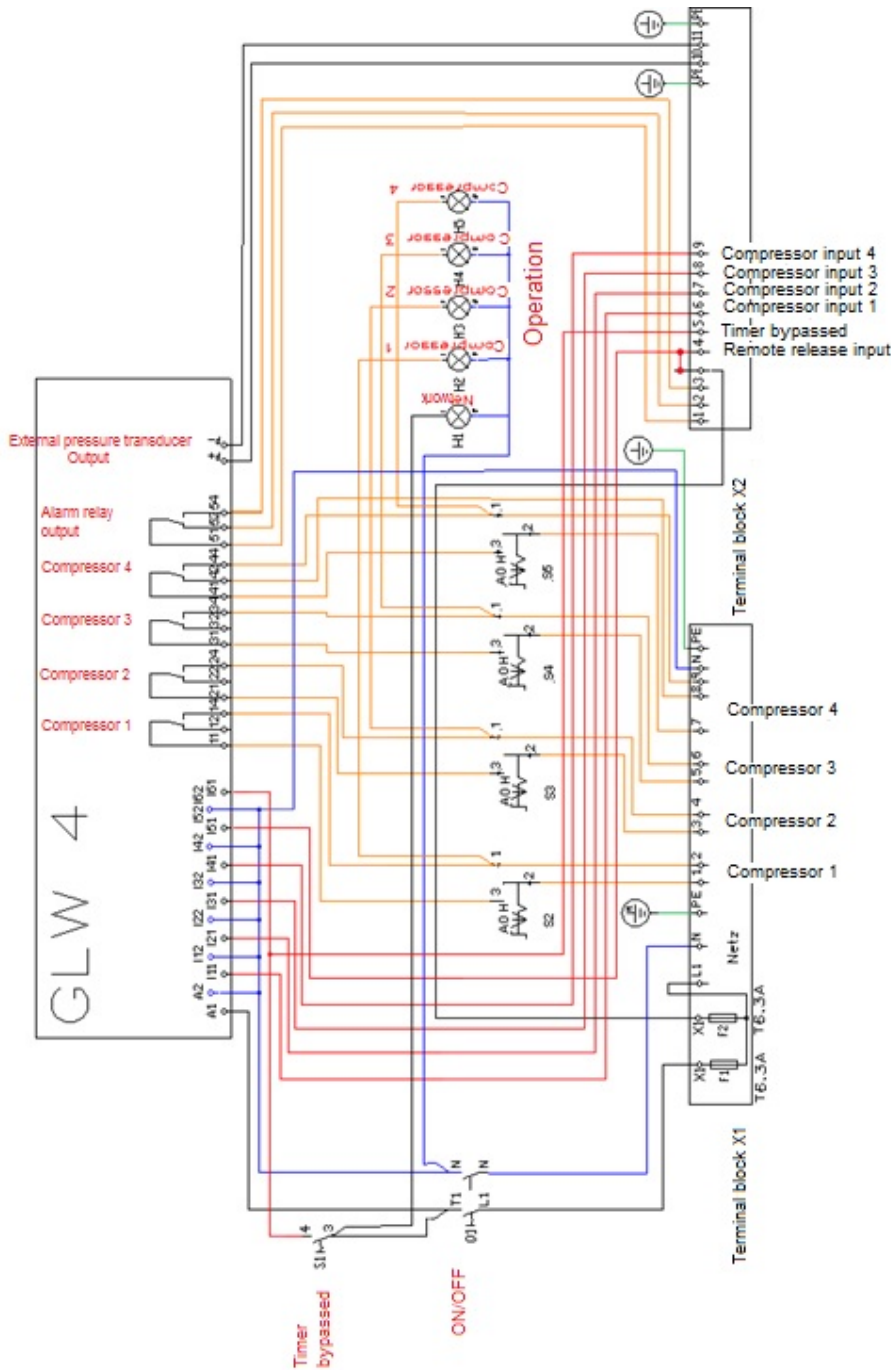


# 14 Terminal connection diagram GLW 4-S



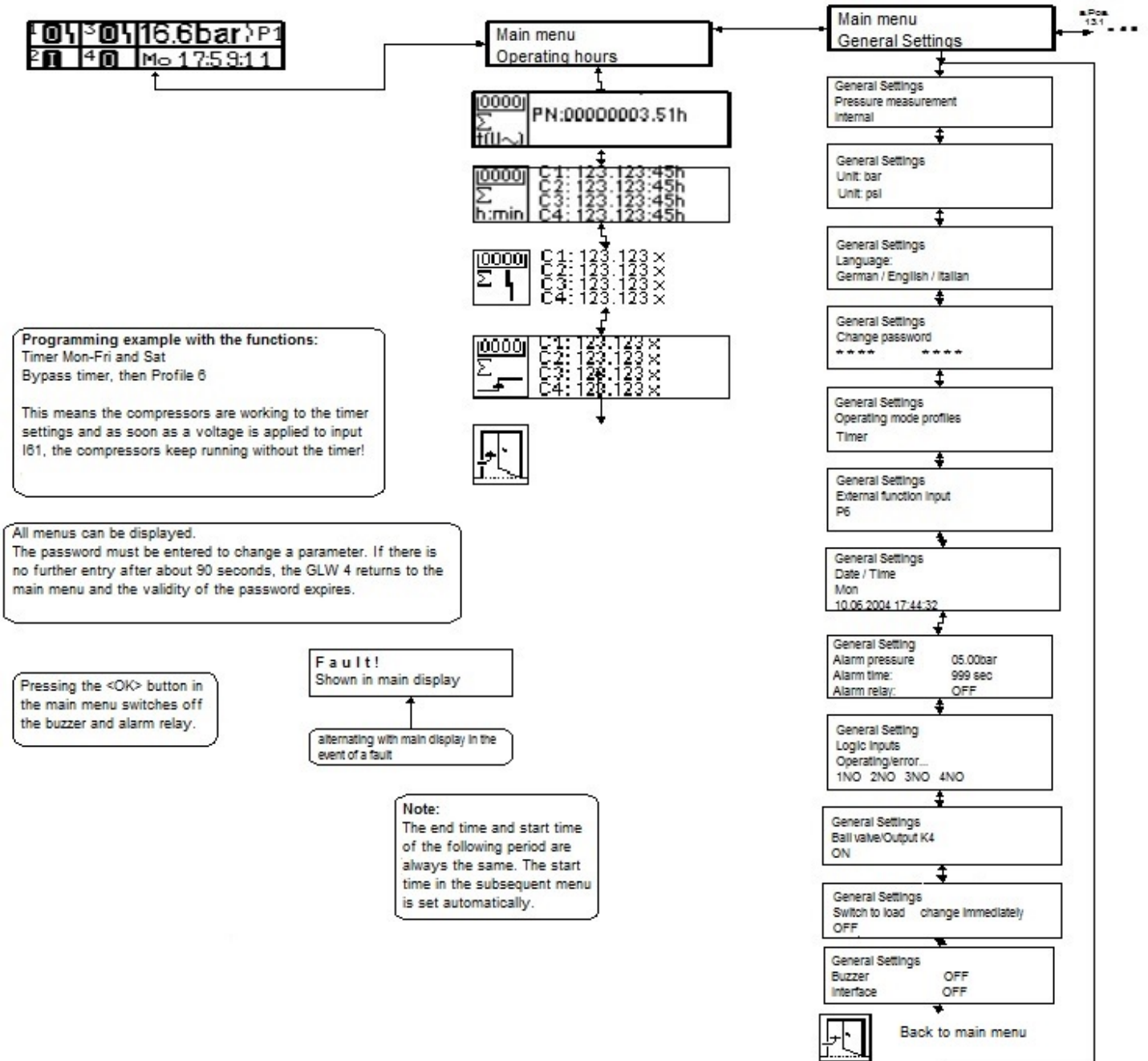


# 15 Terminal connection diagram GLW 4-SK





## 16 Programming example



For questions and technical problems please contact: