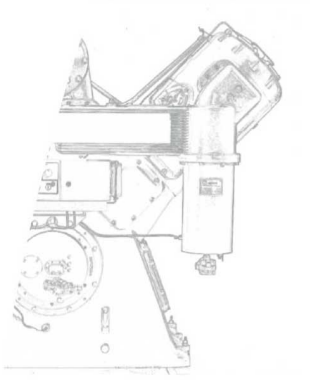
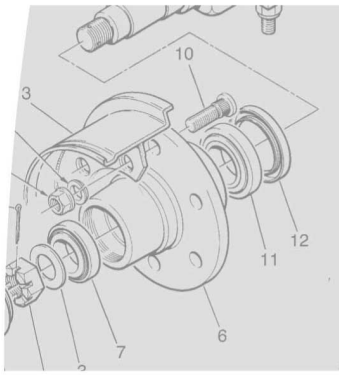
Gardner Denver





Translation of the original operating instructions

Compressor control
GD PILOT TS / L series

USA ZS1133369 / 00 - January 2015

TABLE OF CONTENTS

1 FOREWORD

1.1 About these operating instructions

These operating instructions contain information about controllers for fixed-speed or variable-speed compressors, and for water-cooled or air-cooled compressors.

Special sections are marked accordingly:

- (**FS**) (fixed speed); for compressors with a fixed speed
- (**RS**) (regulated speed); for compressors with speed control
- (**A**) (air); for air-cooled compressors
- (**W**) (water); for water-cooled compressors

All entries shown (parameters, settings, and configurations) are examples and do not apply to special applications. They are not specific values for a particular model of compressor.

The controller type GD PILOT TS is intended for use exclusively with compressors from the L Series from Gardner Denver.

This operating instructions are valid for the controller type GD PILOT TS with software versions DXL-L(RS)-2.0x and higher.

Requirements for personnel

Only assigned personnel may work on the controller and compressor. Personnel are trained and instructed on the compressor.

The responsibilities of personnel for operation, maintenance, and repair must be clearly defined.

The work of personnel should be checked regularly to make sure that all work is done with the personnel being aware of safety and hazard issues.

Personnel in training, under instruction, being taught, or taking part in a general training program may work with the controller and compressor only under the continuous supervision of an authorized person.

For safety-relevant changes to the compressor or its operating behavior, the compressor must be stopped immediately and the fault must be reported to the responsible area or person.

Faults, especially those that can compromise safety, must be corrected immediately. Otherwise the compressor must not be operated.

Work on electrical equipment may be performed only by an appropriately qualified electrician, in accordance with electrical engineering regulations and specifications.

Reference documents

These operating instructions only describe the controller type GD PILOT TS.

In addition to these operating instructions, the operating instructions for the compressor must be followed.

1.2 Intended use

The installed controller type GD PILOT TS is intended for use exclusively with compressors from the L Series from Gardner Denver.

1.3 Foreseeable misuse

Any changes to the software or hardware of the controller must be approved by Gardner Denver.

1.4 Service

If you have any questions about or problems with the compressor please consult your Gardner Denver representative.

Trained and specialized personnel provide fast, technically accurate assistance.

In case of queries

If you have a query or wish to make a spare parts order, please specify the model, the identification number and year of manufacture as indicated on the name plate. Providing these data ensures that you will receive the correct information or spare parts.

Your Gardner Denver representative

Please enter the details of your local Gardner Denver agency in the following table.

Name:	
Contact person:	
Address:	
Telephone	
Fax	
Email:	

Chart 1-1: Local Gardner Denver representative

2 SAFETY REQUIREMENTS

Gardner Denver takes no responsibility for property damage or injuries that result from failure to follow the safety requirements

In additional to these operating instructions, the operating instructions for the compressor must be followed.

2.1 Labeling of safety instructions

Safety instructions are used as special warning notices in the operating instructions, using the following names and symbols.

These special warning notices serve to protect against hazards and are close to the potential hazard in space and time:

- On the system, near the source of hazard
- In the operating instructions, before a sequence of actions or activities to be performed is described

Structure of safety instructions

The special warning notices in the operating instructions are structured as follows:

ALERT WORD	
Safety symbol	**Hazard (consequences of hazard)** Description of the hazard (source) Protective measure (protection against hazard)

Components of safety instructions

Hazard (consequences of hazard): The hazard sequence tells the type of hazard.

Description of the hazard (hazard source): The hazard source indicates the cause of the hazard.

Protective measure (protection against hazard): The protection against the hazard describes the measures for preventing the hazard.

Alert word: The alert word classifies the severity of the hazard into four levels, emphasized graphically with different colors. The alert word is used in the safety instructions as described below.

DANGER Indicates an immediate dangerous situation that, if not prevented, will result in death or extreme (irreversible) injury.

WARNING Indicates a potential dangerous situation that, if not prevented, can result in death or extreme (irreversible) injury.

CAUTION Indicates a potential dangerous situation that, if not prevented, can result in slight or minor (reversible) injury.

CAUTION Indicates information or recommendations that directly or indirectly relate to the safety of persons or equipment protection.

2.2 Safety symbols

The safety symbols (hazard warning signs) can be used in the operating instructions and in the environment around the compressor.

Safety symbol	Meaning	Use / Behaviour
	General hazard	Warning of a general hazard. Observe the warning and proceed with the required caution (e.g., protective clothing) and care.
	Slip hazard	Warning of a slip hazard. Use caution when walking, running, or climbing.
	Component or system under pressure	Identification of devices or areas in which the air pressure is substantially higher than in the normal atmosphere. Do not open devices or chambers until the pressure has been equalized.

Chart 2-1: Safety symbol

Safety symbol	Meaning	Use / Behaviour
	Do not operate with open doors or loose enclosure panels.	It is not permitted to run the compressor with open doors or loose enclosure panels, except for test runs. High sound pressure level, risk of injury! Normal operation requires the enclosure to be closed.
	Do not breathe in the compressed air from this unit	It is not permitted to use the compressed air produced by this compressor for breathing. Indrawn materials can be dangerous to health. Do not use compressed air as breathing air.
	Electrical voltage	Warning against dangerous electrical voltage. Work on the electrical equipment of the compressor may be done only by an electrician in accordance with electrical rules.
	System continues to run	After pressing the stop button <O>, the compressor runs on for 30 seconds. Do not open the compressor enclosure until the compressor has stopped.
	Follow the operating instructions	Identification of instructions where additional information can be found in the (manufacturer's) operating instructions. Before the device is operated, the user (operator) must have read and understood the operating instructions (manufacturer's operating instructions).
	Use hearing protection	Identification of areas with increased sound pressure level. Enter the area only with suitable hearing protection.
	Warning against industrial trucks	Warning of industrial trucks traveling within the plant (e.g., forklifts). Do not perform any work in traffic lanes with limited visibility that are not secured or blocked off. Use or crossing of this traffic lane requires great caution.
	Warning of suspended loads	Warning of suspended loads being transported. During transport, no person may be present in the hazard area. In particular, do not reach in or allow the feet to pass beneath the suspended compressor.
	Warning of moving machine parts.	When performing maintenance work, it is necessary to check some functions with the enclosure open. Risk of injury due to rotational or translational motion. Maintenance work may be performed only by specially trained technicians.

Chart 2-1: Safety symbol

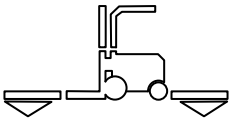
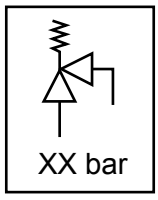
Safety symbol	Meaning	Use / Behaviour
	Warning of hand injuries	Hazard that the hands may be crushed, drawn in, or otherwise injured. Keep clear.
	Warning of automatic start-up	In normal operation the compressor can start automatically at any time. Operational readiness of the compressor is indicated by the green LED on the control panel. Do not perform any work on the compressor when the green LED is lit.
	Warning of hot surfaces	Parts of the compressor become very hot when in operation (up to 235 °C). Risk of injury from hot surfaces. Before beginning maintenance and repair work, the compressor must have cooled off sufficiently.
	Warning of suffocation	Suffocation hazard due to insufficient exhaust extraction and ventilation of the compressor room. The operator must provide sufficient exhaust extraction and ventilation of the compressor room.
	Warning of crushing hazards	Warning of crushing hazards caused by a piece of equipment (e.g., a machine) or structural components (e.g., covers, enclosures, guards, fences) during transport. Working at the marked workstations requires increased vigilance.
	Do not go / stand beneath the load	Do not go / stand beneath a suspended load. The driver is not allowed to drive the industrial truck if there is a person beneath the load. The driver must also make sure that no one stands or walks under the load. The load must be transported so that it is sufficiently clear of the ground (max. 0.5 m above the ground). (In Germany also refer to the law BGV D27 “Industrial trucks”). The driver is responsible for all travel and load movements of an industrial truck.
	Lifting point	Identification of lifting points. Only the indicated lifting points may be used for transport.
	Safety valve	Opening pressure of safety valves (for value “xx” see the label on the control panel).
	Check connection terminals and retighten if needed. For additional information, see the operating instructions.	Warning of loosened clamp connections. Clamping pressure can fade after some time. Check the clamps regularly according to the safety guidelines and retighten as needed.

Chart 2-1: Safety symbol

Safety symbol	Meaning	Use / Behaviour
	Electrical voltage Residual voltage on the capacitors	Warning against dangerous electrical voltage. Warning of electrical energy stores in the form of capacitors. They carry deadly electrical voltage. Do not open the electrical switch cabinet (RS compressor) for 10 minutes after disconnecting the compressor. Check the DC bus voltage of the frequency converter at the grid terminal strip of the frequency converter. The exact position of the “DC+” and “DC-” terminals can be found in the included operating instructions for the frequency converter. Work on the electrical equipment of the compressor may be done only by an electrician in accordance with electrical rules.
	Spring tension	Warning of springs under tension in the interior of the suction regulator. Before opening the suction regulator, read the repair manual.
	Bacterial contamination hazard	Warning of the presence of Legionella in the cooling water in an open-loop cooling water circuit Continuous monitoring of the cooling water by maintenance personnel.
	Caution: hot liquid	Warning of hot oil or hot coolant. Allow the compressor to cool before opening the fluid circuit lines.

Chart 2-1: Safety symbol

NOTE

All hazard warning signs must be present and in legible condition.

Check regularly and replace when needed.

3 CONTROL PANEL AND CONTROLLER

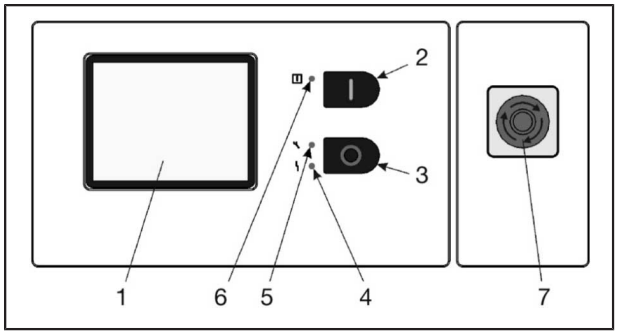


Fig. 3-1: Control panel

[1] Touchscreen Display

[2] Start-Taste < I >

[3] Stopp-Taste < O >

[4] rote LED
langsames Blinken: Warnung oder Wartung
schnelles Blinken: Störung

[5] gelbe LED
langsames Blinken: Wartung erforderlich

[6] grüne LED
Dauerleuchten: Anlage in Betrieb
Blinken: Anlage in Standby (Bereitschaft)

[7] Taster <Not-Halt>

About the compressor controller

The controller is responsible for the following:

- Starting and stopping the compressor
- Compressor rotational speed control (**RS**) and switching the compressor between load and Off-Load operation in response to variations in air demand
- Monitoring of various operating parameters, such as pressures and temperatures
- Display of warnings and fault messages, and automatic shut-down when a fault occurs
- Data entry for adjustment of various operating parameters
- Keeping track of scheduled maintenance of the compressor

3.1 General operation / Parameter entry

Input menus

If parameters must be adjusted or other inputs must be made in a menu, the appropriate input menu appears in order to make the input.

The input menus are largely self-explanatory.

Selection

If only certain defined values are available for an input, appropriate selection input menus are displayed.

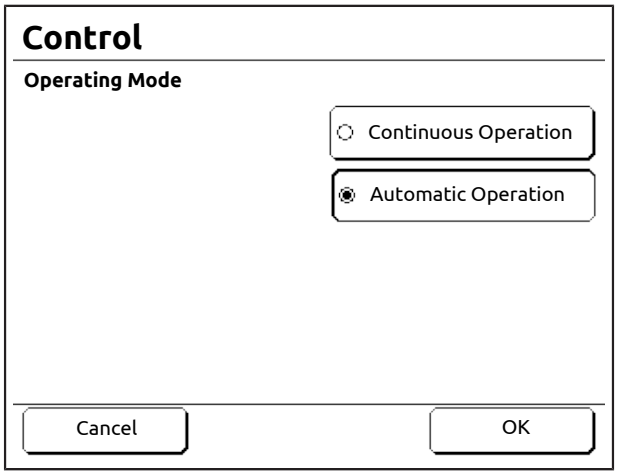


Fig. 3-2: "Select" input menu, example: "Operating Mode"

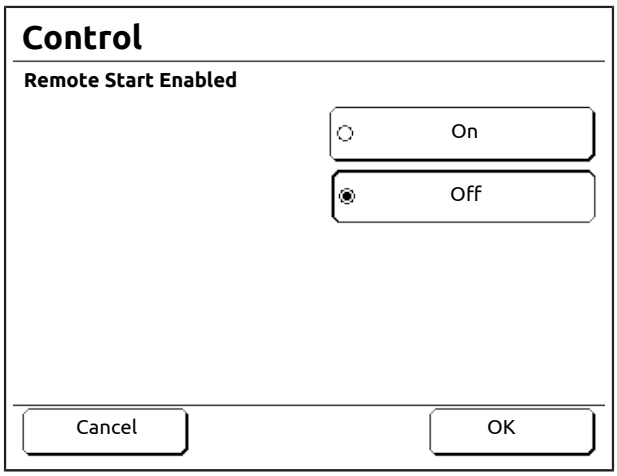


Fig. 3-3: "Select" input menu, example: "Remote Start Enabled"

The input menus are enhanced with an explanatory text where needed.

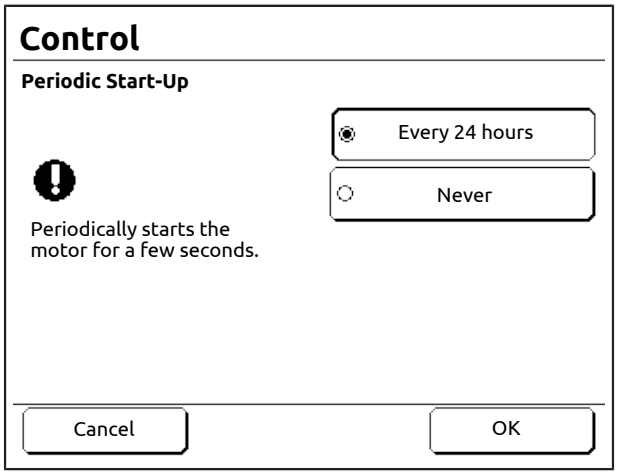


Fig. 3-4: Input menu with explanatory text

Parameters

When parameters must be entered, an appropriate keyboard appears on the screen. The allowable range is displayed next to the entry for the parameter that is being changed.

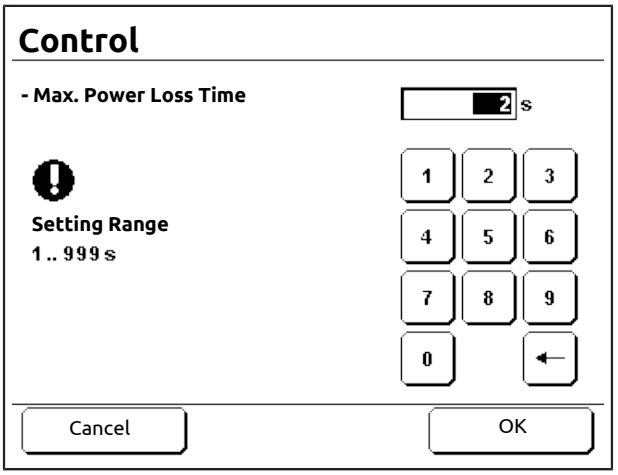


Fig. 3-5: Screen keyboard

Additional information

Instructions for the current menu are given wherever needed.

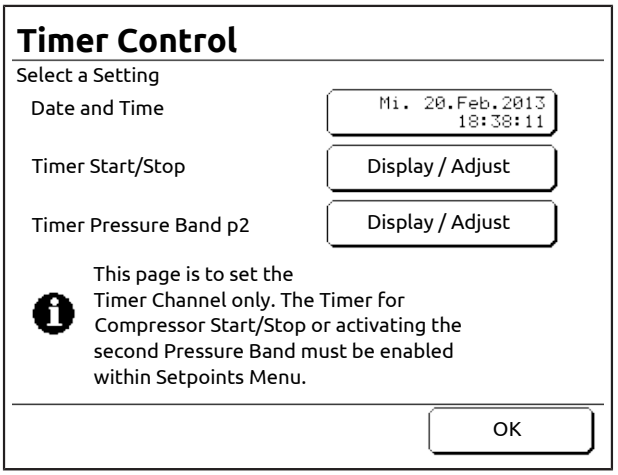


Fig. 3-6: Menu with additional information

Access Code

Input menus for access codes always have a note about the status of the current access authorization.

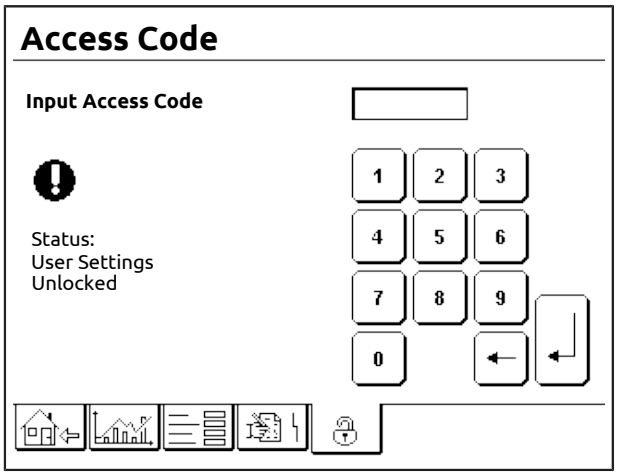


Fig. 3-7: Access code input menu

Arrow keys

If the menu contents do not fit on the display, arrow keys for scrolling through the menu contents will appear.

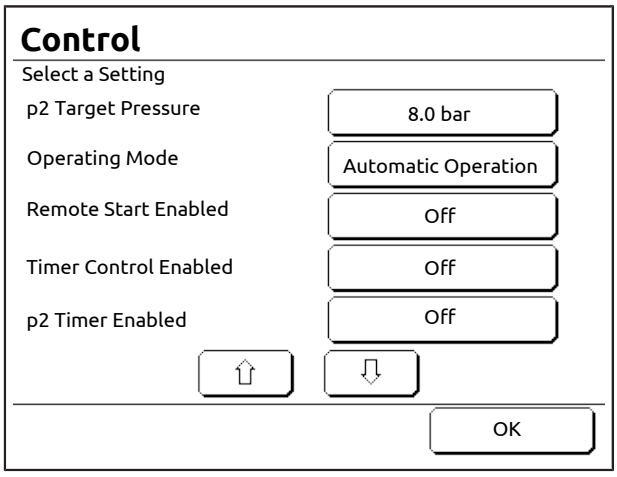
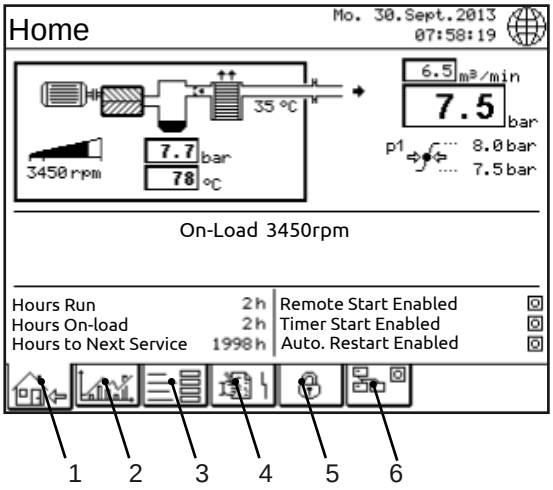


Fig. 3-8: Menu with arrow keys

4 MENUS

4.1 Menu structure



(1) Home
Date and Time / Language Selection Operating Display (Pictogram with Setpoints and Measured Values) Status / message area Hours Run / Service hours Status of switch-on functions

(2) Trends
Statistics On-Load Hours Statistics Weekly Profile Volumetric flow rate Network pressure Motor Speed (VS) Additions at the Service level: Discharge pressure - Output temperature - Heatsink Temperature (VS) - VSD Output Current (VS) Base Load Sequencing additions: - Volume Flow (BLS) - Statistics Weekly Profile (BLS)

(3) Settings
Hour Meters Controller Timer Control Programmable Inputs and Outputs Communication Configuration Factory Settings SD-Card

(4) Fault History
List of alarms, displaying Alarm Details

(5) Access Code
Input menu „Input Access Code“

(6) Base Load Sequencing (optional)
Turn on/off Base Load Sequencing Settings: - Setpoints - Behavior - Timer Control - Configuration

Fig. 4-1: Menu structure

4.2 "Home" menu

The "Home" menu is the basic screen that is shown during normal operation.

This menu is called up via the <Home> register card.
If there is no input for five minutes, this menu will appear automatically.

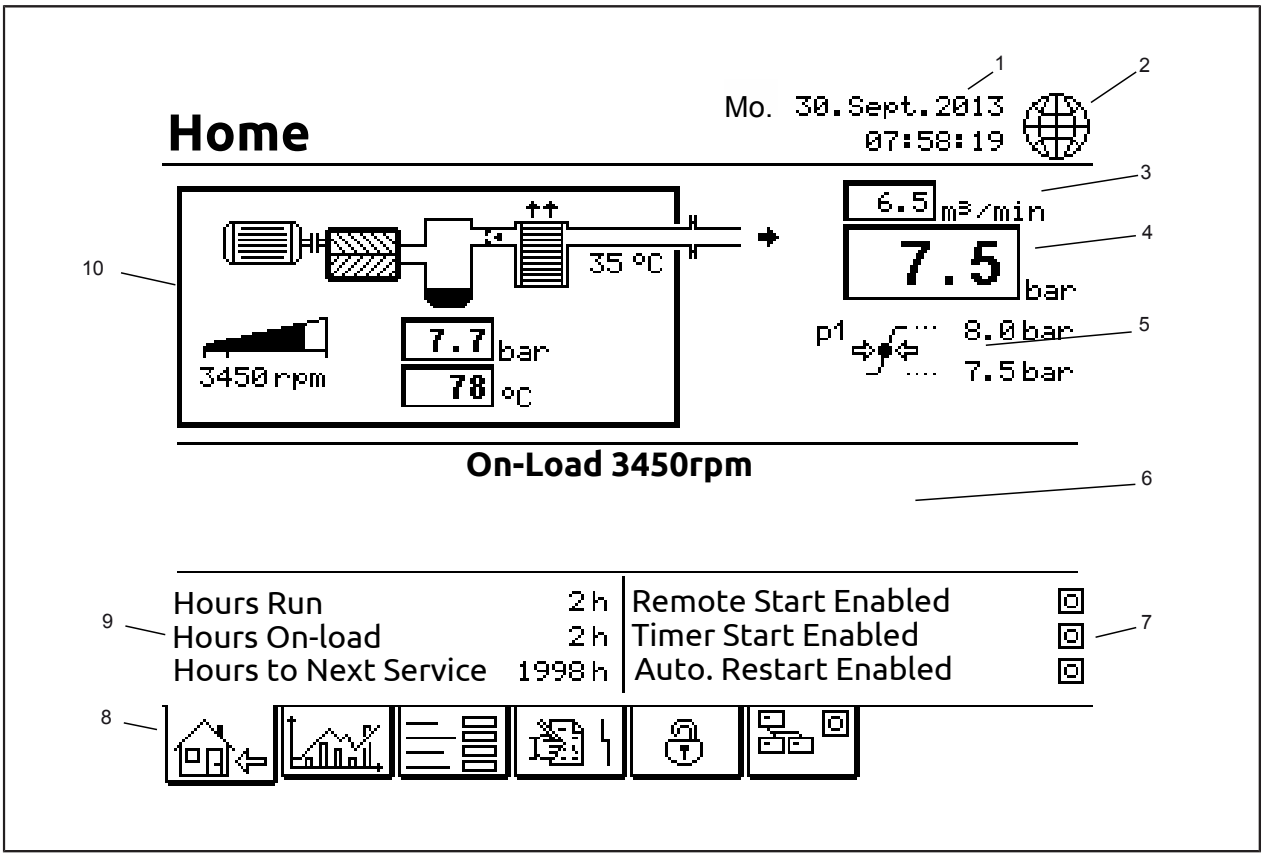


Fig. 4-2: "Home" menu

[1] Date and Time
[2] Direct access <"Language Selection">
[3] Volumetric flow rate
[4] Network pressure
[5] Pressure band
[6] Status / message area
[7] Status of switch-on functions
[8] Register cards
[9] Service information
[10] Pictogram

[1] Date / Time

Displays the current date and time.

[2] Direct access <"Language selection">

Tapping the globe symbol opens the "Choose Language" menu directly. See also the chapter "Configuration / Set Language".

[3] Volume Flow

Displays the current volume flow being supplied.

The current volume flow is calculated linearly from the motor speed (**RS**) and the supply rates set in the "Configuration" menu.

[4] Line Pressure

Displays the current air pressure in the compressed air network.

[5] Pressure Band

Displays information about the current pressure band within which the compressor attempts to maintain the set air pressure in the compressed air network. See chapter "Configuration / Set Pressure bands".

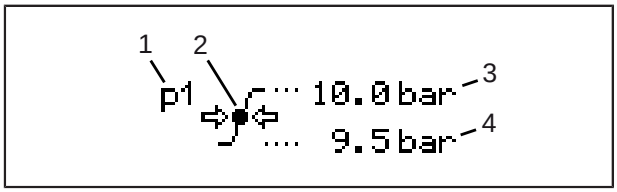


Fig. 4-3: Information about the current pressure band

[1] Current pressure band
[2] International pressure symbol
[3] Upper pressure value
[4] Lower pressure value

[5.1] Current pressure band

Displays the pressure band that is currently in use.

"p1" is the normal pressure band that is used as standard.

"p2" is a second pressure band that can be used if a different line pressure is required. The integrated timer control (see the chapter "Timer Control Operation") or an external contact (see the chapter "Programmable Inputs and Outputs") can be used to switch to the second pressure band.

[5.3] Upper pressure value

Air pressure at which the controller switches the compressor to Off-Load (**RS**: The drive motor runs at minimum speed). The run-on timer is activated and the compressor switches to stand-by mode after "x" seconds if there is no pressure demand by the time the run-on time has expired.

[5.4] Lower pressure value

RS: "Nominal pressure"; air pressure that the controller attempts to maintain.

FS: "Min. Line Pressure"; air pressure at which the controller switches the compressor to On-Load.

NOTE

If the pressure band is controlled via other sources, they are shown as symbols.

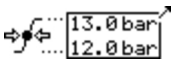
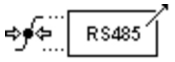
Symbol	Explanation
	Pressure band control via the RS485:1 connection (**RS**)
	On-Load / Off-Load commands control via the RS485:1 connection (**FS**)
	Pressure band control via the optional base load sequencing function.

Chart 4-1: Symbols when using other sources for the pressure band

[6] Status / message area

The status of the compressor is shown in defined status messages in the top line.

In the bottom line, compressor warnings are displayed.

The potential status messages and explanations are summarized in a table in the appendix to these operating instructions.

[7] Status of switch-on functions

The following switch-on functions are available:

- Remote Start Enabled
- Timer Start Enabled
- Auto. Restart Enabled

[7.1] Status Remote Start Enabled

The status of the switch-on functions is indicated in the checkbox.

I: Remote start activated. Remote start is possible.

O: Remote start deactivated. Remote start is not possible.

For details and settings, see the chapter "Configuration / Additional Settings".

[7.2] Status Timer Start Enabled

The status of the Timer Start is indicated in the checkbox.

I: Timer Start activated. Timer Start can be used to start and stop.

O: Timer Start deactivated. Timer Start cannot be used to start and stop.

For details and settings, see the chapter "Configuration / Additional Settings".

[7.3] Status Auto. Restart Enabled

The status of the function "Automatic Restart after Power Interruption" is indicated in the checkbox.

I: Function activated. The compressor can restart automatically after the power supply has been interrupted.

O: Function deactivated. The compressor must be started manually after the power supply has been interrupted.

For details and settings, see the chapter "Configuration / Additional Settings".

[8] Tabs

Tabs are used to call up the controller main menus.

The following tabs are available:

Symbol	Designation	Description
	<Home>	Normal operating display.
	<Trends>	Displays various statistics or tendencies of the compressor over a specified time period.
	<Settings>	Displays and allows editing of various operating settings for the compressor.
	<Fault History>	Lists recent faults and warnings (maximum of 64) and additional information about each event.
 	<Access Code>	Displays the screen keyboard for entering the codes to enable certain settings.
	<Base Load Sequencing>	(option) Displays the menu for controlling the Base Load Sequencing function.

Chart 4-2: Tabs

[9] Service information

The following service information is displayed:

- Hours Run
- Hours On-load
- Hours to Next Service

[9.1] Hours Run

Displays hours that the drive motor has run.

[9.2] Hours On-load

Displays hours that the compressor has run under load.

[9.3] Hours to Next Service

Displays hours until next maintenance is due.

[10] Pictogram

Displays measured values. The pictogram view can be changed to display additional measured values.

See the next chapter for a description.

4.3 Pictogram

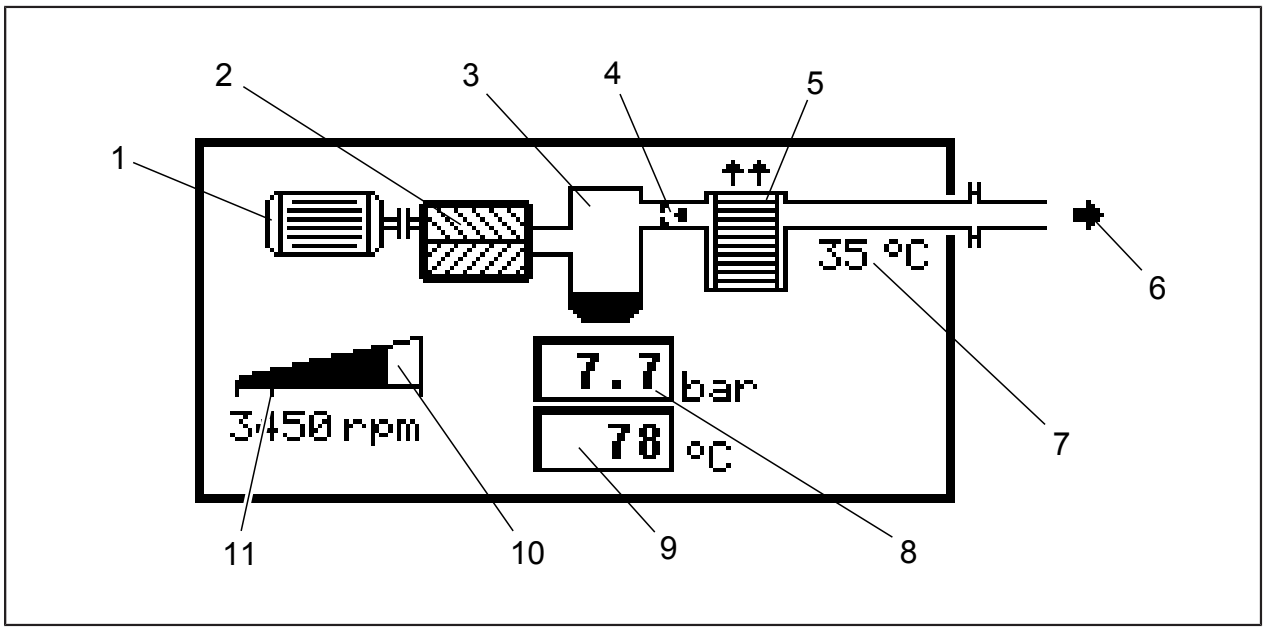


Fig. 4-4: Pictogram

[1] Drive motor

[2] Compressor stage

[3] Pressure vessel

[4] Pressure retention and check valve

[5] Aftercooler

[6] Air supply

[7] Compressed air outlet temperature

[8] Pressure in pressure vessel

[9] Temperature at outlet from compressor stage

[10] Drive motor speed (graphical and numerical)

(only for speed-controlled compressor systems)

[11] Marking for drive motor speed (stopped, idle, max.)

(only for speed-controlled compressor systems)

4.4 "Trends" menu

The "Trends" menu consists of four trend charts (**FS**) or five trend charts (**RS**).

The following trend charts are available:

- Statistics On-Load Hours
- Statistics Weekly Profile
- Volume flow
- Line pressure
- Motor Speed (**RS**)

This menu is called up via the <Trends> tab.

To switch between individual trend charts, use the <arrow buttons> at the top of the screen.

Statistics On-Load Hours

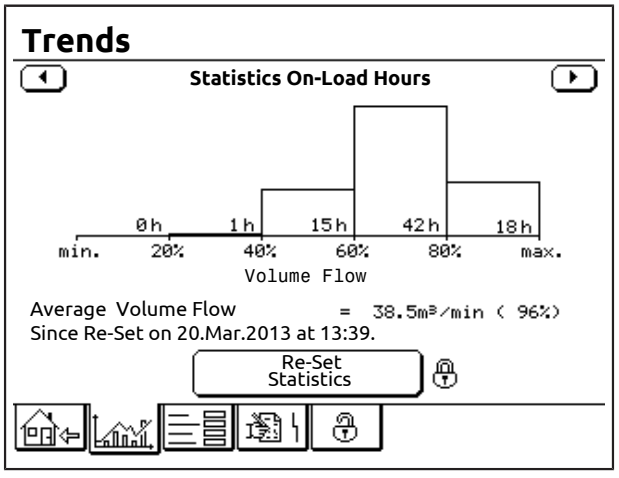


*Fig. 4-5: "Statistics On-Load Hours" trend chart (**RS**)*

This bar chart shows how many hours the **RS** compressor has been operated at various volume flow rates. It also shows the average total volume flow since the last time it was reset.

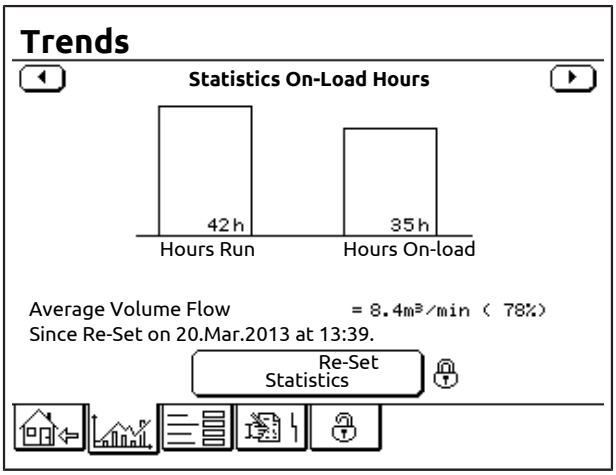


*Fig. 4-6: "Statistics On-Load Hours" trend chart (**FS**)*

This bar chart shows how many hours the FS compressor has been in operation (total hours and On-Load operation). It also shows the average volume flow since the last time it was reset.

Statistics Weekly Profile

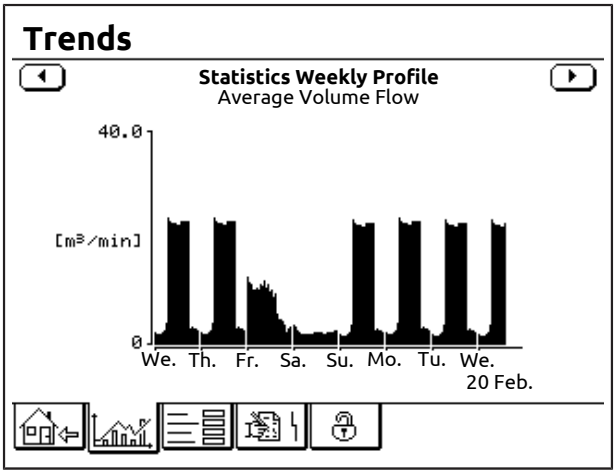


Fig. 4-7: "Statistics Weekly Profile" trend chart

This bar chart shows the average volume flow for the last 8 days.

Volume flow

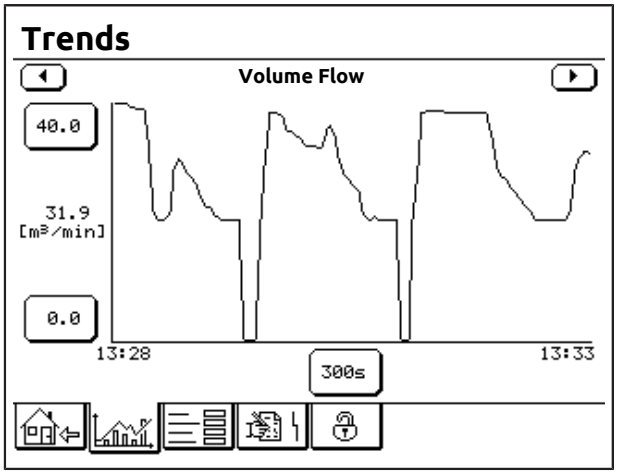


*Fig. 4-8: "Volume Flow" trend chart (Example **RS**)*

This chart shows the volume flow curve over a defined period of time.

Line pressure

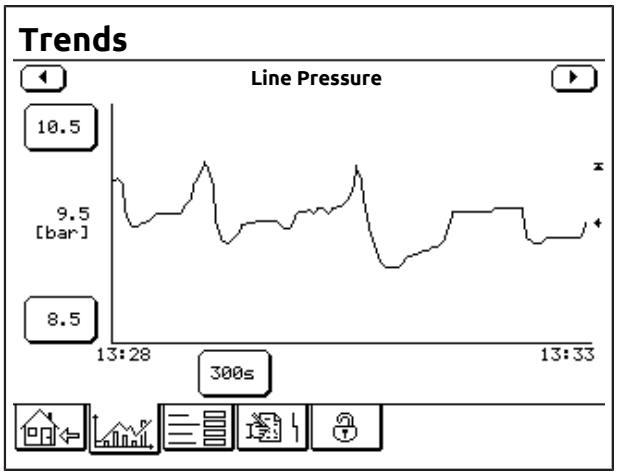


Fig. 4-9: "Line Pressure" trend chart

This chart shows the curve of the pressure in the compressed air network over a defined period of time.

Motor Speed (RS)

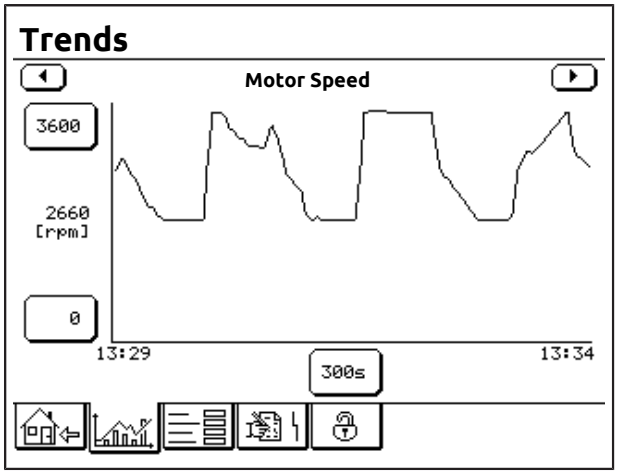


Fig. 4-10: "Motor Speed" trend chart

This chart shows the motor speed curve over a defined period of time.

Contents of line charts

X-axis: time axis.

Y-axis: Parameter value axis; the current value is shown on the left next to the chart.

<Button> on the X-axis: scales the X-axis.

<Button> on the Y-axis: scales the Y-axis.

Scaling the Y-axis

Adjust the upper limit of the chart.

1 Press the <Upper button > of the Y-axis.
   – The "Trend Upper Limit" input menu appears.
2 Press <Numeric keys> to enter the upper limit of the chart.
3 Press the <OK> button.
   – The input is accepted.
   – The Y-axis scale is adjusted accordingly.

The <Cancel> button can be used to cancel the input.

Adjust the lower limit of the chart.

1 Press the <Lower button > of the Y-axis.
   – The "Trend Lower Limit" input menu appears.
2 Press <Numeric keys> to enter the lower limit of the chart.
3 Press the <OK> button.
   – The input is accepted.
   – The Y-axis scale is adjusted accordingly.

The <Cancel> button can be used to cancel the input.

Scaling the X-axis

Adjust the width of the chart.

1 Press the <Button> of the X-axis.
   – The "Trend Time Axis" input menu appears.
2 Press the desired option.
   – The input is accepted.
3 Press the <OK> button.
   – The X-axis scale is adjusted accordingly.

The <Cancel> button can be used to cancel the input.

4.5 "Settings" menu

NOTE

All specific settings should be noted so that they are available when needed (e.g., for setting up a replacement controller).

The settings can be entered in the "Set Values" table attached to these operating instructions.

The "Settings" menu provides a selection of options that can be adjusted individually in order to be able to use the compressor in accordance with the requirements.

The menu is called up via the <Settings> tab.

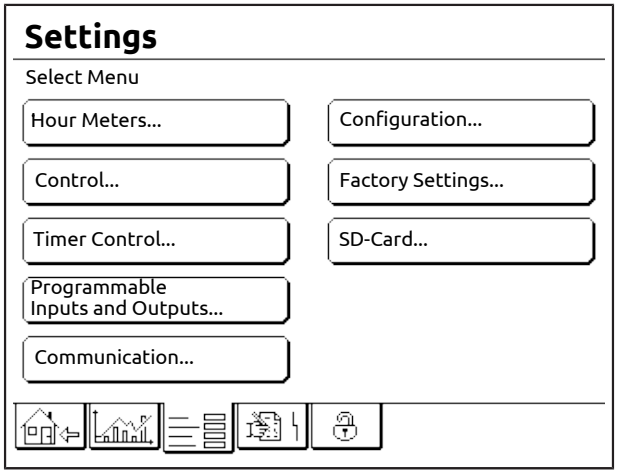


Fig. 4-11: "Settings" menu

The following submenus can be called up from the "Settings" menu:

- "Hour Meters..."; for adjusting service intervals
- "Control..."; for setting up the operating behavior of the compressor
- "Timer Control..."; for setting up the date and time as well as time management
- "Programmable Inputs and Outputs..."; for setting up functions and connected devices
- "Communication..."; for setting up the RS485 interface(s)

- "Configuration..."; for setting up compressor data, language, etc.
- "Factory Settings..."; view for factory customer service
- "SD-Card..."; for switching data recording on and off

Hour Meters

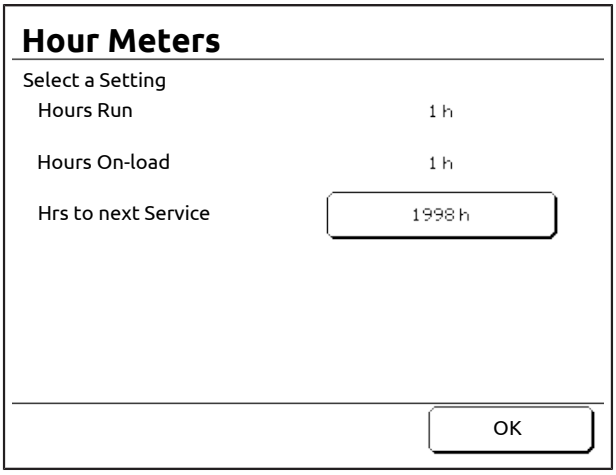


Fig. 4-12: "Hour Meters" submenu

The "Hour Meters" menu displays:

- "Hours Run"; displays number of hours the drive motor has run.
- "Hours On-load"; displays number of hours the compressor has run under load.
- "Hrs to next Service"; displays the time until the next maintenance (service intervall) is due. The time until next service is due can be set by the maintenance personnel. See chapter "Additional operation / Set service interval".

Control

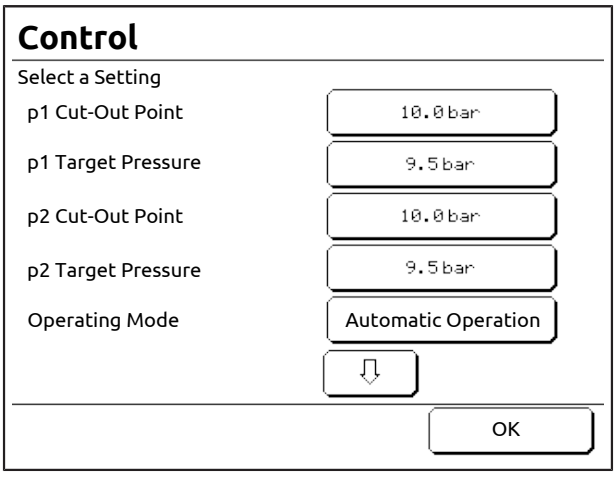


*Fig. 4-13: "Control" submenu (e.g. **RS**)*

In the "Control" menu the operating behavior of the compressor can be set. The following submenus are available.

The arrow keys can be used to scroll down to view additional items.

- "p1 Cut-Out Point"; here the pressure band can be set. See chapter "Configuration / Set Pressure bands".
- "p1 Cut-In Point" (**FS**) / "p1 Target Pressure" (**RS**); here the pressure band can be set. See chapter "Configuration / Set Pressure bands".
- "p2 Cut-Out Point"; here the second pressure band can be set. See chapter "Configuration / Set Pressure bands".
- "p2 Cut-In Point" (**FS**) / "p2 Target Pressure" (**RS**); here the second pressure band can be set. See chapter "Configuration / Set Pressure bands".
- "Operating Mode"; for setting the display language. See chapter "Operation / Operating Modes".
- "Remote Start Enabled"; for enabling the remote start ability. See chapter "Configuration / Remote Start and Stop Setup".
- "Timer Control Enabled"; for enabling timer control operation. See chapter "Configuration / Timer Control Operation".
- "p2 Timer Enabled"; for enabling timer control for the second pressure band. See chapter "Configuration / Timer Control Operation".
- "Auto. Restart Enabled"; for enabling automatic restart after a power loss. See chapter "Configuration / Automatic Restart after Power Loss Settings".
- "- Max. downtime": for setting up behavior for automatic restart after a power loss.
- Behavior"- Restart delay": for setting up behavior for automatic restart after a power loss.
- "Dryer Pre-Run Time"; for setting up the compressor for operation with an external dryer. See chapter "Configuration / Setting the Dryer Pre-Run Time".

Timer Control

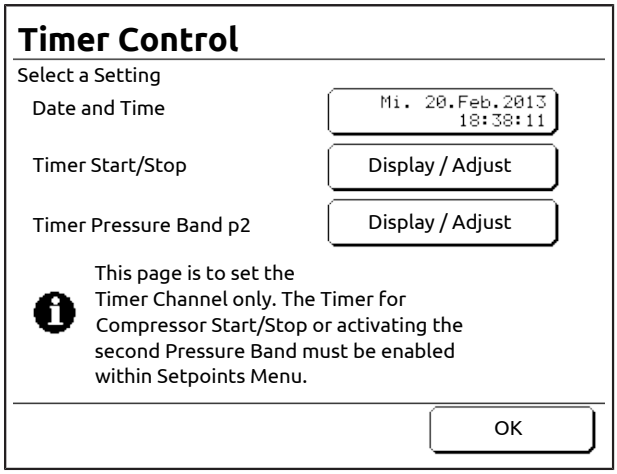


Fig. 4-14: "Timer Control" submenu

Settings for timer control operation as well as settings for date and time can be made in the "Timer Control" menu.

The following submenus are available.

- "Date and Time"; for setting the date and time. See chapter "Configuration / Setting the Date and Time".
- "Timer Start/Stop"; for setting up timer control. See chapter "Configuration / Timer Control Operation".
- "Timer Pressure Band p2"; for setting up timer control in the second pressure band. See chapter "Configuration / Timer Control Operation".

Programmable Inputs and Outputs

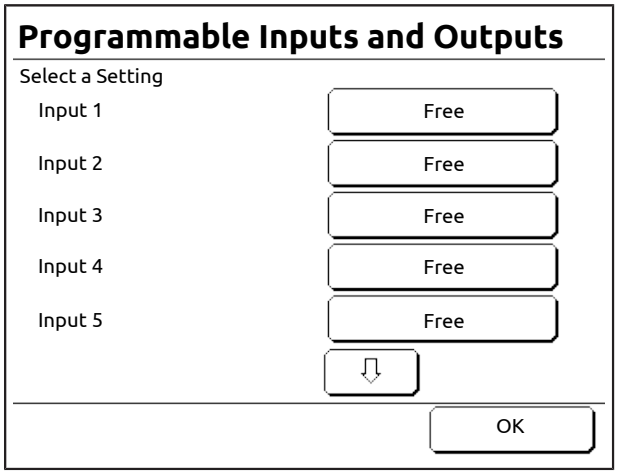


Fig. 4-15: "Programmable Inputs and Outputs" submenu

Programmable inputs can be used to monitor connected devices, or to set up functions that influence the operation of the compressor.

Programmable outputs can be used to transmit status messages from the compressor to an upper-level control room, for example.

The "Programmable Inputs and Outputs" menu is used to assign the inputs and outputs. For details on setting up the inputs and outputs, see chapter "Configuration / Programming Inputs and Outputs".

Communication

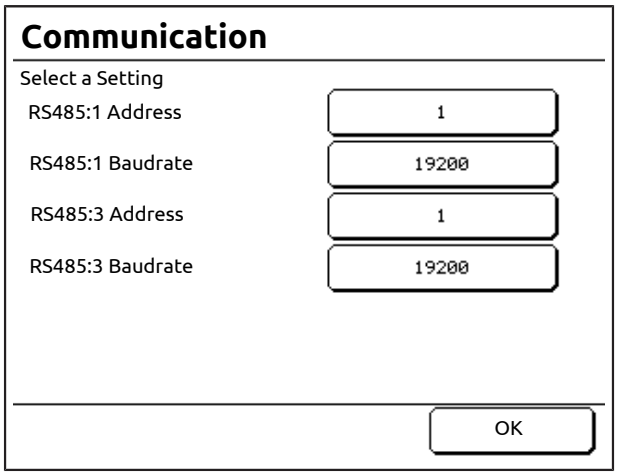


Fig. 4-16: "Communication" submenu

The "Communication" menu can be used to define the communication settings for the RS485 connection (Name: RS485:1). An additional RS485 interface is available as an option (Name: RS485:3).

To set up the interfaces, see chapter "Configuration / Set Up RS485 Communication".

Configuration

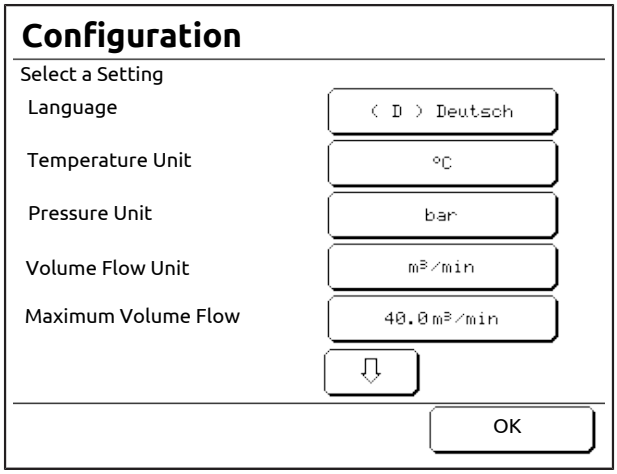


Fig. 4-17: "Configuration" submenu

Compressor data can be set up to preferred units of measure in the "Configuration" menu.

The following submenus are available.

The arrow keys can be used to scroll down to view additional items.

- "Language"; for setting the display language. See chapter "Configuration / Choose Language".
- "Temperature Unit"; for setting the unit of temperature. See chapter "Configuration / Set Units".
- "Pressure Unit"; for setting the unit of pressure. See chapter "Configuration / Set Units".
- "Volume Flow Unit"; for setting the unit of volume flow. See chapter "Configuration / Set Units".
- "Maximum Volume Flow"; for setting the maximum volume flow that is the basis for calculating the volume flow display. This setting has been set to an average value at the factory. Depending on the actual line pressure setting, the value can be finely adjusted here.
- "Minimum Volume Flow" (**RS**); for setting the minimum volume flow that is the basis for calculating the volume flow display. This setting has been set to an average value at the factory. Depending on the actual line pressure setting, the value can be finely adjusted here.
- "Ext. Speed Limit (min)" (**RS**); a programmable input can be used to switch on this adjustable speed limit when needed. See chapter "Configuration / Programmable Inputs".
- "Ext. Speed limit (max)" (**RS**); a programmable input can be used to switch on this adjustable speed limit when needed. See chapter "Configuration / Programmable Inputs".

Factory Settings

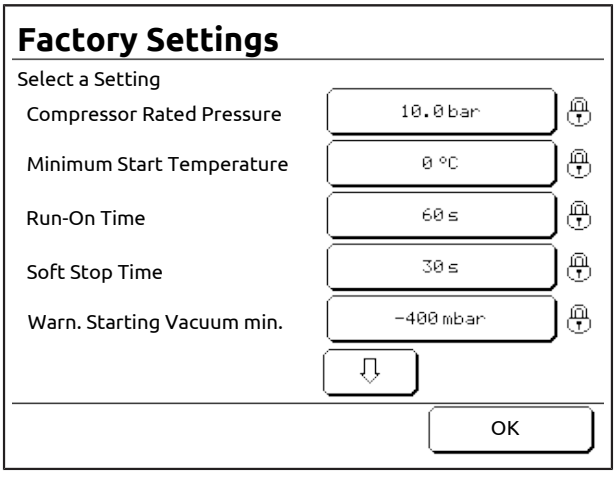


Fig. 4-18: "Factory Settings" submenu

The "Factory Settings" menu shows the controller settings from the factory.

Some values can be changed at the service level; see chapter "Additional Operation / Maintenance Level".

The arrow keys can be used to scroll down to view additional items.

- "Compressor Rated Pressure"; Nominal operating pressure the compressor can generate.
- "Start Protection"; the compressor can be restarted when the pressure in the vessel is below this value.
- "Heavy Startup"; if the pressure in the vessel reaches this level during the startup phase the compressor will be stopped. (compressor without speed control)
- "Discharge Temp. Warning"; warning limit for air temperature at the compressor stage outlet.
- "Discharge Temp. Fault"; if the temperature at the outlet of the compressor stage reached the value set here, then the compressor will be stopped.
- "Minimum Start Temperature"; minimum temperature (jacket cooling water temperature) at which the compressor can be started.
- "Run-On Time"; time that the drive motor runs in Off-Load mode before the compressor is stopped and switched to standby mode.
- "Soft Stop Time"; time that the drive motor runs in Off-Load mode before the compressor is stopped. For manual or remote stop.
- "Star Delta"; star-delta switchover time set at the factory. (compressor without speed control)
- "Cooling Control"; fan controller in idle (thermostatically regulated or continuous mode [Permanent])
- "Software Version"; software version of the controller.
- "Controller Ref.-No."; serial number of the controller.
- "Compressor Ref.-No."; serial number of the compressor.

SD-Card

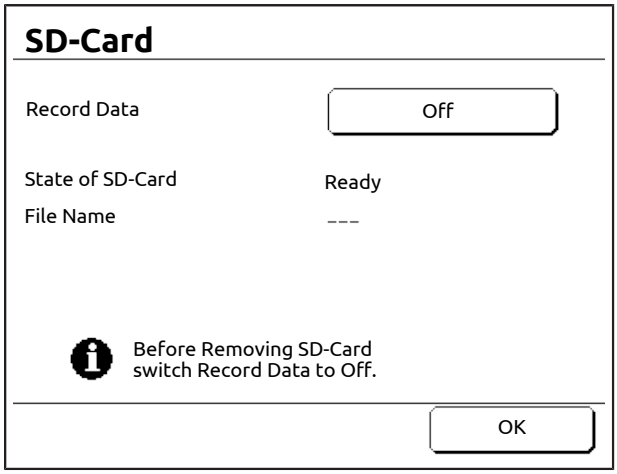


Fig. 4-19: "SD-Card" submenu

The controller has a data recording function (data logger) on an SD-Card.

The data recording function can be switched on and off in this menu. See chapter "Additional Operation / Data Recording".

4.6 "Fault History" menu

The controller saves the last 64 alarms (Faults and Warnings) that have occurred.

The alarms are displayed in a list, with the most recent alarm at the top of the list. If the list exceeds 64 alarms, the oldest alarm at the end of the list will be overwritten.

A flashing symbol to the left of the alarm indicates that this alarm is active (has not yet been reset). The symbol also flashes on the register card <Fault History>.

Fault Overview

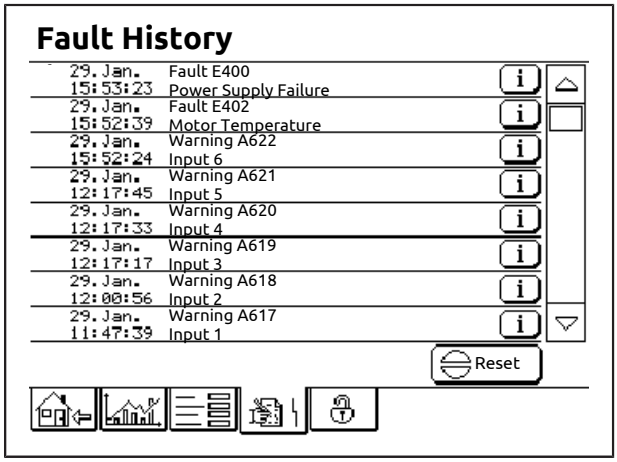


Fig. 4-20: "Fault History" menu

Each alarm is save with the date and time when it occurred.

The arrow keys can be used to scroll through the alarm list.

The <i> button at the right side of the menu line displays the measured values captured at the time of the alarm, in addition to further information about each alarm.

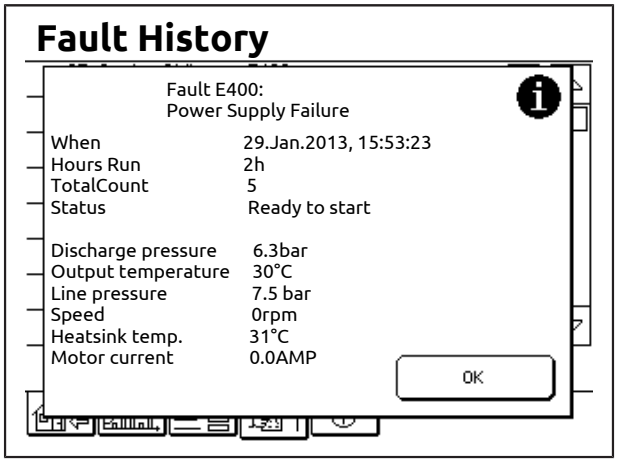


Fig. 4-21: Information about the selected alarm

The arrow keys can be used to scroll through the contents.

Acknowledge alarm

After the cause of the alarm has been corrected, the alarm must be reset in the controller.

1. Correct the cause of the alarm.
2. Press the register card <Fault History>.
3. Press the <Reset> button.

✓ The alarm, or all current alarms, are reset.

- The flashing alarm symbol disappears.
- The symbol stops flashing on the register card <Fault History>.

Alarms that are still present cannot be reset. The alarm symbol and the symbol on the register card <Fault History> continue to flash.

4.7 "Access Code" menu

Codes for special operating options can be entered in the "Access Code" menu.

The following access codes are available to the customer's personnel.

Code	Operating function
1234	Activate and deactivate Base Load Sequencing (option).
3022	Enable and disable user inputs; if disabled, no parameters can be entered.
3091	Enable and disable maintenance level; additional operating functions.

Chart 4-3: Customer access codes

NOTE

The Service level is disabled automatically after five minutes; the controller automatically activates the user level.

Inputting and using access codes

1 Press <Access Code> tab.
   – The "Access Code" input dialog appears.
2 Press <numeric keys> to enter the appropriate access code.
3 Use the <Back> button to make corrections, if required.
4 Press <Enter>.
   – The access code is transmitted to the controller.
   – Associated operating functions are enabled.

In order to reverse the function, enter the same access code again.

5 CONFIGURATION

5.1 Choose Language

1 Press the <Globe Symbol> in the "Home" menu.
   – The "Choose Language" menu appears.

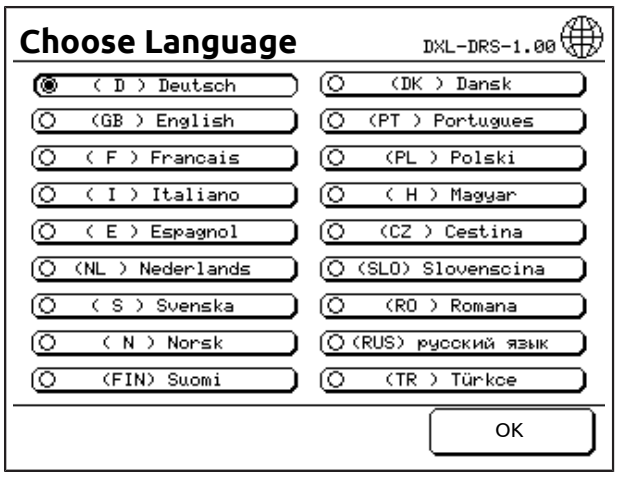


Fig. 5-1: "Choose Language" menu

2 Press the <Button> for the desired language.
   – The screen language has been preselected.
3 Press the <OK> button.
✓ The screen language is switched to the chosen language.

NOTE

The language can also be chosen via "Settings" / "Configuration" / "Language".

1 Press the register card <Settings>.
   – The "Settings" appears.
2 Press the <Configuration> button.
   – The "Configuration" menu appears.
3 Press the <Language> button.
   – The "Choose Language" menu appears.
4 Press the <Button> for the desired language.
   – The screen language has been preselected.
5 Press the <OK> button.
✓ The screen language is switched to the chosen language.

5.2 Set the Date and Time

1 Press the register card <Settings>.
   – The "Settings" appears.

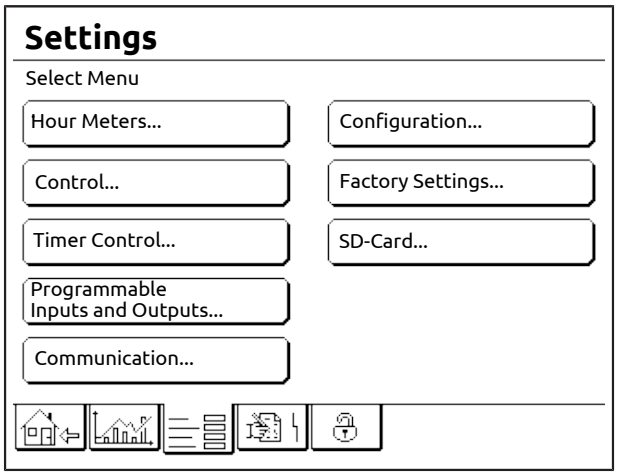


Fig. 5-2: "Settings" menu

2 Press the <Timer Control...> button.
   – The "Timer Control" menu appears.

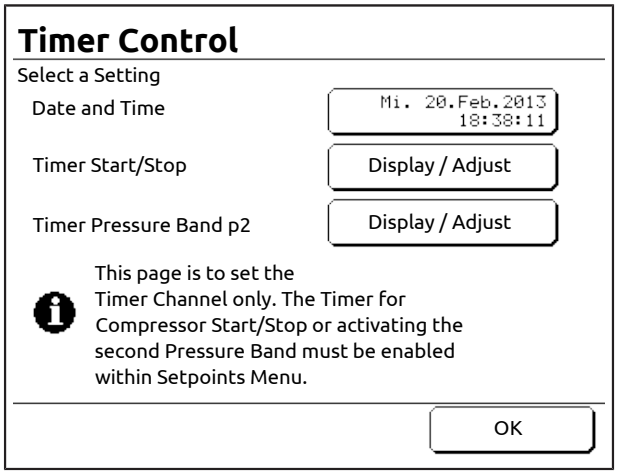


Fig. 5-3: "Timer Control" menu

3 Press the <Date and Time> button.
   – The "Date and Time" input dialog appears.

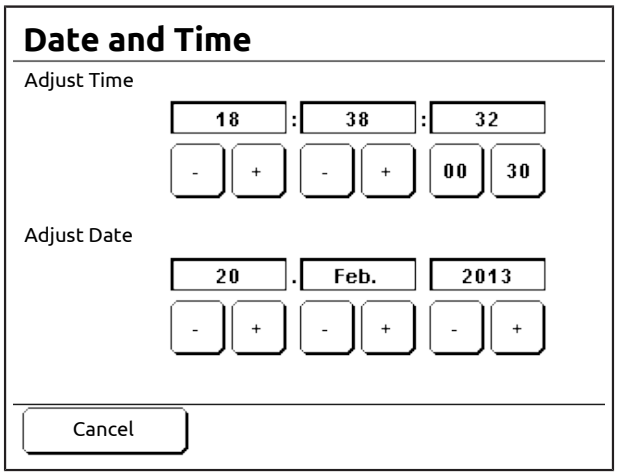


Fig. 5-4: "Date and Time" input dialog

4 Set the Date and Time using the <+> and <-> buttons.
   – As soon as a button is pressed, the <OK> button is displayed.

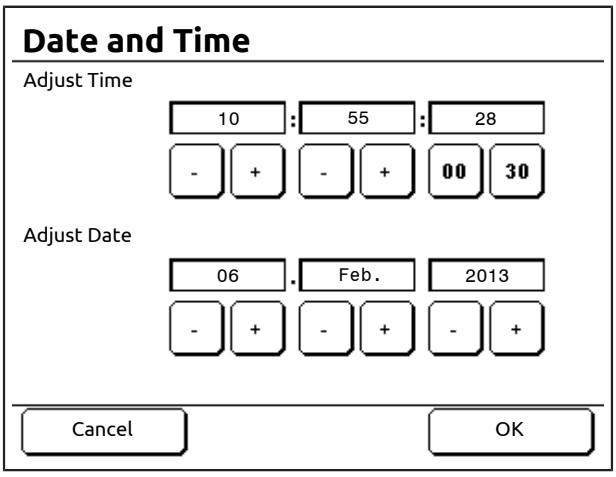


Fig. 5-5: "Date and Time" input dialog

The <Cancel> button can be used to cancel setting the Date and Time.
The previously active Time and the Date are used.

5 Press the <OK> button.

✓ The set Time and Date are saved.

NOTE

In order to simplify synchronization of the time with an external time source, the seconds can be set to "00" or "30".
They do not start to run until the <OK> button is touched.

5.3 Setting units of measure

Set temperature unit

1 Press the register card <Settings>.
   – The "Settings" appears.

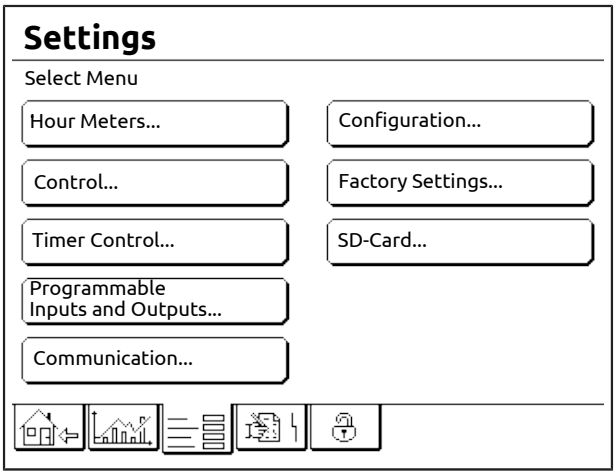


Fig. 5-6: "Settings" menu

2 Press the <Configuration> button.
   – The "Configuration" menu appears.

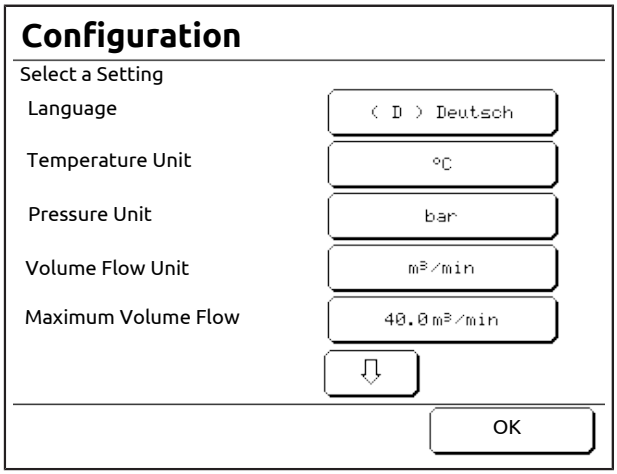


Fig. 5-7: "Configuration" menu

3 Press the <Temperature Unit> button
   – The "Temperature Unit" input menu appears.

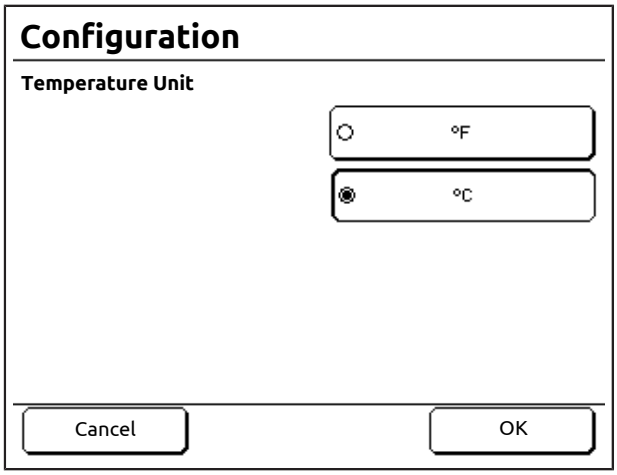


Fig. 5-8: "Temperature Unit" input menu

4 Press the <°F> or <°C> button to select the temperature unit.

5 Press the <OK> button.

✓ The temperature unit has been set.

Set pressure unit

1 Press the register card <Settings>.
   – The "Settings" appears.

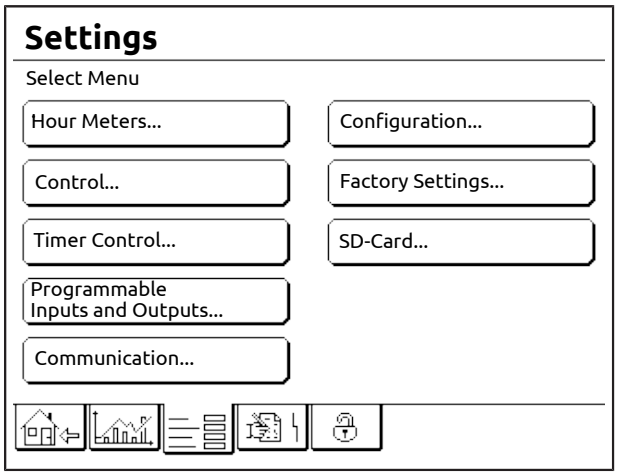


Fig. 5-9: "Settings" menu

2 Press the <Configuration> button.

– The "Configuration" menu appears.

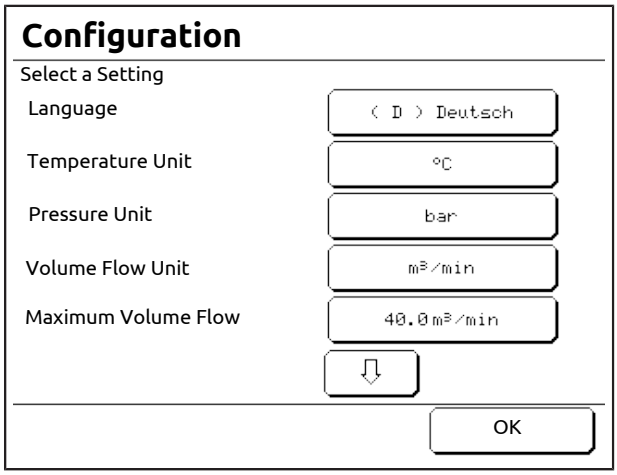
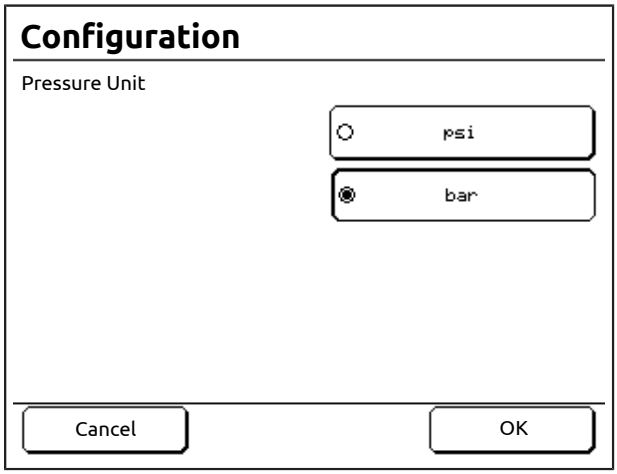


Fig. 5-10: "Configuration" menu

3 Press the <Pressure Unit> button.

– The "Pressure Unit" input menu appears.



4 Press the <bar> or <PSI> button to select the pressure unit.

5 Press the <OK> button.

✓ The pressure unit has been set.

Set the Volume Flow unit

1 Press the register card <Settings>.

– The "Settings" appears.

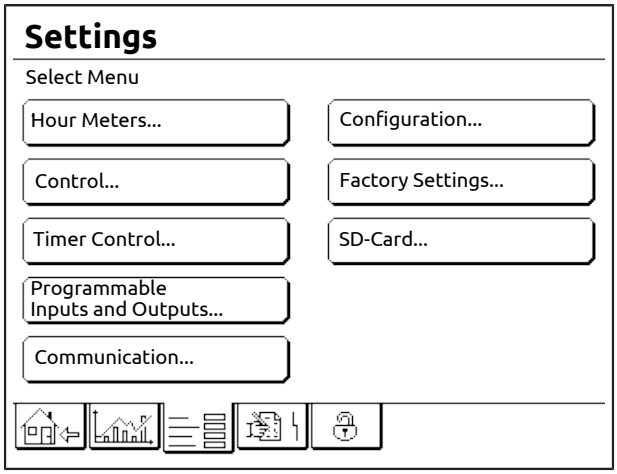


Fig. 5-11: "Settings" menu

2 Press the <Configuration> button.

– The "Configuration" menu appears.

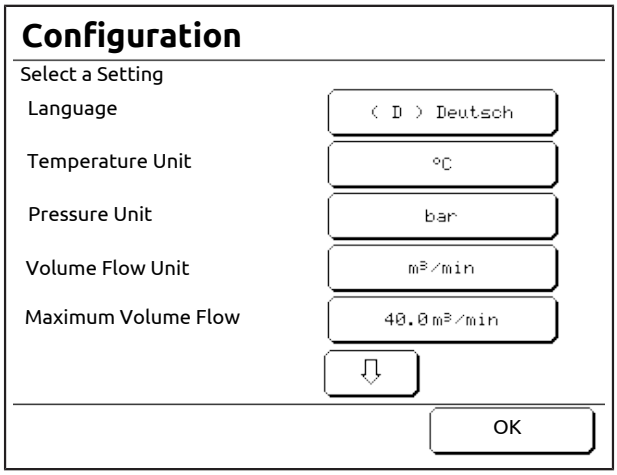
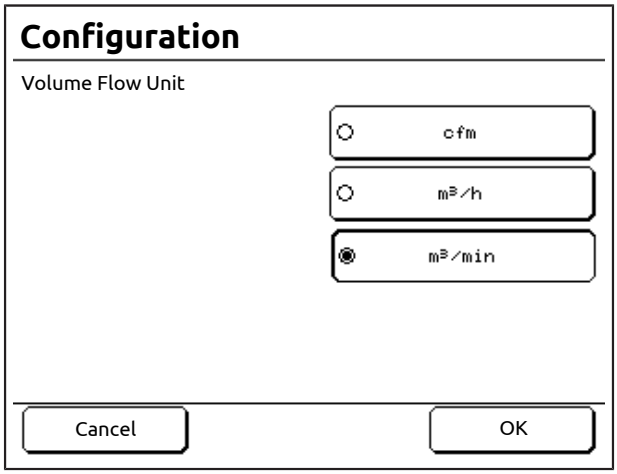


Fig. 5-12: "Configuration" menu

3 Press the <Volume Flow Unit> button.

– The "Volume Flow Unit" input menu appears.



4 Press the <cfm>, <m³/h>, or <m³/min> to select the Volume Flow unit.

5 Press the <OK> button.

✓ The Volume Flow unit has been set.

5.4 Additional settings

5.4.1 Setting pressure bands

Pressure bands

The range between the lower and upper pressure values is referred to as the pressure band.

Two pressure bands are available. They are referred to as "p1" and "p2".

- "p1" is the normal pressure band that is used as standard.
- "p2" is a second pressure band that can be used if a different line pressure is required.

Pressure bands for compressors with speed control (RS)

For **RS** compressors, the controller sets the motor speed to match it precisely to the compressed air demand.

There are two pressure settings:

- Upper pressure value ("p1 Cut-Out Point" / "p2 Cut-Out Point"). The upper pressure value is the pressure at which the compressor stops supplying air and switches to Off-Load mode.
- Lower pressure value ("p1 Target Pressure" / "p2 Target Pressure"). The lower pressure value is the pressure that is to be held constant in the compressed air network.

Example:

- p1 Cut-Out Point: 10.0 bar
- p1 Target Pressure: 9.5 bar

The speed of the compressor varies between the minimum and the maximum in order to maintain the p1 Target Pressure of 9.5 bar.

When the line pressure reaches the upper pressure value of 10.0 bar, the compressor switches to Off-Load mode, the run-on timer is activated, and the compressor is switched to standby mode after the run-on timer has expired.

Setting the pressure band p1 for compressors with speed control (RS)

1 Press the <Settings> tab.

– The "Settings" menu appears.

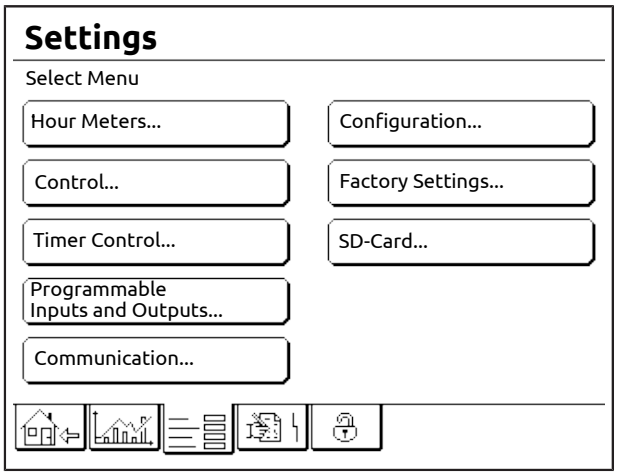


Fig. 5-13: "Settings" menu

2 Press the <Control...> button.

– The "Control" menu appears.

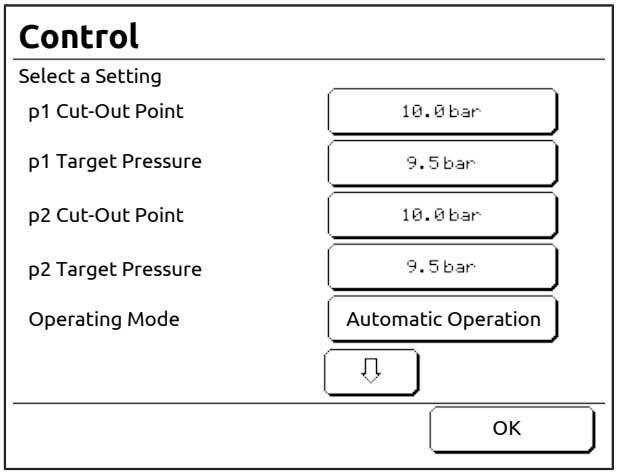


*Fig. 5-14: "Control menu (**RS**)*

3 Press the <p1 Target Pressure> button.

– The "p1 Target Pressure" input menu appears.

4 Press <numeric keys> to input the pressure value.

The <Cancel> button can be used to cancel setting the pressure value.
The previously active pressure value is used.

5 Press the <OK> button.

– The set pressure value is saved.

– The display returns to the previous "Control" menu.

6 Press the <p1 Cut-Out Point> button.

– The "p1 Cut-Out Point" input menu appears.

7 Press <numeric keys> to input the pressure value.

NOTE

The difference between the upper and lower pressure limits may not be less than 0.3 bar (lockout).

The difference between the upper and lower pressure limits should not be less than 0.5 bar (recommended).

The <Cancel> button can be used to cancel setting the pressure value.
The previously active pressure value is used.

8 Press the <OK> button.
- The set pressure value is saved.
- The display returns to the previous "Control" menu.

✓ The pressure band p1 is set.

Setting the pressure band p2 for compressors with speed control (RS)

The p2 pressure band is set in the same way as described for p1, except that the buttons for p2 are used instead of those for p1.

Pressure bands for compressors with fixed speed (FS)

For FS compressors, the suction regulator manages the On-Load/Off-Load controls in order to provide the required amount of compressed air.

There are two pressure settings:

- Upper pressure value ("p1 Cut-Out Point" / "p2 Cut-Out Point"). The upper pressure value is the pressure at which the compressor switches to Off-Load mode.
- Lower pressure value ("p1 Cut-In Point" / "p2 Cut-In Point"). The lower pressure value is the pressure at which the compressor switches to on-load mode.

Example:

- p1 Cut-Out Point: 10.0 bar
- p1 Cut-In Point: 9.5 bar

The compressor switches between On-Load and Off-Load in order to maintain the Line Pressure between the two pressure values.

When the Line Pressure reaches the upper pressure limit value of 10 bar, the suction regulator closes and the compressor switches to Off-Load mode, so that it no longer provides compressed air. The run-on timer is activated, and the compressor is switched to standby mode after the run-on timer has expired.

When the line pressure reaches the lower pressure limit value of 9.5 bar (Pressure Demand), the suction regulator opens and the compressor switches to On-Load mode, so that it provides compressed air again.

Setting pressure band p1 for compressors with fixed speed (FS)

1 Press the <Settings> tab.
- The "Settings" menu appears.

2 Press the <Control...> button.
- The "Control" menu appears.

3 Press the <p1 Cut-In Point> button.
- The "p1 Cut-In Point" input menu appears.

4 Press <numeric keys> to input the pressure value.

The <Cancel> button can be used to cancel setting the pressure value. The previously active pressure value is used.

5 Press the <OK> button.
- The set pressure value is saved.
- The display returns to the previous "Control" menu.

6 Press the <p1 Cut-Out Point> button.
- The "p1 Cut-Out Point" input menu appears.

7 Press <numeric keys> to input the pressure value.

The <Cancel> button can be used to cancel setting the pressure value. The previously active pressure value is used.

8 Press the <OK> button.
- The set pressure value is saved.
- The display returns to the previous "Control" menu.

✓ The pressure band p1 is set.

Setting pressure band p2 for compressors with fixed speed (FS)

The p2 pressure band is set in the same way as described for p1, except that the buttons for p2 are used instead of those for p1.

Assign the source for pressure band control

The source for pressure band control can be changed using p2 Timer Control and programmable inputs. See chapter "Configuration / Timer Control Operation" and chapter "Configuration / Program Inputs and Outputs".

5.4.2 Program Inputs and Outputs

NOTICE

Property damage

⇨ Only potential-free contacts may be connected to the terminal strip.
Outside voltages can destroy the controller.

⇨ The potential-free contacts may not be any further than 20 meters from the terminal strip.
If necessary, coupling relays must be installed in the electrical enclosure.

5.4.2.1 Programmable Inputs

The controller has programmable inputs. The number of inputs can vary according to the configuration of the compressor. See circuit diagram.

NOTE

Programmable inputs may already be taken up by factory accessories or special equipment. The included electrical schematic can be used to check which inputs are available.

If factory monitors are installed and connoted to programmable inputs, the corresponding settings must not be changed, as otherwise the monitors will no longer function.

Inputs can be assigned in order to

- monitor conditions or devices when the contacts for the corresponding terminals are opened.
- activate functions when the contacts of corresponding terminals are closed.

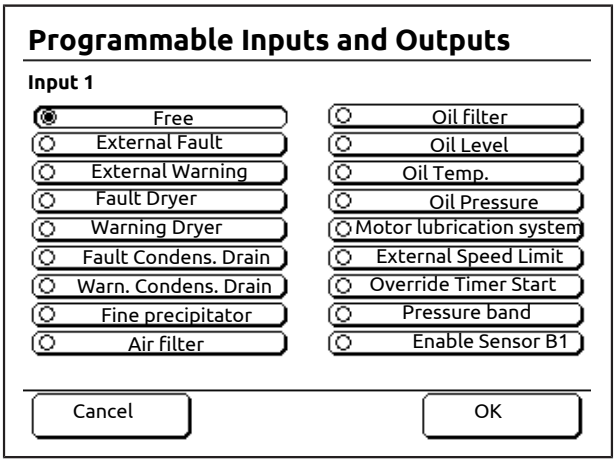


*Fig. 5-15: "Programmable Inputs and Outputs" menu for Input 1 (**RS**)*

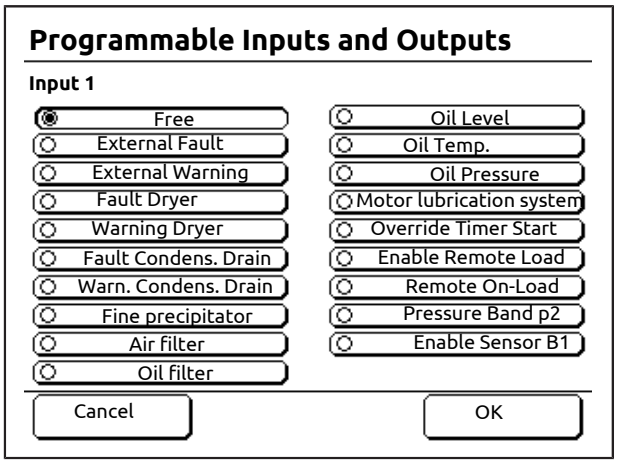


*Fig. 5-16: "Programmable Inputs and Outputs" menu for Input 1 (**FS**)*

The programmable inputs can be assigned to the functionalities described below.

NOTE

If a programmable input is activated, that is, electrically closed, but there is no monitor or function assigned to the input, then the message "Input x" is shown on the display.

See warnings A617-A622 in chapter "Fault correction".

Free

The input has no function whatsoever.

External Fault

If the device connected to the input sends a control signal (contact opens in case of error), the message "E412:External Fault" is shown on the display. The compressor switches off. Application example: An important device in the customer's compressed air network (e.g., a sensor on the customer's downstream compressed air service unit on-site) reports an error.

See the operating instructions for the connected device.

External Warning

If the device connected to the input sends a control signal (contact opens in case of error), the message "A615: External Warning" is shown on the display. The compressor does not switch off. Application example: An important device in the customer's compressed air network (e.g., a sensor on the customer's downstream compressed air service unit on-site) reports an error.

See the operating instructions for the connected device.

Fault Dryer

If the dryer connected to the input sends a fault message (contact opens in case of error), the message "E413:Dryer" is shown on the display. The compressor switches off.

See the operating instructions for the dryer.

Warning Dryer

If the dryer connected to the input sends a warning message (contact opens in case of error), the message "A608:Dryer" is shown on the display. The compressor does not switch off.

See the operating instructions for the dryer.

Fault Condens. Drain.

If the condensate drain connected to the input sends a fault message (contact opens in case of error), the message "E414: Extern. Condensate Drain" is shown on the display. The compressor switches off.

See the operating instructions for the condensate drain.

Warn. Condens. Drain.

If the condensate drain connected to the input sends a warning message (contact opens in case of error), the message "A609: Extern. Condensate Drain" is shown on the display. The compressor does not switch off.

See the operating instructions for the condensate drain.

External Speed Limit (RS)

This function can be used to temporarily limit the upper and lower speed of the drive motor, for example to limit the maximum supply quantity or power consumption as needed.

Fine precipitator

This optional monitoring function displays the warning message "A610:Air filter" if the differential pressure switch on the fine precipitator indicates that it needs to be replaced.

Air filter

This optional monitoring function displays a warning message "A611:Air Filter" if the differential pressure switch on the air filter indicates that it needs to be replaced.

Oil filter

This optional monitoring function displays a warning message "A612:Oil Filter" if the differential pressure switch on the oil filter indicates that it needs to be replaced.

Oil level

This function, in combination with a level switch, checks the oil level during on-load phase. If the oil level is too low, the warning message "A613:Oil level low" appears.

Oil temperature

If this optional switch contact is opened, a warning message "A614:Oil temperature high" is displayed.

Oil Pressure

If the pressure switch connected to the input switches to an oil pressure that is too low (contact opens in case of fault), the message "E411:Oil pressure low" is shown on the display. The compressor switches off.

Motor lubrication system (if automatic motor lubrication system is available)

This option can be selected in order to monitor the operation of automatic motor lubrication systems. If the grease is used up or some other error occurs, this leads to a warning message "A616411:Motor lubrication system".

Setting up the "External Speed Limit (rpm limit)" function

1. Set the desired min/max values in the "Settings / Configuration" menu.
2. Assign one input to this function. See chapter "Program input".

As soon as the input is closed, the speed of the drive motor remains within the desired range.

Override Timer Start

If the compressor has been switched off due to the settings in the "Timer Start/Stop" menu (see chapter "Timer Control Mode Operation"), this function overrides the Timer Control and switches the compressor on again as long as the input is activated.

This allows the maintenance personnel, for example, to start the compressor on a weekend, when the timer control would normally switch the compressor off.

Pressure Band p2

This function switches the pressure band to pressure band p2.

When this function is active, the "Home" menu ("Current pressure band" area) shows that pressure band p2 is being used and has been activated by a programmable input. The number of the programmable input is also shown.

Enable Sensor B1

From the factory, the signal for switching the compressor between On-Load and Off-Load comes from the line pressure sensor B1.

If the input is open, the compressor is switched to Off-Load. If the input is closed, the sensor regulates switching the compressor between On-Load and Off-Load operation.

Enable Remote Load (FS)

If the input is closed, the On-Load/Off-Load control is handled solely by the "Remote Load" function described below.

Remote Load (FS)

The "Remote On-Load and Off-Load" function allows an FS compressor to be switched between On-Load and Off-Load by a control room, for example. Condition: "Enable Remote Load" is activated.

See chapter "Configuration / Remote On-Load and Off-Load (FS)".

5.4.2.2 Conditions linked to programmable inputs

The following table contains a list of conditions that must be met before the controller initiates the associated event.

Monitoring	Condition
External Fault	Time >1 s
External Warning	Time >1 s
Fault Dryer	Time >1 s
Warning Dryer	Time >1 s
Fault Condens. Drain.	Line Pressure >1.0 bar and time >250 s
Warn. Condens. Drain	Line Pressure >1.0 bar and time >250 s
Oil Separator	Time >30 s
Air filter	Time >30 s
Oil filter	Time >30 s
Oil Level	Time > 60 s (only during the load phase)
Oil Temp.	Time >30 s
Oil Pressure	Time > 30 s (only during the load phase)

Chart 5-1: Conditions linked to programmable inputs

5.4.2.3 Programming inputs

1 Press the <Settings> tab.
   – The "Settings" menu appears.
2 Press the <Programmable Inputs and Outputs> button.
   – The "Programmable Inputs and Outputs" menu appears.

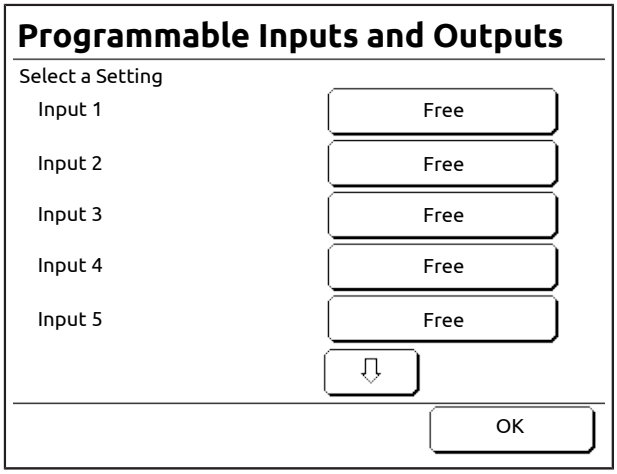


Fig. 5-17: "Programmable Inputs and Outputs" menu

3 Press the<Input x> button for the desired input.
   – The "Programmable Inputs and Outputs" menu for the selected input appears.

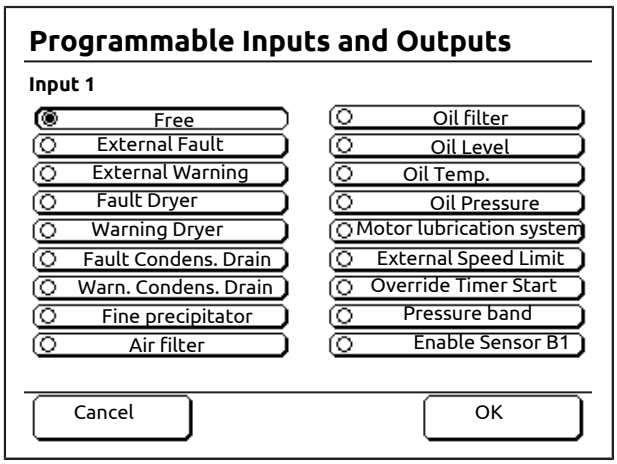


*Fig. 5-18: "Programmable Inputs and Outputs" menu for Input 1 (e.g. **RS**)*

4 Press the <Button> for the desired input function.

   The <Cancel> button can be used to cancel the selection of the input function. The function previously assigned to the input is used.

5 Press the <OK> button.

✓ The input has been programmed.

The other free inputs can be programmed in the same way.

5.4.2.4 Programmable Outputs

The controller has programmable outputs. The number of outputs can vary according to the configuration of the compressor. See the electrical schematic.

NOTE

Programmable outputs may already be taken up by factory accessories or special equipment. The included electrical schematic can be used to check which outputs are available.

Inputs can be assigned to

- Activate functions or devices (e.g., warning lights in a control center) if the corresponding contacts are closed.

NOTICE

Property damage

⇨ Max. current / max. voltage per relay output: 1 A at 240 V.

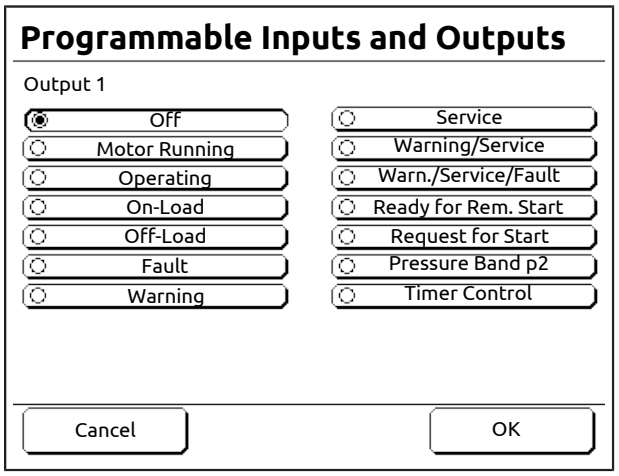


Fig. 5-19: "Program Inputs/Outputs" menu for Output 1

Off

The output remains deactivated permanently.

Motor Running

The output is activated if the drive motor is running.

Operating

The output is activated if the compressor is Operating (On-Load, Off-Load, or Standby).

On-Load

The output is activated if the compressor is in On-Load mode.

Off-Load

The output is activated if the compressor is in Off-Load mode.

Fault

The output is activated as long as there is no fault. The output is deactivated if a fault has occurred.

Warning

The output is activated as long as there is no warning. The output is deactivated if a warning has occurred.

Service

The output is activated as long as there is no service. The output is deactivated if service is due or past due. The activation is initiated if the next service is due in less than 200 hours.

Warning / Service

The output is activated as long as there is no service and no warning. The output is deactivated if a warning occurs or a service is due (combined message).

Warn./Service/Fault

The output is activated as long as there is no service, no warning, and no fault. The output is deactivated if a warning or fault occurs or a service is due (combined message).

Ready for Rem. Start

The output is activated if the controller has been programmed for remote start and all conditions for remote start have been met.

Request for Start

The output is activated if the compressor would like to start and is waiting for the "Start Requ. Approval" via a corresponding input.

Pressure Band p2

Indicates that the control is currently using pressure band p2.

The pressure band p2 is activated either by the Timer Control p2 or by a programmable input.

Timer Control

Indicates that "Timer Start Enabled" is switched on and the timer schedule is enabled. The compressor runs if it within the time window and ON has been set.

5.4.2.5 Program output

1 Press the register card <Settings>.

– The "Settings" appears.

2 Press <Program Inputs/Outputs> button.

– The "Program Inputs/Outputs" menu appears.

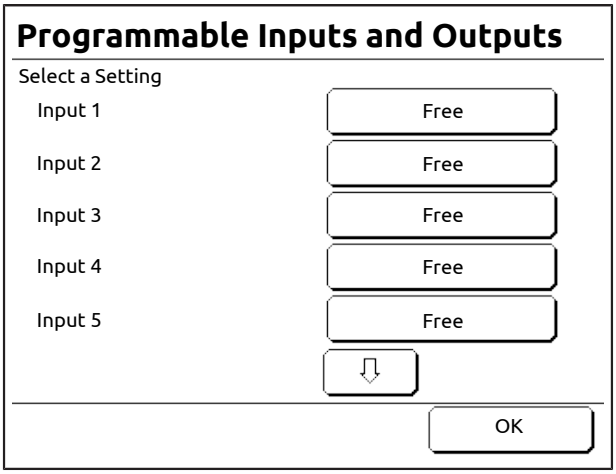


Fig. 5-20: "Program Inputs/Outputs" menu

3 <Press the Arrow Key> until the desired output appears.

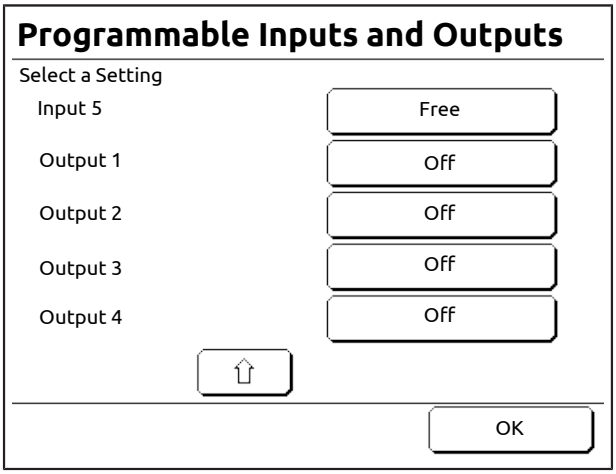


Fig. 5-21: "Program Inputs/Outputs" menu

4 Press the <Output x> button for the desired output.

– The "Program Inputs/Outputs" menu appears for the selected output.

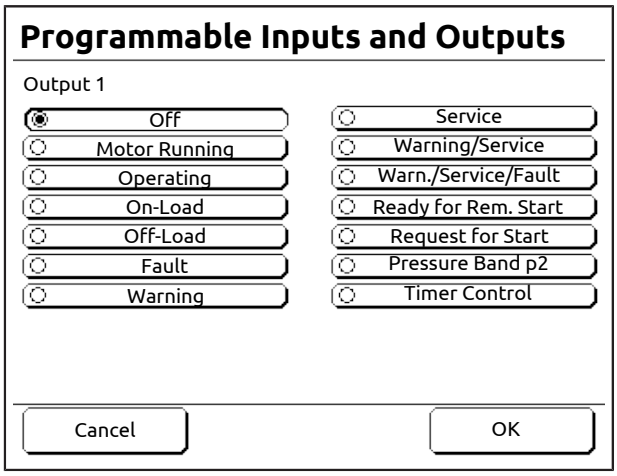


Fig. 5-22: "Program Inputs/Outputs" menu for Output 1

5 Press the <button> for the desired output function.

The <Cancel> button can be used to cancel the selection of the output function. The function previously assigned to the output is used.

6 Press the <OK> button.

✓ The output has been programmed.

The other free outputs can be programmed in the same way.

5.4.3 Timer Control

5.4.3.1 Starting and Stopping with Timer Control

The controller can be programmed so that the compressor is automatically started and stopped at certain times.

Three steps are necessary for this:

1. Define the switch-on and switch-off times.

2. Enable Timer Control mode in the "Controls" menu.

3. Press the Start button < I > (start up the compressor).

Example

A plant works two shifts, with the day shift starting at 8:00 a.m. and ending at 4:00 p.m.

The late shift starts at 5:00 p.m. and ends at 1:00 a.m.

The work week is 5 days; no work is done on weekends.

Program the controller as follows:

- The compressor starts at 7:50 a.m.
- The compressor stops at 4:10 p.m.
- The compressor starts at 4:50:00 PM a.m.
- The compressor stops at 1:10 p.m.

5.4.3.2 Set the start and stop times for the compressor

The previous example is used to illustrate setting the starting and stopping times for the compressor.

1 Press the register card <Settings>.

– The "Settings" appears.

2 Press the <Timer Control...> button.

– The "Timer Control" menu appears.

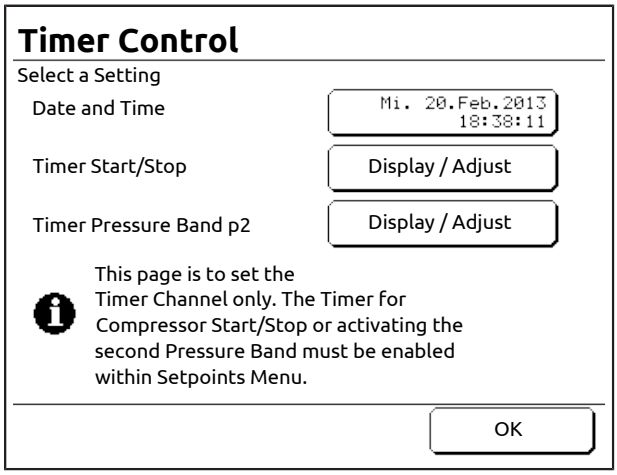


Fig. 5-23: "Timer Control" menu

3 Press the <Timer Start/Stop> button.

– The "Timer Start/Stop" menu appears.

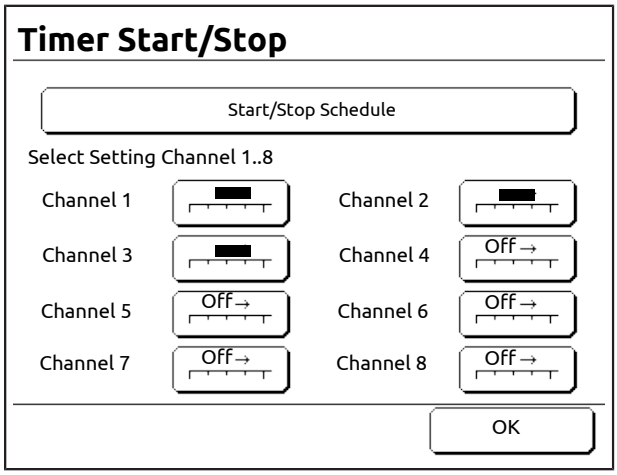


Fig. 5-24: "Timer Start/Stop" menu (state after programming)

The shows an overview of the Timer Control channels.
Each Timer Control channel controls a compressor switch-on time and a compressor switch-off time that can be set for one or more Days of the Week.

Programming the compressor for the day shift

1 Press the <Channel 1> button.

– The input menu for setting the start time, end time, and Day of the Week appears.

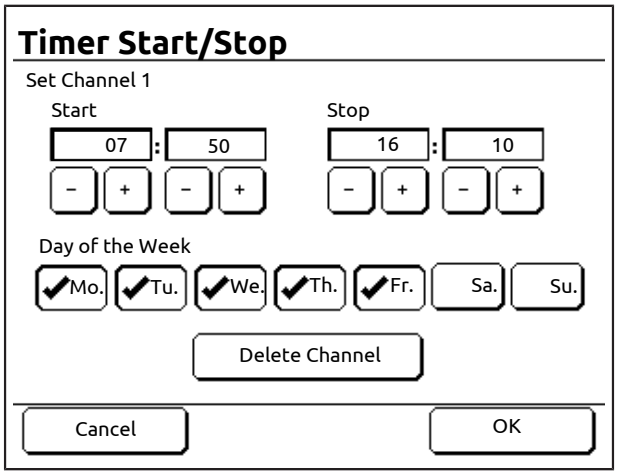


Fig. 5-25: "Timer Start/Stop" input menu for Timer Control Channel 1 (state after programming)

2 Press the <+> and <-> buttons to set the start and end times.

3 Press the <Day of the Week> button to set the Days of the Week for which the time settings will apply.

The <Delete Channel> button deletes all of the entries.

The <Cancel> button cancels the entry. The functionality previously assigned to the Timer Control channel is used.

4 Press the <OK> button.

– The entry is saved.

– The "Timer Start/Stop" menu appears.

Programming the compressor for the late shift

1 Press the <Channel 2> button.

– The input menu for setting the start time, end time, and Day of the Week appears.

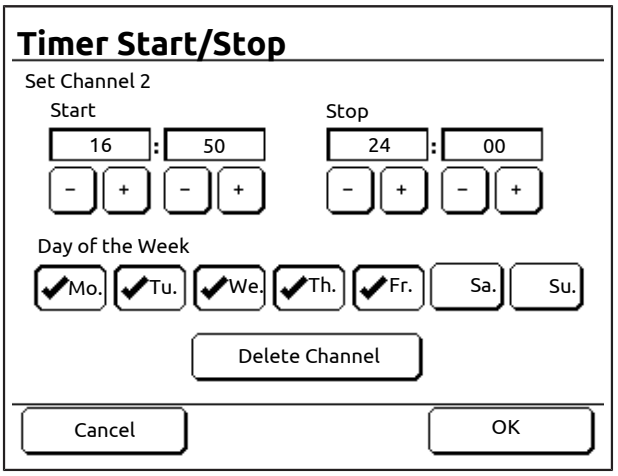


Fig. 5-26: "Timer Start/Stop" input menu for Timer Control Channel 2 (state after programming)

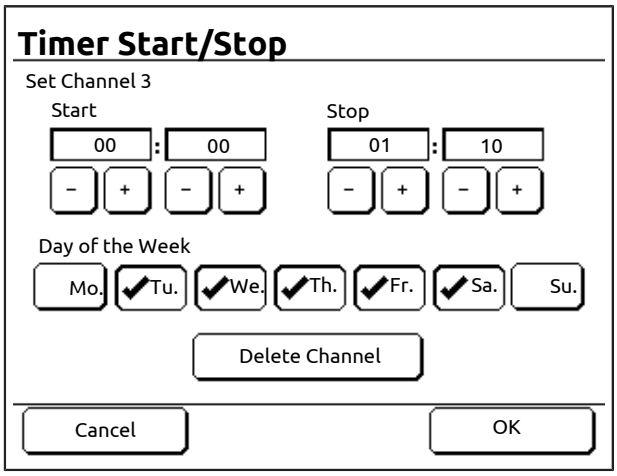


Fig. 5-27: "Timer Start/Stop" input menu for Timer Control Channel 3 (state after programming)

2 Press the <+> and <-> buttons to set the start and end times.

3 Press the <Day of the Week> button to set the Days of the Week for which the time settings will apply.

The <Delete Channel> button deletes all of the entries.

The <Cancel> button cancels the entry. The functionality previously assigned to the Timer Control channel is used.

4 Press the <OK> button.

– The entry is saved.

– The "Timer Start/Stop" menu appears.

Programming the additional Timer Control channel required

Each Timer Control channel can cover only one range from 12:00 midnight to 12:00 midnight. An additional Timer Control channel is required for the required time period from 12:00 midnight to 1:10 a.m.

1 Press the <Channel 3> button.

– The input menu for setting the start time, end time, and Day of the Week appears.

2 Press the <+> and <-> buttons to set the start and end times.

3 Press the <Day of the Week> button to set the Days of the Week for which the time settings will apply.

The <Delete Channel> button deletes all of the entries.

The <Cancel> button cancels the entry. The functionality previously assigned to the Timer Control channel is used.

4 Press the <OK> button.

– The entry is saved.

– The "Timer Start/Stop" menu appears.

Start/Stop Schedule

The "Start/Stop Schedule" overview makes it possible to show the settings in a graphical summary.

1 Press the register card <Settings>.

2 Press the <Timer Control...> button.

3 Press the <Timer Start/Stop> button.

4 Press the <Start/Stop Schedule> button.

– The "Start/Stop Schedule" image appears.

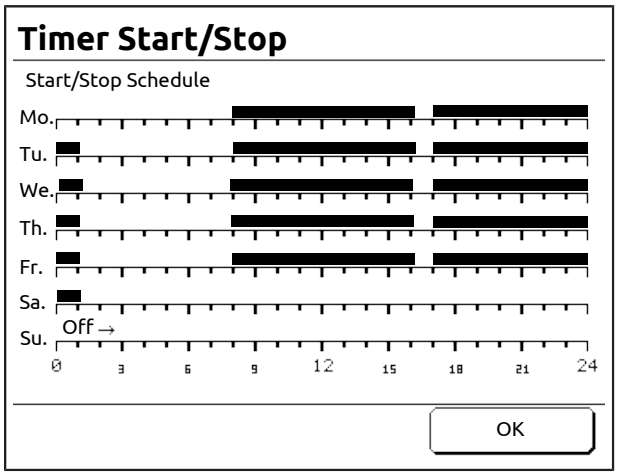


Fig. 5-28: Overview of Timer Control channel settings (state after programming)

The "Start/Stop Schedule" overview shows the hours from 12:00 midnight to 12:00 midnight for each day along the X-axis, and the days of the week along the Y-axis. The highlighted ranges show the programmed Timer Control channels (time window).

5.4.3.3 Activate Timer Control mode

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 <Press the Arrow Key> until the <Timer Start Enabled> button is visible.

4 Press the <Timer Start Enabled> button

– The "Timer Start Enabled" appears.

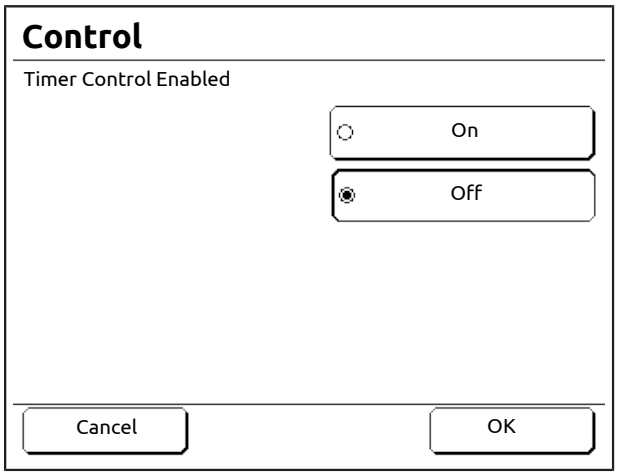


Fig. 5-29: "Timer Start Enabled" menu

5 Press the <On> button.

The <Cancel> button can be used to cancel the enabling of Timer Control mode. The previously active setting is used.

6 Press the <OK> button.

✓ Timer Control mode is activated.

– The "Home" menu shows that "Timer Start Enabled" is activated.

The Timer Control mode can be deactivated again with the <Off> button in the "Timer Start Enabled" menu.

7 Press the start button < I >.

– The compressor is switched ON (set in operation).

– The compressor runs if it within the time window.

5.4.3.4 Setting the Timer Control for operation in pressure band p2

The second pressure band can be selected via "Timer Pressure Band p2" under time control.

Example

Alternatively to the previous example, instead of completely shutting down the compressor, a reduced pressure is to be maintained for the period from 4:10 p.m. to 4:50 p.m. The Timer Control p2 is set as follows for this case:

Programming the second pressure band

1 Press the register card <Settings>.

– The "Settings" appears.

2 Press the <Timer Control...> button.

– The "Timer Control" menu appears.

3 Press the <Timer Pressure Band p2> button.

– The "Timer Pressure Band p2" menu appears.

4 Press the <Channel 1> button.

– The input menu for setting the start time, end time, and Day of the Week appears.

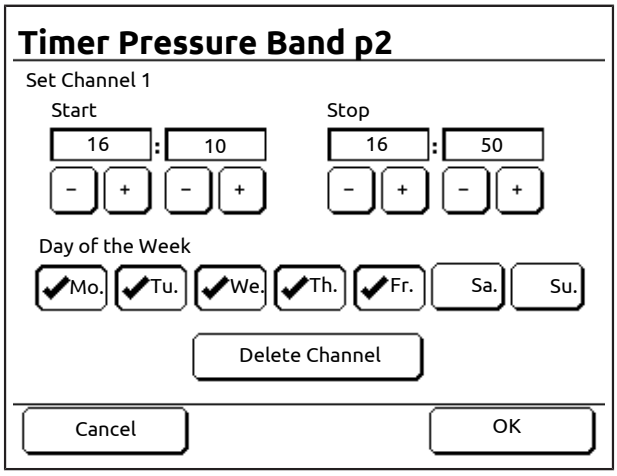


Fig. 5-30: "Timer Pressure Band p2" input menu for Timer Control Channel 1 (state after programming)

5 Press the <+> and <-> buttons to set the start and end times.

6 Press the <Day of the Week> button to set the Days of the Week for which the time settings will apply.

The <Delete Channel> button deletes all of the entries.

The <Cancel> button cancels the entry. The functionality previously assigned to the Timer Control channel is used.

7 Press the <OK> button.

– The entry is saved.

– The "Timer Start/Stop" menu appears.

8 Press the <OK> button.

✓ The Timer Control is programmed for the example.

– The switch-on times are saved.

– The "Timer Start/Stop" menu appears with the selected entries.

Start/Stop Schedule p2

1 Press the register card <Settings>.

2 Press the <Timer Control...> button.

3 Press the <Timer Pressure Band p2> button.

4 Press the <Start/Stop Schedule p2> button.

– The "Start/Stop Schedule p2" image appears.

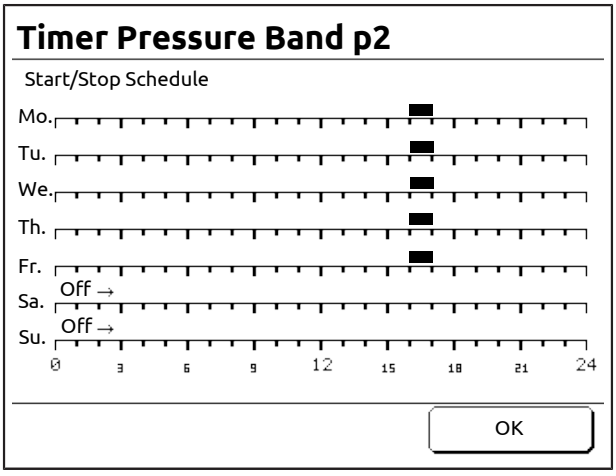


Fig. 5-31: Overview of Timer Control channel settings (state after programming)

The overview shows the hours from 12:00 midnight to 12:00 midnight for each day along the X-axis, and the days of the week along the Y-axis. The highlighted ranges show the programmed Timer Control channels (time window).

5.4.3.5 Activating the Timer Control for operation in pressure band p2

Activating Timer Control pressure band p2

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 <Press the Arrow Key> until the <p2 Timer Enabled> button is visible.

4 Press the <p2 Timer Enabled> button.

– The "p2 Timer Enabled" menu appears.

5 Press the <On> button.

The <Cancel> button can be used to cancel the enabling of Timer Control mode. The previously active setting is used.

6 Press the <OK> button.

✓ Timer Control mode is activated for pressure band p2.

– The "Control" menu is displayed.

– The <p2 Timer Enabled> button now shows "On".

– The "Home" menu also shows that the p2 Timer Control is activated (if within the time window).

The p2 Timer Control mode can be deactivated again with the <Off> button in the "p2 Timer Enabled" menu.

7 Press the start button < I >.

– The compressor is switched ON (set in operation).

– The compressor runs within pressure band p2 if it is in the p2 time window and the p2 conditions have been met.

p2 Conditions

The compressor reverts back to pressure band p1 as standard, except if:

- A planned p2 event is currently active (in the time window), and
- The p2 Timer Control in the "Control" menu has been activated.

If these two conditions are met, the controller switches to pressure band p2.

5.4.4 Programming the Dryer Pre-Run Time

The controller can be programmed so that the compressor does not start for manual or remote start until a certain Pre-Run Time has expired. This allows an external dryer to reach its optimal operating temperature.

The minimum Pre-Run Time is indicated in the operating instructions for the dryer.

1 Press the register card <Settings>.
2 Press the <Control...> button.
3 Press the <Arrow Key> until the <Dryer Pre-Run Time > button is visible.
4 Press the <Dryer Pre-Run Time> button.
   – The input menu for the Dryer Pre-Run Time appears.
5 Press the <Number Keys> to enter the required Dryer Pre-Run Time.
   The <Cancel> button can be used to cancel the input. The previously active setting is used.
6 Press the <OK> button.
✓ The Dryer Pre-Run Time has been programmed.
   – The "Control" menu is displayed.
   – The time setting now appears on the <Dryer Pre-Run Time> button.

Programming the programmable output for starting the external dryer

1 Press the register card <Settings>.
2 Press the <Programmable Inputs and Outputs...> register card.
3 Press the <Output x> button for the output to which the external dryer is connected.
4 Press the <Operating> button.
   The <Cancel> button can be used to cancel the assignment of the output. The previously active setting is used.
5 Press the <OK> button.
✓ The programmable output for starting the external dryer has been programmed.

Operating behavior of the dryer and compressor

The external dryer is switched on when the compressor is put into operation.

The external dryer is switched off when the compressor taken out of operation.

- Press the start button < I >.
- The relay output closes.
   – The dryer connected to the relay output is switched on and runs.
   – The compressor start is delayed by the time set for Dryer Pre-Run Time.
- After the Dryer Pre-Run Time has expired, the compressor is started.
- Operating: compressor and dryer are running.
- Press the stop button < O >.
   – The compressor is stopped.
- The relay output opens.
   – The dryer connoted to the relay output is switched off.

5.4.5 Setting RS485 communication

RS485 Communication

The controller has a serial RS485 interface (labeled "RS485:1"). A second RS485 interface is available as an option (labeled "RS485:3"). The RS485 interfaces use the ModBus RTU protocol.

The RS485 interface can be used for Communication with external sequence controllers or for monitoring purposes.

Setting up the RS485 interface

1 Press the register card <Settings>.
2 Press the <Communication...> button.
   – The "Communication" menu appears

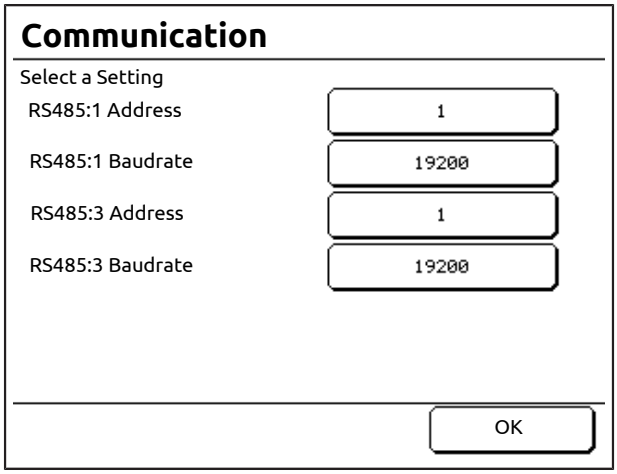


Fig. 5-32: "Communication" menu

The following menu options are available.

- Set address
- Set baud rate

Set address

1 Press the <Address> button.
   – The input menu for setting the address appears.
2 Press the <Number Keys> to enter the address of the interface.
   The <Cancel> button can be used to cancel the input of the address. The previously active setting is used.
3 Press the <OK> button.

✓ The address has been set.

– The "Communication" menu appears.

Set baud rate

1 Press the <Baud Rate> button.

– The input menu for setting the baud rate appears.

2 Press the <Baud Rate> button for the desired value.

The <Cancel> button can be used to cancel the input of the baud rate. The previously active setting is used.

3 Press the <OK> button.

✓ The baud rate has been set.

– The "Communication" menu appears.

5.4.6 Setting the automatic restart after power loss

⚠ DANGER

In this Operating Mode, the compressor can start up automatically at any time.

⇨ Post warning signs on the compressor.

⇨ Keep the compressor room locked.

⇨ Instruct the personnel.

⇨ Install a main disconnect switch per EN 60204 and post a warning sign on it.

5.4.6.1 Auto. Restart Enabled

The controller can be set so that the compressor starts up again automatically after a power loss.

The permissible duration of a power loss can be set. If the power loss lasts for longer than the set period of time, the compressor will not automatically start again. The fault message "E400:Power Supply Failure" appears in the display. In this case, the compressor must be started manually.

If a compressed air station comprises several compressors, a staged start-up can be set up by assigning start-up delays.

Activate automatic restarting

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 Press the <Arrow Key> until the <Auto. Restart Enabled> button appears.

4 Press the <Auto. Restart Enabled> button.

– The "Auto. Restart Enabled" input menu appears.

5 Press the <On> button.

The <Cancel> button can be used to cancel the enabling of the automatic restart. The previously active setting is used.

6 Press the <OK> button.

✓ Automatic restart after power loss is activated.

– The "Control" menu is displayed.

– The <Auto. Restart Enabled> button now shows "On".

– The "Home" menu also shows that automatic restarting is activated.

The <Off> button in the "Auto. Restart Enabled" menu can deactivate the automatic restart again.

Setting the maximum downtime

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 Press the <Arrow Key> until the <- Max. downtime> button appears.

4 Press the <- Max. downtime> button.

– The "- Max. downtime" input menu appears.

5 Press the <Number Keys> to set the desired maximum downtime.

The <Cancel> button can be used to cancel setting of the maximum downtime. The previously active setting is used.

6 Press the <OK> button.

✓ The maximum downtime has been set.

– The "Control" menu is displayed.

– The time setting now appears on the <- Max. downtime> button.

NOTE

The downtime can be set to "Unlimited". This is not permitted in some countries. Consult Gardner Denver.

⚠ DANGER

Danger to life and limb

In this Operating Mode, the compressor can start automatically at any time and for an unlimited duration after a power loss.

⇨ To enable this operating mode, a code must be requested from Gardner Denver.

⇨ The request absolutely must include the country of installation.

⇨ Before the compressor is allowed to be run in this Operating Mode, all valid safety specifications must be met and all required protective equipment must be installed.

Start delay

If a compressed air station comprises several compressors, and if all compressors start up again simultaneously when the power supply is restored, then the power supply may be overloaded and fail. Different start delay times that are set individually can be used to set up a staged start-up, which increases the load more uniformly.

Setting up start-up delay

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 Press the <Arrow Key> until the <- - Restart delay> button appears.

4 Press the <- - Restart delay> button.

– The "- Restart delay" input dialog appears.

5 Press the <Number Keys> in order to set the desired delay time before restarting.

The <Cancel> button can be used to cancel setting the delay time. The previously active setting is used.

6 Press the <OK> button.

✓ The start-up delay is set.

– The "Control" menu is displayed.

– The delay time setting now appears on the <- - Restart delay> button.

5.4.7 Setting remote start/stop

⚠ DANGER

In this Operating Mode, the compressor can start up automatically at any time.

⇨ Post warning signs on the compressor.

⇨ Keep the compressor room locked.

⇨ Instruct the personnel.

⇨ Install a main disconnect switch per EN 60204 and post a warning sign on it.

NOTICE

Property damage

⇨ Only potential-free contacts may be connected to the terminal strip.
Outside voltages can destroy the controller.

⇨ The potential-free contacts may not be any further than 20 meters from the terminal strip.
If necessary, coupling relays must be installed in the electrical enclosure.

The "Remote Start/Stop" function makes it possible to start and to stop the compressor by remote control, e.g., from a control room.

This function is programmed permanently and uses specific terminals (see circuit diagram).

As long as the potential-free contact is closed, the compressor runs. If the contact is opened, then a soft-stop takes place and the compressor stops.

Activating the "Remote Start/Stop" function

⚠ DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed by specialized electrical technicians only.

⇨ For speed-controlled models (RS) there is a risk of electric shock from the charged capacitors.
Disconnect the compressor and wait 10 minutes before touching electrical components.

⇨ Check the DC bus voltage.

Remote start function after power loss

After a power loss, the remote switch must be switched to OFF and back to ON so that the compressor will start.

If automatic restart is desired after a power loss, this function must be activated (see chapter "Setting Automatic Restart after Power Loss") and the remote switch must still be set to "ON" when the power supply is restored.

5.4.8 Remote On-Load and Off-Load (FS)

This function allows an FS compressor to be switched between On-Load and Off-Load by a control room, for example.

⚠ DANGER

In this Operating Mode, the compressor can start up automatically at any time.

- ⇨ Post warning signs on the compressor.
- ⇨ Keep the compressor room locked.
- ⇨ Instruct the personnel.
- ⇨ Install a main disconnect switch per EN 60204 and post a warning sign on it.

NOTICE

Property damage

- ⇨ Only potential-free contacts may be connected to the terminal strip.
  Outside voltages can destroy the controller.
- ⇨ The potential-free contacts may not be any further than 20 meters from the terminal strip.
  If necessary, coupling relays must be installed in the electrical enclosure.

Activate the "Remote On-Load and Off-Load" function

1. Press the register card <Settings>.
2. Press the <Programmable Inputs and Outputs...> button.
3. Program a free input to "Enable Remote Load".
4. Program another input to "Remote Load".

As long as the function "Enable Remote Load" is activated, the On-Load / Off-Load command is given exclusively by the remote load input. All internal pressure target values are ignored. If the Line Pressure exceeds the set Compressor Rated Pressure by more than 0.5 bar due to a permanent Remote Load signal, "Warning A606:Line Pressure high" is shown. As long as the Warning "A606" is active, the remote load input is deactivated.

6 OPERATING

6.1 Stopping the compressor in case of emergency

Emergency stop

The emergency stop button can be used to bring the compressor to a safe condition in dangerous situations.

The emergency stop button is located on the compressor control panel.

Using the emergency stop

See the operating instructions for the compressor.

1 Press the <E-stop> button.
The compressor is brought to a safe condition.

2 Correct the fault that was the reason for the emergency stop.
See the “fault correction” chapter.

3 Unlock the <E-stop> button.

4 Start up the compressor.
See the paragraph “Commissioning after a fault” in the chapter “Commissioning and operation.”

6.2 Starting the compressor

Display shows "Ready to start".

If there is a fault, it must be cleared and reset in the "Fault History" menu. See the “fault correction” chapter.

1 Press the start button < I >.

– The compressor starts, if the start has not been blocked by the following factors.

The compressor runs automatically according to Pressure Requirement.

NOTE

For the air-cooled version of the compressor, there are always one or two fans installed. If two fans are installed, then they are switched on and off together.

Only one fan is installed in the water-cooled version.

6.3 Factors that inhibit starting

The following factors can inhibit the starting of the compressor.

No Pressure Requirement

If there is no Pressure Requirement when the Start button < I > is pressed, the compressor switches to standby mode. The green LED flashes and the message "Attention:Start with Pressure Requirement..." appears on the display.

The compressor starts automatically if the lower pressure limit is reached.

The ambient temperature is below the permissible minimum starting temperature

If the compressor stage has been cooled too much due to low ambient temperatures, the compressor cannot be started.

When the start button < I > is pressed, the fault message "E404:Start Temperature low" appears on the display.

After the ambient temperature has risen, the fault must be reset in the "Fault History" menu.

Dryer Pre-Run

If the compressor controls an external dryer, the controller can be programmed so that the dryer is started before the compressor starts, so that the external dryer will have reached its optimal operating temperature before the compressor starts. The Dryer Pre-Run Time accomplishes this.

As long as the Dryer Pre-Run Time is running, the compressor remains in Standby mode. The green LED flashes and the message "Attention:Start in "x" min after dryer pre-run..." appears on the display.

The compressor starts automatically when the Dryer Pre-Run Time has expired.

Start by remote control

If the compressor is operated by a remote control, the controller waits for the start command from the remote control.

The message "Attention:Start by remote control..." appears on the display.

The compressor can now be switched on and off only by means of the potential-free contact.

Start by Timer Control

If the compressor is operated by a Timer Control, the controller waits for the start command from the Timer Control.

The green LED flashes and the message "Attention:Start by Timer Control on <Day of the Week> at <Time> ..." appears on the display.

The compressor starts automatically according to the Timer Control settings.

Start by external Start Requ. Approval

If a programmable input has been activated with the function "Start Requ. Approval", the controller waits for the external start requirement approval.

The green LED flashes and the message "Attention:Start by external start approval..." appears on the display.

The compressor starts automatically when the external Start Requ. Approval has been issued (which must be issued by a corresponding programmable input).

6.4 Operation

Speed control (RS):

The controller controls the speed of the drive motor in order to match it exactly to the compressed air demand.

When the minimum permissible speed has been achieved, On-Load/Off-Load control takes place.

On-Load/Off-Load Control

The required amount of compressed air is controlled by switching the suction regulator on and off (On-Load/Off-Load control).

6.5 Operating Modes

The controller has two Operating Modes:

- Automatic Operation
- Continuous Operation

Automatic Operation

In Automatic Operation mode, the drive motor starts and stops depending on the Pressure Requirement.

If the network pressure reaches the upper pressure limit, then the controller switches the compressor to idle and the run-on period starts.

If there is no Pressure Requirement at the end of the run-on time, the controller stops the controller and switches to standby mode.

If the line pressure reaches the lower pressure limit (Pressure Requirement), the controller starts the compressor again.

Continuous Operation

In Continuous Operation mode, the drive motor runs continuously, that it, if the compressor switches to Off-Load, there is no Run-On Time and the drive motor is not switched off.

Changing the Operating Mode

The compressor is set to Automatic Operation at the factory as standard.

To change the Operating Mode:

1 Press the register card <Settings>.

2 Press the <Control...> button.

3 Press the <Operating Mode> button.

  – The "Operating Mode" input menu appears.

4 Press the <Continuous Operation> button.

  The <Cancel> button can be used to cancel the change of the operating mode. The previously active setting is used.

5 Press the <OK> button.

✓ The operating mode has been changed to Continuous Operation.

  – The "Control" menu is displayed.

  – The <Operating Mode> button now shows "Continuous Operation".

The Automatic Operation> button in the "Operating Mode" menu can be used to return the operating mode to Automatic Operation.

6.6 Stop the compressor

1 Press the stop button < O >.

  – The compressor switches to Off-Load and the drive motor stops after a 30 second delay (soft stop).

  – The message "Stopping Procedure <x>s" appears on the display. The remaining seconds until the drive motor stops are counted down to "0".

The display shows "Ready to start". The green LED is off.

6.7 Operation Monitoring

During operation, the controller monitors the state of the compressor. The operating state is shown on the display.

The following operating states are displayed:

- Warnings; the compressor continues to run
- Faults; the compressor is stopped
- Power losses

Warnings / warning messages

Warning messages are displayed if a monitored parameter is exceeded but it is not necessary to switch off the compressor.

If the outlet temperature of the compressor stage reaches 110°C, for example, a flashing warning symbol with a corresponding message appears on the display. The red LED and the symbol on the <Fault History> register card flash slowly, and the compressor continues to run.

When the problem has been eliminated and the temperature drops, the warning message will continue to be displayed. The warning symbol, the LED, and the symbol on the <Fault History> register card continue to flash until the warning is reset. The warning can be reset regardless of whether the compressor is stopped or running.

Faults / fault messages

Fault messages are shown if a monitored parameter is exceeded, making it necessary to switch off the compressor automatically for safety reasons or in order to avoid compressor damage.

If, for example, the outlet temperature of the compressor stage exceeds the specified limit, the controller switches the compressor off. A flashing fault symbol appears on the display with a corresponding message. The symbol on the <Fault History> register card flashes; the red LED flashes quickly.

The compressor cannot be started again until the cause of the fault has been cleared and the fault has been reset.

Power losses

A loss of power must be confirmed in the "Fault History" menu before the compressor can be started again.

If the "Remote Start" switch-on function is activated, the remote start must be switched OFF and ON. This confirms the fault in the Fault History and resets it automatically.

If "Auto. Restart Enabled" is activated, the compressor starts automatically after the power supply is restored.
If "Auto. Restart Enabled" is activated in addition to the "Remote Start" function, the remote switch must still be set to "ON" for automatic restart to work.

7 CLEARING A FAULT

If a fault or warning (alarm) occurs, this is shown as a message on the display. LEDs, a symbol in the Status/Message area, and the symbol on the <Fault History> register card all continue to flash.

Acknowledge alarm

After the cause of the alarm has been corrected, the alarm must be reset in the controller.

1 Correct the cause of the alarm.

2 Press the <Fault History> register card.
   – The "Fault History" menu appears.

3 Press the <Reset> button.

✓ The alarm is reset.
   – The flashing alarm symbol disappears.
   – The symbol stops flashing on the register card <Fault History>.

Alarms that are still present cannot be reset. The alarm symbol and the symbol on the register card <Fault History> continue to flash.

7.1 Checklist for clearing faults

Loose connections or plugs, faulty power supply, or failure to pay attention to information or instructions can cause a series of faults.

The following points should be followed in order to prevent faults.

- The supply voltage must be within the permissible limits.
- The control transformer must be set to the local nominal voltage (see the electrical schematic).
- The temperature in the electrical enclosure must not exceed 50 °C.
- Any retrofitted remote controls (potential-free contacts) may not be any further than 20 meters from the terminal strip.
  If necessary, coupling relays must be installed in the electrical enclosure.
- Prior to commissioning and after performing maintenance work, ensure that the screws on all connections are tight and that all plugs are properly seated.
- The cables for the power supply must have sufficient cross section. When sizing cables, consider the type of routing, the length of the line, and the expected line temperatures.
- When retrofitting controls hardware, the controls transformer must never be "tapped".
- Do not connect any additional control or measurement equipment without the permission of Gardner Denver.
- Do not run any internally integrated measurement instruments outside of the compressor.
- Use only original Gardner Denver replacement parts.
- For technical questions, have the following information ready:
  – Type of system / Factory number
  – Order number
  – Electrical schematic, drawing number, and Reference Number
  – Information about operating conditions
  – Information about any accessories that have been installed after the fact (remote controls, etc.)
  – Information about other retrofits or changes
  – Fault number and exact description of the fault that has occurred

7.2 Structure of fault and warning codes

Fault codes consist of a letter, a number, and a brief description of the error that has occurred (event).

Letters

The letter "A" indicates a warnings.

The letters "E" and "F" indicate faults.

Number ranges

Number range	refers to
000 ... 399	Frequency converter (RS compressors)
400 ... 495	Compressor
500 ... 531	Frequency converter (RS compressors)
600 ... 695	Compressor
700 ... 731	Frequency converter (RS compressors)

Chart 7-1: Number ranges for fault and warning codes

7.3 Troubleshooting

Faults triggered by the frequency converter (F000 - F399) (RS)

Display	Potential root cause	Remedy
Fault VSD Fxxx	The converter has detected a fault with fault number xxx, which is not listed below.	Contact Gardner Denver service.
Fault VSD F003 .. F004	Low voltage of the frequency converter.	Check power supply. Check fuses and replace as needed. Check main circuit protector (only for compressors with PowerFlex 400 converter). Check all connection terminals and plugs for secure seating and tighten if needed.
Fault VSD F007	Motor overload of the frequency converter.	Check power supply. Check fuses and replace if needed. Check main circuit protector (only for compressors with PowerFlex 400 converters). Check all connection terminals and plugs for secure seating and tighten if needed.
Fault VSD F008	Over temperature of the frequency converter.	Check the cooling air inlet filter on the switch cabinet for contamination and replace if needed. See the operating instructions for the compressor. Ensure that the ventilation of the electrical switch cabinet and the frequency converter fans work properly. Check the inlet and outlet of the cooling air supply to the frequency converter for blockages and dirty cooling fins.
Fault VSD F017	Input phase loss of the frequency converter.	Check power supply. Check fuses and replace if needed. Check main circuit protector (only for compressors with PowerFlex 400 converter). Check all connection terminals and plugs for secure seating and tighten if needed.

*Chart 7-2: Faults triggered by the frequency converter (F000 - F399) (**RS**)*

Display	Potential root cause	Remedy
Fault VSD F021	Output phase loss of the frequency converter.	Check the wiring of the frequency converter to the drive motor. Check all connection terminals and plugs for secure seating and tighten if needed. Check motor windings.
Fault VSD F038 .. F040	Ground connection at the output of the frequency converter.	Check motor windings. Perform insulation test.
Fault VSD F041 .. F046	Short-circuit at the output of the frequency converter.	Check motor windings. Perform insulation test.
Fault VSD F064	Overload of the frequency converter.	Check the differential pressure of the fine precipitator. Check oil level. Check the water content of the oil.

*Chart 7-2: Faults triggered by the frequency converter (F000 - F399) (**RS**)*

Faults triggered by the compressor (E400 - E495) (RS)

Display	Potential root cause	Remedy
E400: Power Supply Failure	Power failure.	Look for root cause.
	Voltage drop.	Look for root cause.
	Damaged cables / wiring.	Check cables / wiring and repair if needed.
	Loose terminals.	Check all connection terminals and plugs for secure seating and tighten if needed.
E401: Emergency stop actuated	Emergency stop is/was actuated.	Unlock the emergency stop pushbutton.
	Emergency stop pushbutton is defective.	Check emergency stop pushbutton and replace if necessary.
	Damaged cables / wiring.	Check cables / wiring and repair if needed.
E402: High Motor Temperature M1	Drive motor has been started too often.	Limit the number of starts/stops.
	Insufficient cooling of the drive motor.	Check the cooling air supply, improve if necessary.
	Current draw too high.	Check and look for root cause.
	Power supply defective.	Check and look for root cause.
	Drive motor defective.	Check drive motor, replace if needed.
E403 Compressor Disch. Temp.	Compressor outlet temperature has been exceeded.[1)]	Look for root cause.

*Chart 7-3: Faults triggered by the compressor (E400 - E495) (**RS**)*

Display	Potential root cause	Remedy
	Intake temperature too high.	Check the cooling air supply, improve if necessary.
	Insufficient cooling.	Check cooling air or cooling water infeed, and improve if necessary.
	System operated with the guard enclosure open.	Close the enclosure.
	Oil injection quantity/temperature too low/high.	Check and look for root cause.
	Wrong type or viscosity of oil.	Check oil and perform oil change if necessary.
	R2 temperature sensor is defective (indicated values are too high).	Check and replace if necessary.
E404 Low Start Temperature	Start attempt at too low a temperature.	Heat the compressor room.
	Temperature sensor R2 defective (indicated values are too low).	Check and replace if necessary.
E405 Discharge Over Pressure	Operating pressure exceeded at 1.5 bar / 21 psi.[1)]	
	1 Pressure losses in the system are too high 2 Nominal line pressure values too high 3 External pressure demand too high 4 Suction regulator does not close 5 Pressure sensor B1 or B2 defective (incorrect display)	1 Check and look for root cause. 2 Correct it. 3 Check remote-load / idle switching points. 4 Check and look for root cause. 5 Check and replace if necessary.
E406 Line Pressure Sensor B1	Defective line pressure sensor.	Check and replace if necessary.
	Pressure sensor and/or temperature sensor defective.	Check and replace if necessary.
	Sensor wiring defective.	Check and replace if necessary.
E407 Disch. Press. Sensor B2	Defective compressor final pressure sensor.	Check and replace if necessary.
	Pressure sensor and/or temperature sensor defective.	Check and replace if necessary.
	Sensor wiring defective.	Check and replace if necessary.
E408 Disch. Temp Sensor R2	Defective compressor outlet temperature sensor.	Check and replace if necessary.
	Pressure sensor and/or temperature sensor defective.	Check and replace if necessary.
	Sensor wiring defective.	Check and replace if necessary.

*Chart 7-3: Faults triggered by the compressor (E400 - E495) (**RS**)*

Display	Potential root cause	Remedy
E409 Controller Hardware	Hardware error at the controller	Replace the Delcos controller
E410 Cooling	Air-cooled systems:	
	1 Fan motor circuit breaker tripped 2 Resistances too high in the supply / exhaust air channels 3 Circuit breaker for the fan motor is set incorrectly 4 Fan motor is defective	1 Check it. 2 Check, and install additional fans if necessary. 3 Set to 110% of the nominal fan current. 4 Check, replace if necessary.
	Water-cooled systems:	
	1 Insufficient cooling water supply 2 Cooling water temperature too high 3 Cooling water flow too low 4 Dirt catcher clogged 5 Cooling water solenoid valve does not open 6 Air in the system	1 Improve. 2 Improve. 3 Increase. 4 Clean. 5 Check, replace if necessary. 6 Bleed.
E411 Low Oil Pressure	Oil pressure too low or absent[3)]	Check and look for root cause.
E412 External Fault	Deactivation by an external device[3)]	Check and look for root cause.
E413 Dryer (compressor without speed control)	Fault of integrated or external dryer.[3)]	See the chapter on the integrated dryer in the compressor operating instructions.
E413 Dryer (compressor with speed control)	Fault of integrated or external dryer.[3)]	Check and look for root cause.
E414: Condensate Drain	Connected condensate drainage valves defective.[3)]	Check and look for root cause.
E415: No Start Pressure	No pressure buildup in the start-up phase, e.g. because the motor is turning in the wrong direction.	Check and look for root cause.
E416: Heavy Startup	Compression pressure is too high during the motor start-up phase.	Check that the suction regulator is closed and seals properly.

*Chart 7-3: Faults triggered by the compressor (E400 - E495) (**RS**)*

1) System-specific setting. See "Factory Settings" menu.
3) Monitoring by an optional device or an optional sensor connected to a programmable digital input. See the chapter "Programmable inputs" and the circuit diagram.

Faults triggered by the frequency converter (E500 - E531) (RS)

Display	Potential root cause	Remedy
E500: Pre-Adjustment VSD	The frequency converter was defective or not programmed (replacement device), so that it had to be reprogrammed by the GD Pilot TS.	
E501: Pre-Adjustment	The frequency converter was defective or not programmed (replacement device), so that it had to be reprogrammed by the GD Pilot TS.	
E502: VSD Locked	Error while programming the frequency converter.	Contact Gardner Denver service.
E503: VSD Write Fault	Error while programming the frequency converter.	Contact Gardner Denver service.
E504: VSD Communication	Communication with frequency converter interrupted, the frequency converter does not respond.	Main circuit protector (only for compressors with PowerFlex 400 converters) Check ModBus interface wiring. If no error is found, contact Gardner Denver Service.
E505: VSD Stop Pressed	The red stop button on the frequency converter has been pressed while the compressor was running.	Always switch off the compressor using the GD Pilot TS.
E506: VSD EM-Stop Input	Only for compressors with PowerFlex 75x converter: While the GD Pilot TS has detected that an emergency stop button has been pressed, no corresponding feedback has been received from the converter.	Check the Emergency Stop circuit. This critical error cannot be reset. Because of the compressor restart, the Setup Code procedure is run. See the chapter "Setting up a replacement controller / Setup Code and compressor reference number".
E507: VSD Read Fault	Error while reading data from the frequency converter.	Contact Gardner Denver service.
E508: VSD EM-Stop Input	Only for compressors with PowerFlex 75x converter: While the converter has detected that an emergency stop button has been pressed, no corresponding feedback has been received from the GD Pilot TS.	Check the Emergency Stop circuit. This critical error cannot be reset. Because of the compressor restart, the Setup Code procedure is run. See the chapter "Setting up a replacement controller / Setup Code and compressor reference number".
E509: See VSD display	Only for compressors with PowerFlex 75x converter: The converter received an unexpected fault code.	Read the fault code shown on the converter display and contact the Gardner Denver Service.

*Chart 7-4: Faults triggered by the frequency converter (E500 - E531) (**RS**)*

Display	Potential root cause	Remedy
E510: Speed below min. Limit	The speed is below the minimum permissible speed.	Check the differential pressure of the fine precipitator. Check oil level. Check the water content of the oil.

*Chart 7-4: Faults triggered by the frequency converter (E500 - E531) (**RS**)*

Warnings triggered by the compressor (A900 - A995)

Display	Potential root cause	Remedy
A600: Service due	Less than 200 hours to next service.	Service the compressor according to the service instructions.
A601: Discharge Over Pressure	Operating pressure exceeded by 1.0 bar / 14 psi[1)] 1 Pressure losses in the system are too high 2 Nominal line pressure values[4)] too high 3 External pressure demand too high 4 Suction regulator does not close. 5 Pressure sensor B1 or B2 defective (incorrect display)	• Check and look for root cause. • Correct it. • Check remote-load / idle switching points. • Check and look for root cause. • Check and replace if necessary.
A602:Compressor Disch. Temp.	Final compression temperature has been exceeded.[1)]	Look for root cause.
	Intake temperature too high.	Improve.
	Insufficient cooling.	Improve.
	System operated with the guard enclosure open.	Close the enclosure.
	Oil injection quantity/temperature too low/high.	Check and look for root cause.
	Wrong type or viscosity of oil.	Check oil and perform oil change if necessary.
	R2 temperature sensor is defective (indicated values are too high).	Check and replace if necessary.
A603:	Not assigned / reserved	
A604:	Not assigned / reserved	
A605:	Not assigned / reserved	
A906: Line Pressure high	For more information, see "Configuration / expanded settings / remote load and idle operation"	
A607: Controller Battery empty	Battery dead	Replace battery: Gardner Denver Part No. 100016235

Chart 7-5: Warnings triggered by the compressor (A600 - A695)

Display	Potential root cause	Remedy
A608 Dryer (compressor without speed control)	Fault of integrated or external dryer.[3)]	See the chapter on the integrated dryer in the compressor operating instructions.
A608 Dryer (compressor with speed control)	Fault from external dryer.[3)]	Check and look for root cause.
A609: Condensate Drain	Connected condensate drainage valves (Bekomat) defective[3)]	Check and look for root cause.
A610: Fine precipitator	Fine precipitator differential pressure is too high[3)]	Check and replace fine separator if necessary.
A611: Air Filter	Air filter differential pressure is too high[3)]	Check and replace air filter if necessary.
A612: Oil Filter	Oil filter differential pressure is too high[3)]	Check and replace oil filter if necessary.
A613: Oil level low	Oil level too low.[3)]	Check and top up oil if necessary.
A614: Oil temperature high	High oil temperature.[3)]	Check and look for root cause.
A615: External Warning	Warning from an external device.[3)]	Check and look for root cause.
A616: Lubrication System	A fault has occurred in the motor lubrication system, or the LC unit is empty.[3)]	See the chapter on the motor lubrication system in the compressor system operating instructions.
A617: Setting Input 1	The programmable digital input 1 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]
A618: Setting Input 2	The programmable digital input 2 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]
A619: Setting Input 3	The programmable digital input 3 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]
A620: Setting Input 4	The programmable digital input 4 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]
A621: Setting Input 5	The programmable digital input 5 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]
A622: Setting Input 6	The programmable digital input 6 has been actuated, but is programmed as [Open].[3)]	Check the corresponding input assignment.[3)]

Chart 7-5: Warnings triggered by the compressor (A600 - A695)

Display	Potential root cause	Remedy
A623: SD-Card full	Storage space on the SD card has been used up.	Replace SD card. Gardner Denver part no. ZS1067681

Chart 7-5: Warnings triggered by the compressor (A600 - A695)

1) System-specific setting. See "Factory Settings" menu
3) Monitoring by an optional device or an optional sensor connected to a programmable digital input. See the chapter "Programmable inputs" and the circuit diagram.
4) Only for water-cooled version (W version)

Warnings triggered by the frequency converter (A700 - A731) (RS)

Display	Potential root cause	Remedy
A700: VSD Temperature High	Temperature of the frequency converter is close to the temperature trigger limit.	Check the cooling air inlet filter on the switch cabinet for contamination and replace if needed. See the operating instructions for the compressor. Ensure that the ventilation of the electrical switch cabinet and the frequency converter fans work properly. Check the inlet and outlet of the cooling air supply to the frequency converter for blockages and dirty cooling fins.

*Chart 7-6: Warnings triggered by the frequency converter (A700 - A731) (**RS**)*

Other faults

Fault	Potential root cause	Remedy
A fault or warning cannot be acknowledged.	Fault/warning is still pending.	Look for and eliminate root cause.
Erroneous display of volume flow.	Volume flows set incorrectly.	Check the maximum and minimum volume flow rate in the "Configuration" menu. See the chapter "Menus / Configuration".
System does not start automatically after power failure.	Automatic restart after power failure is not activated. Power failure lasted too long.[1)]	Activate automatic restart after power failure.
System continuously runs in Off-Load without switching to standby on its own.	"Durchlaufbetrieb" operating mode selected.[1)] Very brief pressure demand during run-on time.	Select "Automatic Operation" operating mode.

Chart 7-7: Other faults

1) System-specific setting: See "Control" menu.

8 ADDITIONAL CONTROLS

8.1 Maintenance level

Parameters locked at user level can be modified by the local maintenance personnel at maintenance level. In addition, more trend charts and selections are available.

Enabling and locking the maintenance level

1 Press <Access Code> tab.
   – The "Access Code" input menu appears.
2 Press <numeric keys> to enter the access code "3091".
   Use the <Back> button to make corrections, if required.
3 Press <Enter>.

✓ The maintenance level is enabled.
   – Associated operating functions are enabled.
   – On the <Access Code> tab, the number "2" is displayed next to the padlock symbol.

To lock the maintenance level, enter the same access code again.

NOTE

The Service level is disabled automatically after five minutes; the controller automatically activates the user level.

8.2 Additional trend charts at the maintenance level

The following trend charts and selections are only available in the "Trends" menu on the maintenance level:

- <Setpoints Targets> button on the "Line Pressure" trend chart.
- VSD Heatsink Temperature (**RS**)
- VSD Output Current (**RS**)
- Discharge Pressure
- Discharge temperature
- Line pressure - Setpoints Targets

<Setpoints Targets> button on the a"Line Pressure" trend chart.

As an additional button on maintenance level, the <Setpoints Target> button is displayed in the "Line Pressure“ trend chart.

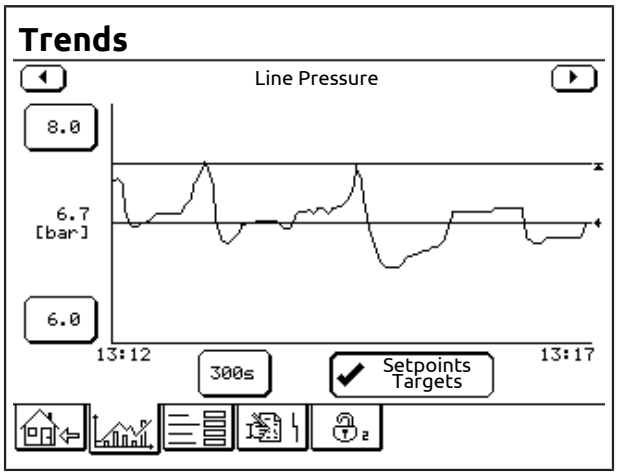


Fig. 8-1: "Line Pressure" trend chart with <Setpoints Targets> button.

1 Press <Setpoints Targets> button.
   – In addition, a checkmark appears on the "Setpoints Targets“ button.
   – The setpoints for the upper and lower pressure values are shown on the chart in addition to the line pressure curve.

VSD Heatsink Temperature

As an additional trend chart the "VSD Heatsink Temperature" chart is available on maintenance level.

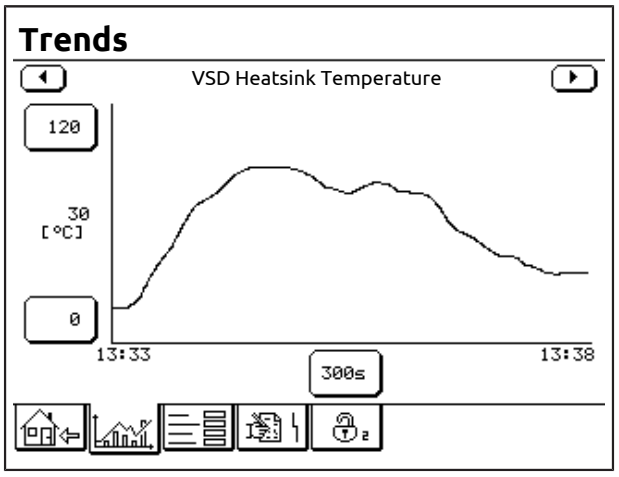


Fig. 8-2: "VSD Heatsink Temperature" trend chart

The chart shows the time curve of the temperature of the heatsink in the power supply of the frequency converter.

VSD Output Current

As an additional trend chart the "VSD Output Current" chart is available on maintenance level.

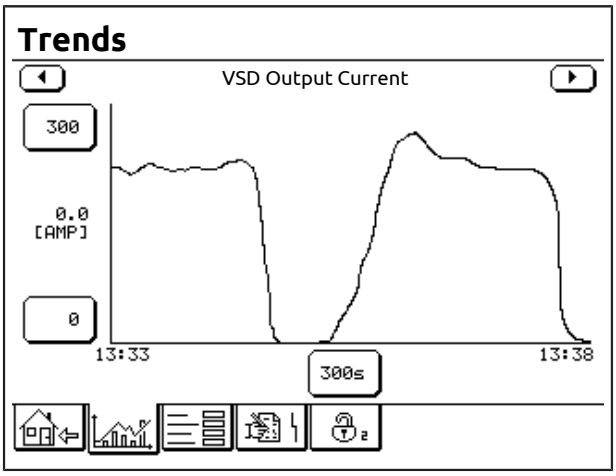


Fig. 8-3: "VSD Output Current" trend chart

The chart shows the time curve of the output current of the frequency converter.

8.3 Resetting Statistics On-Load Hours

At maintenance level, the history (recorded data) of the on-load hours can be reset (deleted) in the "Statistics On-load Hours" chart.

1 Press the <Trends> tab.

2 Use the <arrow buttons> to call up the "Statistics On-Load Hours" trend chart.

– On maintenance level, the <Re-Set Statistics> button is enabled.

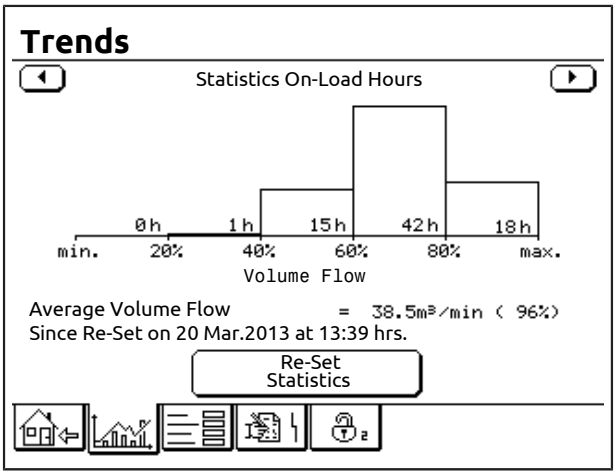


*Fig. 8-4: "Statistics On-Load Hours" trend chart (example **RS**)*

3 Press the <Re-Set Statistics> button.

– The confirmation question "Are you sure you want to re-set the Statistics Data?" appears.

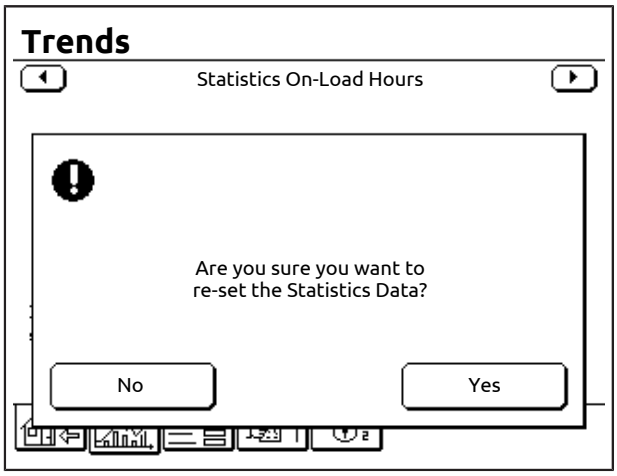


Fig. 8-5: Confirmation question "Are you sure you want to re-set the Statistics Data?"

4 Press <Yes> button.

✓ The recording of on-load hours is reset.

– The bar chart is deleted.

– The details in the text are updated.

or

5 Press <No> button.

– The recording of on-load hours is kept.

In both cases, the "Statistics On-Load Hours" trend chart is displayed again.

8.4 Set the Service interval

The time until the next Service is due (Service interval) can be set in the "Hour Meters" menu at the Service level.

1 Press the register card <Settings>.

– The "Settings" screen appears.

2 Press the <Hour Meters...> button.

– The "Hour Meters" menu appears.

3 Press the <Hours to next Service> button.

– The "Hours to next Service" input menu appears.

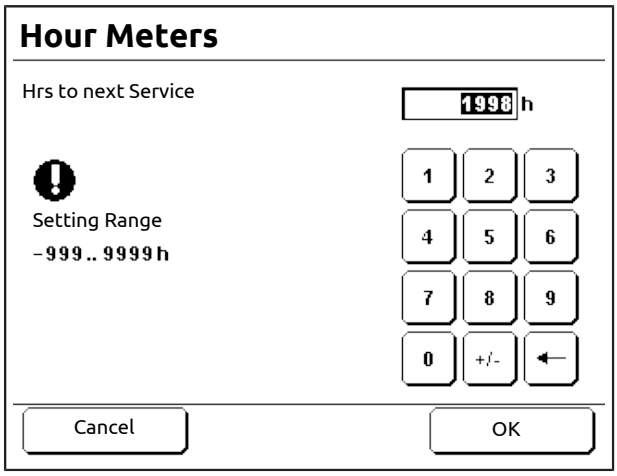


Fig. 8-6: "Hours to next Service" input menu

1 Press the <Number Keys> to input the Service interval.
The <Back> button can be used to make corrections.

The <Cancel> button can be used to cancel setting the Service interval. The previously active setting is used.

2 Press the <OK> button.

✓ The Service interval has been set.
- The value that was input is saved.
- The "Hour Meters" menu is displayed.
- The set time until the next Service is displayed on the <Hours to next Service> button.

8.5 Data Recording

The controller has a data recording function (data logger) on an SD-Card. This function can be used to monitor and save various compressor parameters.

Inserting and removing the SD-Card

⚠ DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed by specialized electrical technicians only.

⇨ For speed-controlled models (RS) there is a risk of electric shock from the charged capacitors.
Disconnect the compressor and wait 10 minutes before touching electrical components.

⇨ Check the DC bus voltage.

Starting and stopping data recording

Starting data recording

1 Press the <Settings> tab.

2 Press the <SD card> button.

3 Press the <Record Data> button.

4 Select data recording option "3" or "60" seconds interval.

5 Press the <OK> button.

✓ Data recording starts immediately.
- The "SD-Card" menu appears.
- The notice "Recording" appears. The file name of the data recording file is also shown.

Stopping data recording

1 Press the <Settings> tab.

2 Press the <SD card> button.

3 Press the <Record Data> button.

4 Select the "Off" option for data recording.

5 Press the <OK> button.

✓ Data recording stops immediately.
- The "SD-Card" menu appears.
- The notice "Ready" appears.

Recorded Data

When a data recording session is started, the controller saves a settings file that contains the current settings and configuration details for the controller.

The file name contains the start date and has the suffix "S00":
YYYYMMTT.S00 (The "S" identifies the file as a settings file. YYYY is a placeholder for the year, MM for the month and TT for the day.)

The controller then starts to monitor and record the machine data at the intervals that have been selected in the "SD-Card" menu.

The controller creates a data file for this purpose. The file name contains the start date and has the suffix "D00":
YYYYMMTT.D00 (The "D" identifies the file as a data file. YYYY is a placeholder for the year, MM for the month and TT for the day.)

A new data file is written for each new day while the recording session is active. Each file has its own date-based file name.

If several data recording sessions occur on the same day (and therefore the file names contain the same date), the number in the suffix is increased in order to indicate which file was recorded most recently.

When the recording session is terminated, a second settings file is written to the SD-card with the settings and configuration details for the controller at the end of the recording session.

This file name contains the date and also has the suffix "S00":
YYYYMMDD.S00 (The "S" identifies this file as a further "Settings file")
The set values can be read from this settings file and entered in the "Setting Values" table in the appendix of these operating instructions.

All files are *.tsv (tab-separated values) text format and can be imported and displayed in a spreadsheet program, for example.

SD-Card format

The data recording function supports SD and SDHC cards. SDXC cards cannot be used.

The SD-Card should be formatted in FAT32. SD card driver compatibility cannot be guaranteed for any SD card other than the card with CompAir part number ZS1105017.

Gardner Denver recommends using the GD PILOT TS SD-card reader. Part number ZS1069300.

9 SETTING UP A REPLACEMENT CONTROLLER

9.1 Setup Code and Compressor Reference Number

NOTICE

Property damage

Each compressor has a dedicated Setup Code and a dedicated Reference Number. If a Setup Code from another compressor is used, the compressor will be incorrectly configured, which can cause significant damage to the compressor.

⇨ In no case may data from another compressor be used.

NOTE

It is recommended that the Setup Code and compressor Reference Number be noted and kept handy before the controller is turned on.

⚠ DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed by specialized electrical technicians only.

⇨ For speed-controlled models (RS) there is a risk of electric shock from the charged capacitors.
Disconnect the compressor and wait 10 minutes before touching electrical components.

⇨ Check the DC bus voltage.

Setup Code

All of the basic factory settings for the compressor are defined in the Setup Code.

The setup code consists of 16 characters. The Setup Code is specified on a sticker inside the switch cabinet.

Compressor Reference Number

The compressor reference number is the serial number of the compressor.

The compressor reference number consists of 13 characters and starts with "CD". The compressor reference number is specified on the name plate.

9.2 Setting up a replacement controller

Replacing the controller

⚠ DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed by specialized electrical technicians only.

⇨ For speed-controlled models (RS) there is a risk of electric shock from the charged capacitors.
Disconnect the compressor and wait 10 minutes before touching electrical components.

⇨ Check the DC bus voltage.

Switching on the replacement controller for the first time

1 Switch the main switch ON.
– The "Choose Language" menu appears.

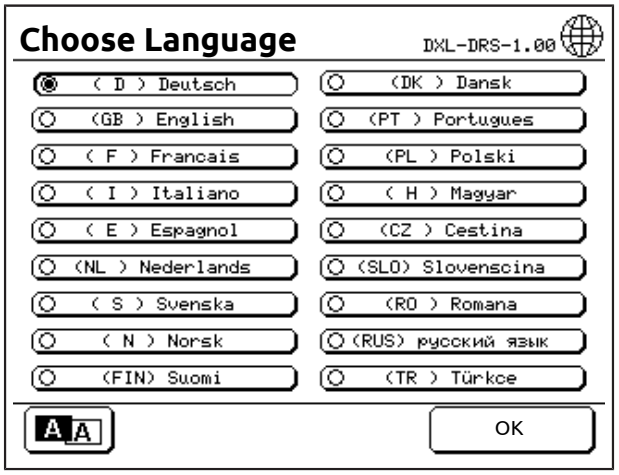


Fig. 9-1: "Choose Language" menu

2 Press the <Button> for your language.
– The screen language is now selected.

3 Press the <OK> button.

✓ The screen language switches to the selected language.
– The "Setup Code" input menu appears.

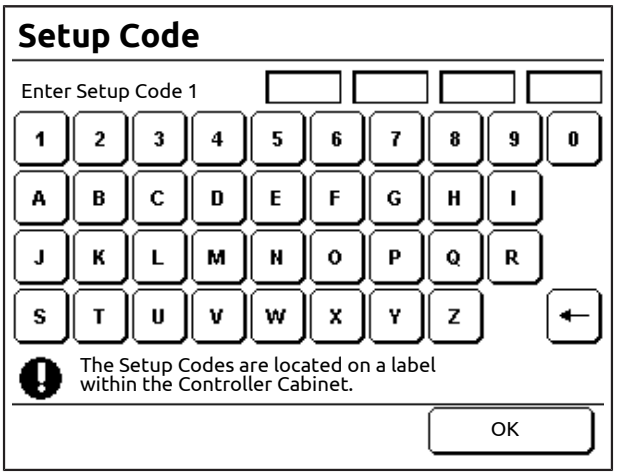


Fig. 9-2: Input menu "Enter Setup Code 1".

4 Press <screen buttons> to enter the setup code.

5 Press the <OK> button.

– The "Enter Reference Number" input menu appears.

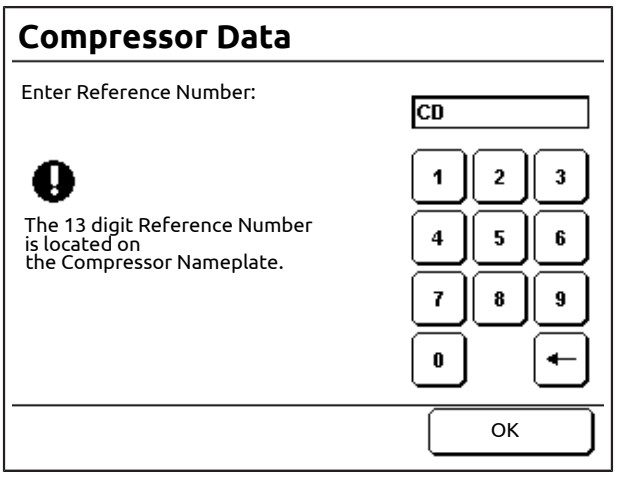


Fig. 9-3: "Enter Reference Number" input menu

6 Press the <screen buttons> to enter the compressor reference number.

After the input is complete, the <OK> button appears.

7 Press the <OK> button.

– The "Reset System Settings" confirmation query appears.

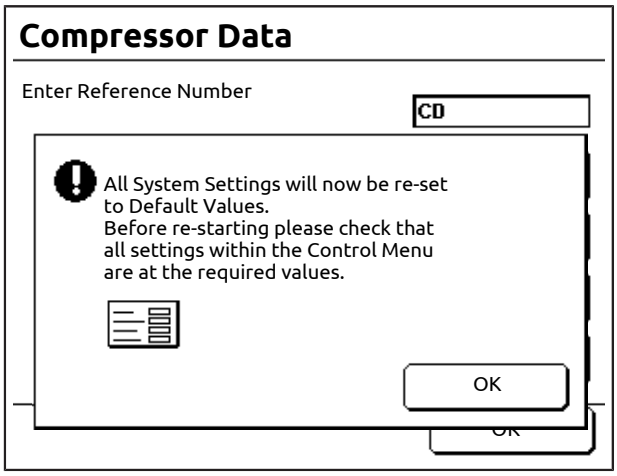


Fig. 9-4: Confirmation query "Reset System Settings"

8 Press the <OK> button.

– All settings are reset to the basic factory settings for the compressor.

– (**FS**) The "Home" menu appears.

✓ The FS compressor is ready for operation.

RS compressor

For RS compressors, after confirming the confirmation query "Reset System Settings", the "Home" menu appears with the message "Parameterizing VSD".

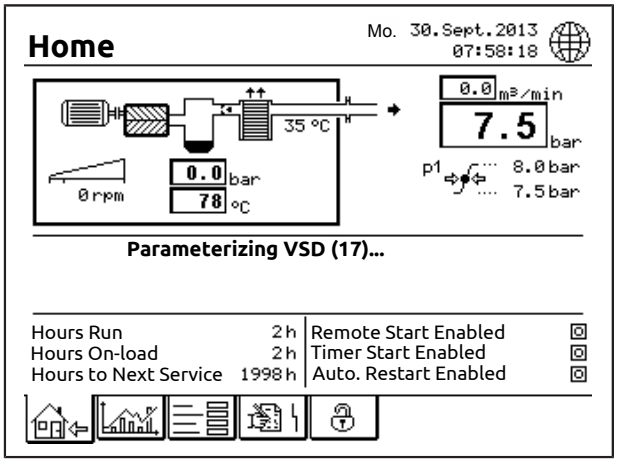


Fig. 9-5: "Home" menu with message "Parameterizing VSD"

– The frequency converter parameters are set.

When the parameters for the frequency converter have been set:

– The "Home" menu appears with the message "Ready to Start".

✓ The RS compressor is ready for operation.

Testing the emergency stop function

For RS compressors, this test ensures that the VSD and the controller have correctly detected the emergency stop input.

When the following request appears:

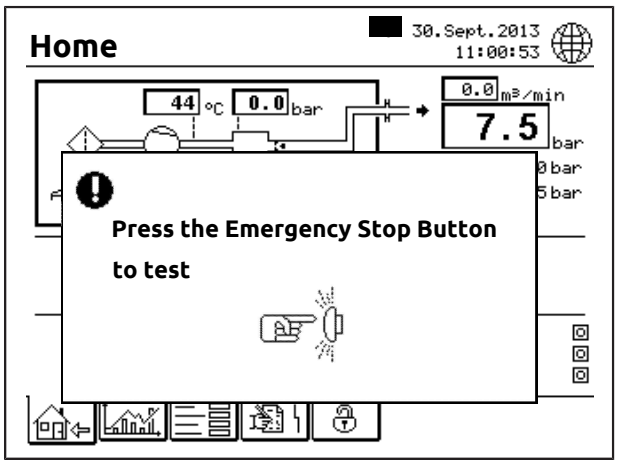


Fig. 9-6: Request "Press the Emergency Stop Button to test"

1 Press the <Emergency stop> pushbutton.
   – The message "Emergency Stop Activated" appears on the display.
   – The symbol on the <Fault History> tab flashes.
2 Unlock the <Emergency stop> pushbutton.
3 Press the <Fault History> tab.
4 Press the <Reset> button.
   – The symbol on the <Fault History> tab stops flashing.

✓ The controller is ready for use.

Checking the settings

NOTE

All specific settings should be noted so that they are available when needed (e.g., for setting up a replacement controller).

The settings can be entered in the "Set Values" table attached to these operating instructions.

Before the compressor is started for the first time after installing the replacement controller, all settings must be checked.

In particular, the specific settings must be input again.

10 BASE LOAD SEQUENCING (BLS)

The following chapter mainly describes the master controller in Base Load Sequencing mode.

For slave controllers, only the address needs to be set. See the chapter "Configuration / Set RS485 Communication / Setting up the Communication Parameters for the Slave Compressor Controller".

10.1 Base Load Sequencing

General description

The GD PILOT TS controller can act as a master controller for a Base Load Sequencing group.

Up to three slaves can be connected to the master via a serial connection.

NOTE

All slave compressors must be of the same type, that is, either only RS compressors or only FS compressors.

Base Load Sequencing function

The Base Load Sequencing function is available as an option.

Base Load Sequencing has two functions:

- A central superordinate controller (the master controller) is used to control a group of compressors in order to maintain the line pressure within a narrow pressure band.
- The master controller regularly changes the priority of the compressors in the group, so that the load is distributed among the compressors.

System Requirements

A communication module (RS485:3 module) must be installed in the master controller if it was not already installed at the factory.

Supported compressor group configurations

Type	Description / Requirement
FS Master FS Slaves	An FS master can control up to 3 FS slaves. The rated volume flow for each compressor within the Base Load Sequencing group should be about the same as that of the master.
RS Master FS Slaves	An RS master can control up to 3 FS slaves. The rated volume flow of each slave compressor should match that of the master, or be slightly lower.
RS Master RS Slaves	An RS master can control up to 3 RS slaves. The rated volume flow for each compressor within the Base Load Sequencing group should be about the same as that of the master.

Chart 10-1: Supported compressor group configurations

NOTE

An FS master cannot control any RS slaves.

10.2 Supported slave controllers

Supported slave controllers

Supported electronic slave controllers are DELCOS 3100, DELCOS PRO, DELCOS XL, GD PILOT MK, GD PILOT und GD PILOT TS having the minimum required software version installed. See the table below.

If it is necessary to connect a different compressor controller or a compressor with electromechanical controls to the master, then a compressor module (STD) can be installed in the slave (see the chapter "Installing the Compressor Module (STD)"). This compressor module controls the switching of the compressor between On-Load and Off-Load, monitors its status, such as "Ready" and "On-Load", and is connected to the master via a serial connection.

Supported Slave Compressor Controllers and Required Software Versions

The following compressor controllers are supported and must have one of the software version numbers listed below:

Electronic controller	Minimum required software version
DELCOS XL-D	DXL-D-1.00
DELCOS XL-DRS	DXL-DRS-1.00
DELCOS XL-DH	DXL-DH-1.00
DELCOS XL-DHRS	DXL-DHRS-1.00
DELCOS XL-L	DXL-L-1.02
DELCOS XL-LRS	DXL-LRS-1.04
DELCOS PRO-L	DPro-L-1.18
DELCOS PRO-LRS	DPro-LRS-1.02
DELCOS PROG-LSR	DPro-LSR-1.05
DELCOS 3100-L	SD31V2.05
DELCOS 3100-LRS	SD31R2.03
DELCOS 3100-LRS (V2)	D31RS1.06
DELCOS 3100-LSR	SD31S1.16
DELCOS 3100-DH	HD31V2.05
DELCOS 3100-DHRS	HD31R1.34
DELCOS 3100-DHSR	HD31S1.22

Chart 10-2: Required software versions

Electronic controller	Minimum required software version
GD PILOT TS (Enviro T)	DXL-D-1.00
GD PILOT TS (Enviro TVS)	DXL-DRS-1.00
GD PILOT TS (Enviro)	DXL-DH-1.00
GD PILOT TS (Enviro VS)	DXL-DHRS-1.00
GD PILOT TS (ESM)	DXL-L-1.02
GD PILOT TS (VS)	DXL-LRS-1.04
GD PILOT (ESM)	DPro-L-1.18
GD PILOT (VS)	DPro-LRS-1.02
GD PILOT MK (ESM)	SD31V2.05
GD PILOT MK (VS)	D31RS1.06

Chart 10-3: Required software versions

The software version can be viewed in the controller menu structure. For more information, see the operating instructions for each controller.

If a software update is required, please consult Gardner Denver.

10.3 "Base Load Sequencing" menu

Activating and deactivating Base Load Sequencing

1 Press <Access Code> tab.
   – The "Access Code" input dialog appears.
2 Press <numeric keys> to enter the access code "1234".
3 Use the <Back> button to make corrections, if required.
4 Press <Enter>.

✓ Base Load Sequencing is activated.
   – The <Base Load Sequencing> tab appears.

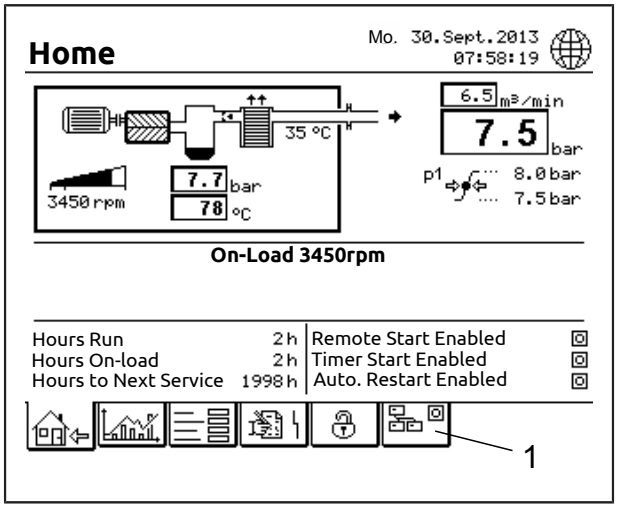


Fig. 10-1: "Home" menu with <Base Load Sequencing> tab

To deactivate Base Load Sequencing, enter the same access code again.

NOTE

The Base Load Sequencing function can also be activated if the RS485:3 module is not installed. In this case, you will see a communication error message, because the master cannot establish communication with the slaves, because they are not connected. See the chapter "Installing the RS485:3 Module"

Symbols on the <Base Load Sequencing> tab

The symbols that are displayed next to the symbol on the tab can vary depending on the operating state of Base Load Sequencing. The following information is displayed:

Symbol	Meaning
⊡	Base Load Sequencing is switched off. All compressors run, independently of each other, according to their individual settings.
⊡	Base Load Sequencing is switched on.
⊡	Base Load Sequencing is switched on and is controlled by the timer control.
⚠	An alarm is displayed in the "Base Load Sequencing" menu.

Chart 10-4: Symbols on the <Base Load Sequencing> tab

"Base Load Sequencing" menu

If the <Base Load Sequencing> tab is active, the "Base Load Sequencing (BLS)" menu can be called up by pressing it.

If the "Base Load Sequencing (BLS)" menu is called up before slave compressors have been defined or the BLS function is switched off, a corresponding message is displayed.

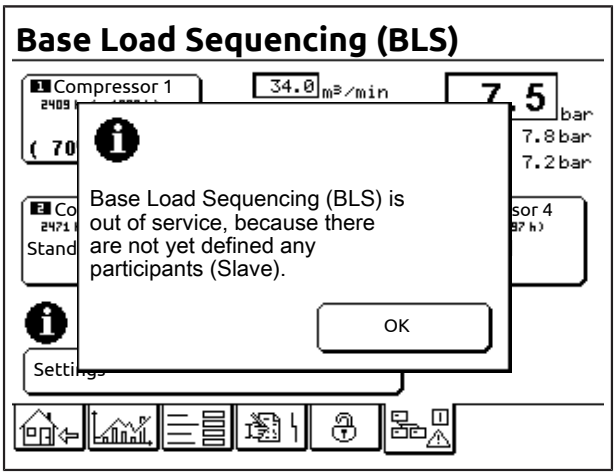


Fig. 10-2: Message "No participants (slaves) have been defined yet"

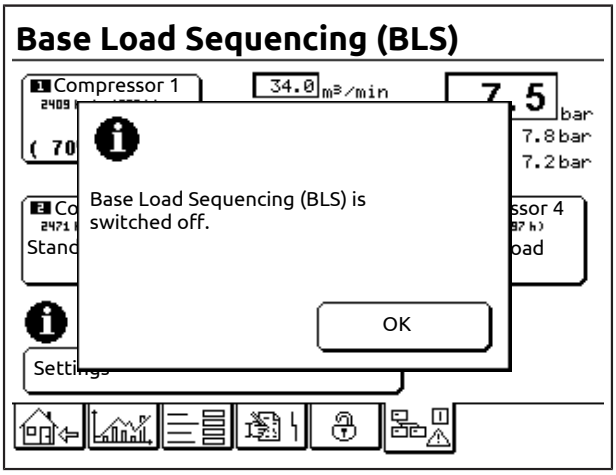


Fig. 10-3: Message "BLS function is switched off"

1 Press the <OK> button to confirm the message.

– The message is closed.

– The "Base Load Sequencing (BLS)" menu appears.

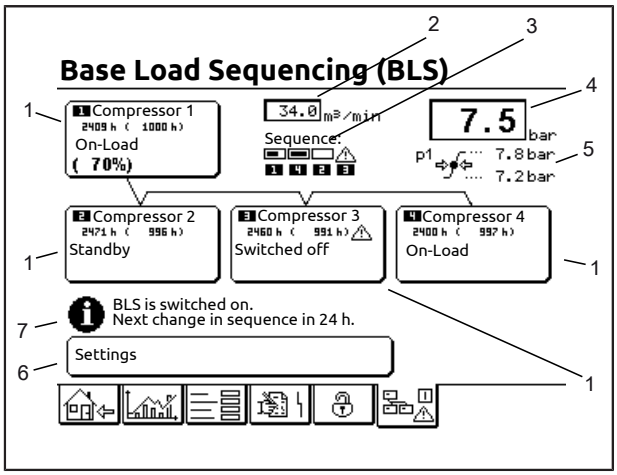


Fig. 10-4: Typical "Base Load Sequencing (BLS)" menu view

[1] <Compressor> buttons

[2] Volumetric flow rate

[3] Sequence and Status Display

[4] Network pressure

[5] Pressure band

[6] <Settings> button

[7] BLS status information

The example above shows a Base Load Sequencing group that consists of the master ("Compressor 1") and three slaves.

[1] <Compressor> buttons

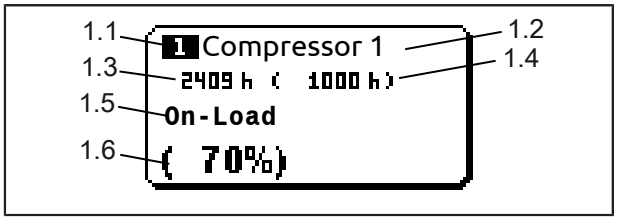


Fig. 10-5: <Compressor> button

[1.1] RS485 Address

[1.2] Compressor Name

[1.3] Hours Run

[1.4] Hours Run (BLS)

[1.5] Compressor status message (see the chapter "Compressor Status Messages")

[1.6] Percentage of current compressed air flow rate (see the chapter "Compressor Status Messages")

Pressing a <Compressor> button opens an information menu for the compressor with the option of setting compressor data. See the chapter "Compressor Settings and Information".

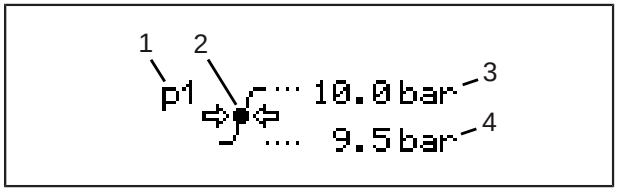
[2] Volume Flow

Displays the current volume flow being supplied by the BLS group.

[3] Line Pressure

Displays the current air pressure in the compressed air network.

[4] Pressure Band



[1] Current pressure band

[2] International pressure symbol

[3] Upper pressure value

[4] Lower pressure value

If Base Load Sequencing is switched on, this display shows the lower and upper pressure values at which the next available compressor is switched on or switched off.

For RS compressors, the nominal pressure for the BLS group is exactly between the two values.

The symbols "p1" and "p2" and the optional "clock symbol" indicate the pressure band being used, and whether the timer control is operating.

[5] Sequence and Status Display

Fig. 10-6: Sequence and Status Display

Sequence Display:

If Base Load Sequencing is switched on, this display indicates the current sequence (order in which the compressors are switched on). In the example shown above (1-4-2-3), the left compressor is the base load compressor; the other compressors are switched on in sequence from left to right if the demand for compressed air increases.

Status Display:

The status of the compressor is shown above the sequence display, using the following symbols:

Symbol	Meaning
no symbol	Compressor not defined
▭	Compressor in Off-Load
▬	Compressor in On-Load (**FS**)
▬	On-Load bar chart (**RS**)
⚠	Compressor not available (switched off, no communication, fault, etc.)

Chart 10-5: Status display symbols

[6] BLS Status Information

The Base Load Sequencing status is shown in defined status messages.

<Settings> button

Tapping a <Settings> button opens a menu to set the base load sequencing parameters. See the chapter "Base Load Sequencing Settings".

10.4 Compressor status messages

Messages in normal operation

Message	Meaning
Standby	The compressor is ready to be started by the master.
Motor starting...[1)]	The drive motor is started.
Off-Load	The compressor is currently running in Off-Load mode.
On-Load	The compressor is currently running in On-Load mode. (**FS**)
On-Load (xxx %)[1)]	Percentage of the current compressed air flow rate (min. up to 100 %). (**RS**)
De-Pressurizing...[1)]	The compressor is stopped and is currently depressurized.
Load requested...	The compressor has received a load request but has not started yet.

Chart 10-6: Compressor status messages

1) Not shown for slaves that are controlled by a compressor module (STD).

Messages that are displayed if a compressor is not available

If a compressor is not available, this is indicated by a flashing alarm symbol on the <Base Load Sequencing> tab.

Message	Meaning
No Communication	Communication with the slave cannot currently be established.
Fault	There is a fault at the compressor.
Switched off[1)]	The compressor is switched off and therefore not available.
Incorrect configuration	The Base Load Sequencing configuration indicates that there are no RS slaves connected. The slave, however, is a RS compressor. or The Base Load Sequencing configuration indicates that there are RS slaves connected. The slave, however is a FS compressor.
Not compatible[1)]	The slave is not compatible. Slave compressor controller or software version is/are not supported.

Chart 10-7: Compressor status messages

1) Not shown for slaves that are controlled by a compressor module (STD).

10.5 Compressor Settings and Information

"Compressor / Select a Setting" menu

Calling Up

1 Press the <Base Load Sequencing> tab.

2 Press the <Compressor x> button for the desired compressor.

– The "Compressor / Select a Setting" menu appears.

Description

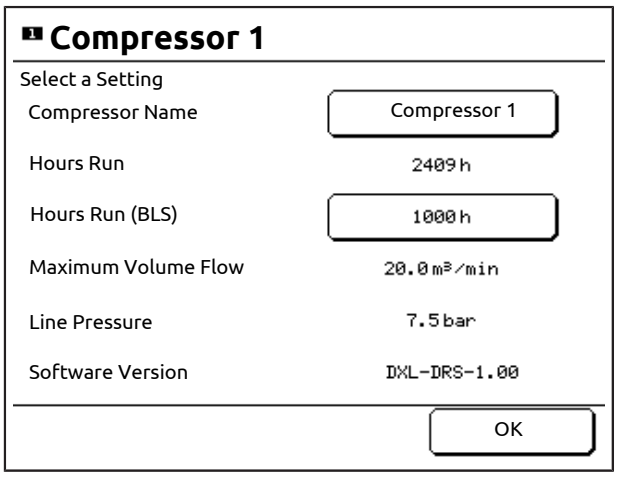


*Fig. 10-7: "Compressor / Select a Setting" menu (example **RS**)*

NOTE

Depending on the controller and type of compressor (RS or FS) there are differences in the assignment of the buttons. See the following descriptions.

Compressor Name

The compressor name can be modified as required.

Modifying the name of the compressor in the Base Load Sequencing group

1 Press the <Base Load Sequencing> tab.

2 Press the <Compressor> button of the desired compressor.

3 Press the <Compressor Name> button.

– The screen keyboard appears.

4 Press <Screen buttons> to enter the desired compressor name.

5 The <Back> button can be used to make corrections.

The <Cancel> button can be used to cancel the changes being made to the compressor name. The previously active compressor name is used.

6 Press the <OK> button.

✓ The name of the compressor is now changed.

– The "Compressor" menu appears.

– The compressor name that was entered appears on the <Compressor> button.

Hours Run

Indication of the actual (hours run) for the compressor.

If the compressor is connected via the STD module, the actual hours run for the compressor cannot be read serially. In this case, there is a button for setting the hours run. After pressing the button, an input menu appears for inputting the actual hours run for the compressor.

Hours Run (BLS)

The BLS sequence is redefined regularly based on the hours run (BLS) displayed here. If this setting deviates from the actual hours run on the compressor button, both values are shown on the compressor button.

To cyclically define a BLS sequence, see the chapter "BLS Functional Description / Defining a New BLS Sequence Based on Hours Run (BLS)".

Maximum Volume Flow

Display of the maximum volume flow. (**FS**)

Display of the maximum available volume flow at the current line pressure. (**RS**)

Some slaves require a manual setting. If so, there is a button available. After pressing the button, an input menu appears for inputting the maximum volume flow of the compressor.

Line pressure

Displaying the current line pressure measured by the compressor.

This line is not shown for compressors that are controlled by the compressor module (STD).

Software Version

Display of the software version of the controller.

10.6 Base Load Sequencing Settings

Calling Up

1 Press the <Base Load Sequencing> tab.

2 Press the <Settings> button.

– The "Settings" menu appears.

Description

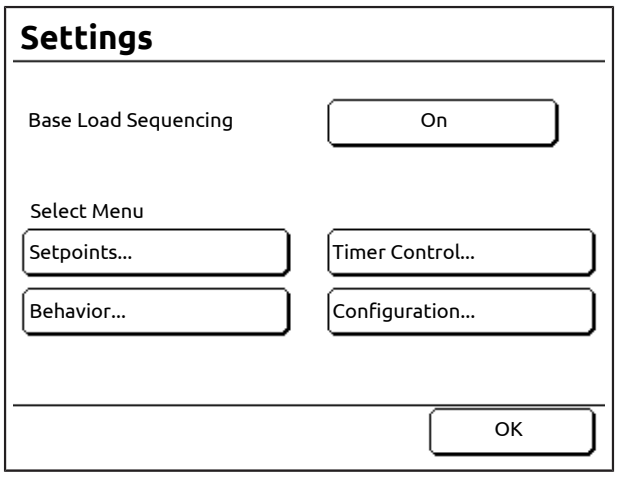


Fig. 10-8: BLS "Settings" menu

Base Load Sequencing <On> / <Off>

Switching Base Load Sequencing on and off.

Base Load Sequencing can be switched on only if the number of slaves is greater than zero. If Base Load Sequencing is switched on, the slaves are controlled by the master. The local setpoints for the slaves are ignored.

If base load sequencing is switched off, then the slaves run independently of the master and use their local setpoints. The BLS group continues to be displayed.

Setpoints

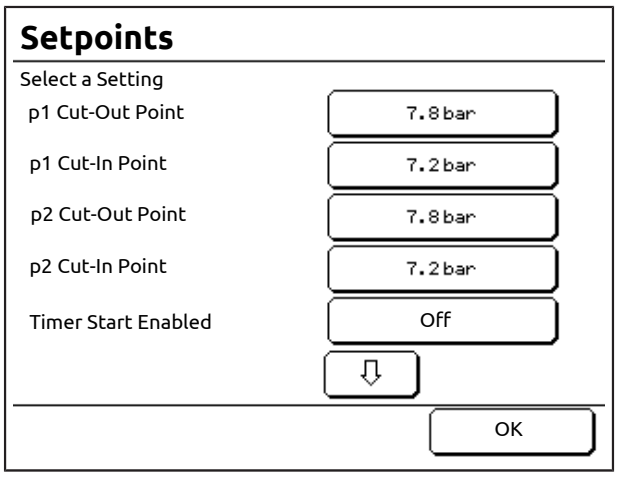


Fig. 10-9: BLS "Setpoints" menu

The operating behavior of the base load sequencing can be set in the "Setpoints" menu. The following submenus are available. The arrow keys can be used to scroll down to view additional items.

p1 Cut-Out Point
The maximum line pressure at which the BLS switches off the compressor at the far right of the sequence.

p1 Cut-In Point
The minimum line pressure at which the BLS switches on the next available compressor.

p2 Cut-Out Point
The maximum line pressure in the p2 pressure band at which the BLS switches off the compressor at the far right of the sequence.

p2 Cut-In Point
The minimum line pressure in the p2 pressure band at which the BLS switches on the next available compressor.

Timer Start Enabled
Activates the programmed start/stop settings for the BLS Timer Control, in order to start or stop the entire BLS group; e.g., on weekends.

p2 Timer Enabled On/Off
Activates the programmed settings for the BLS Timer Control for the p2 pressure band, in order to activate the second pressure band for the BLS.

Behavior

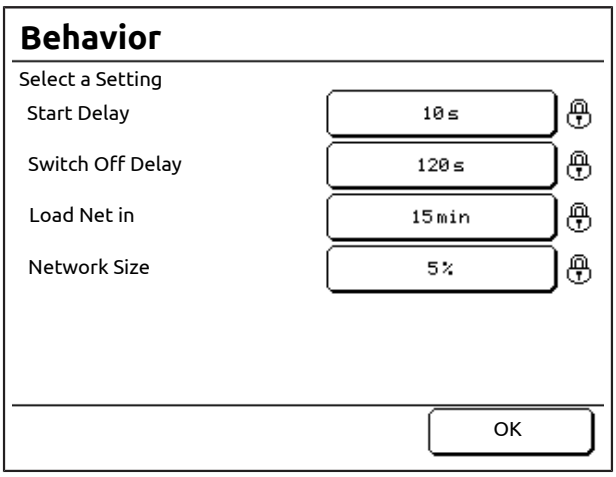


Fig. 10-10: BLS "Behavior" menu

NOTE

This menu must be unlocked using the "Service Level" code in order to make changes to the settings.

From this menu, the operating behavior of the BLS group can be adjusted to the operating conditions.

Start Delay
When the line pressure drops below the minimum value (Pressure Demand), the first compressor is switched on immediately. The next compressor is not switched on until the programmed start delay time has elapsed. Staged start-up ensure that the load on the local power supply is increased uniformly.

Switch Off Delay (**RS**)
When the master calculates that the compressed air demand in the network has dropped sufficiently to switch off one slave, a delay time (called the Switch Off Delay) is activated. If the compressed air demand remains low during this delay time, then the slave to the far right of the BLS sequence is switched off and the remaining compressors cover the demand for compressed air.
If the compressed air demand rises again before the programmed switch off delay has elapsed, then the slave is not switched off. This prevents the compressors from being switched on and off unnecessarily.

Load Net in
If the BLS is activated manually or by the programmed BLS Timer Control, the compressed air network is filled in the set time and only the number of compressors required to fill the compressed air network within this time period are switched on. The shorter the time setting, the more compressors are switched on.

Network Size
The master controller uses this value as a factor in performing calculations while the line pressure moves within the pressure band. This value should be changed only in case of severe variances in the compressed air demand.

The value is used to calculate how many compressors must be switched on (or off) to match the rise (or fall) in line pressure.

If the line pressure drops and the controller calculates that more than two compressors are required, for example, in order to cover the current demand for compressed air, then one or more compressors are started immediately as a preventive measure, instead of waiting until the minimum line pressure has been reached. The same occurs in reverse if the line pressure rises.

If the Network Size is set too large, then the controller will start (or stop) more compressors than necessary in order to counteract the pressure rise (or fall). Change the standard value only if the compressed air demand varies severely.

Enter a percentage "a" on the basis of a ratio of network volume size to the available volume flow supply from the group. This is calculated using the following formula:

$a = (100 * b) / c$

where

a = Network Size (%)

b = Network volume size (m^3)

c = Total supplied volume flow (m^3/min)

NOTE

The network volume "b" should correspond only to the volume of compressed air tanks that are closest to the compressor group. All lines and additional pressure vessels that are installed along the compressed air network should be ignored.

In case of questions, consult Gardner Denver.

Configuration

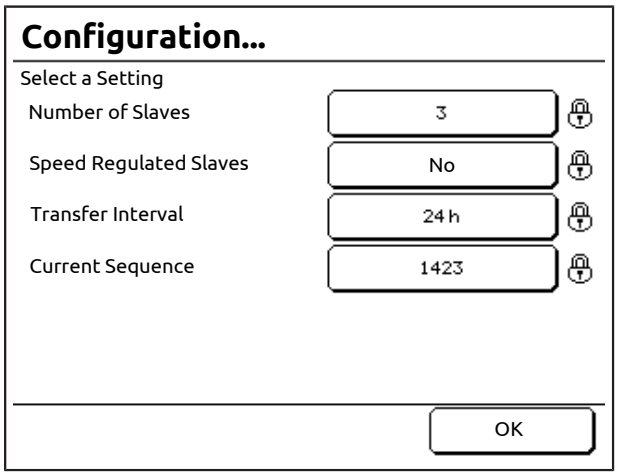


Fig. 10-11: BLS "Configuration..." menu

NOTE

This menu must be unlocked using the "Service Level" code in order to make changes to the settings.

In this menu, the slaves can be configured and settings for the BLS sequence can be made.

Number of Slaves
Enter the number of slaves that are connected to the master.

Speed Regulated Slaves (**RS**)Select whether the slaves have speed control or not.

Transfer Interval
Define the time interval at which the sequence is redefined based on the Hours Run (BLS) of the compressor. The transfer can be deactivated by entering 0 hours.

Current Sequence
The sequence can be defined manually, e.g., for test purposes or if a certain sequence is intended to be used permanently. To do so, enter Transfer Interval "0 h".

Timer Control

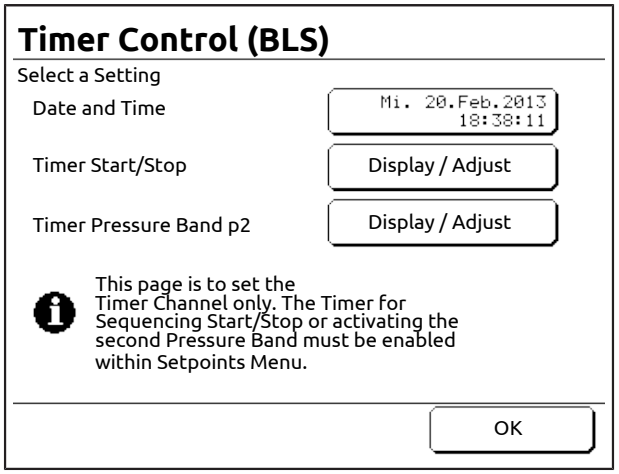


Fig. 10-12: BLS "Timer Control (BLS)" menu

The "Timer Control (BLS)" menu can be used to change settings for timer control operation.

The following submenus are available.

- "Timer Start/Stop"; for setting up timer control operation for the BLS group. See chapter "Configuration / Timer Control Operation".
- "Timer Pressure Band p2"; for setting up timer control operation for the BLS group in the second pressure band. See chapter "Configuration / Timer Control Operation".

The timer control for switching the BLS group on or off, or for activating the p2 pressure band must be activated in the BLS "Setpoints" menu.

A BLS group that is switched off by the timer control can be switched on by a programmable input. See the chapter "Configuration / Programmable Inputs / Override Timer Start".

The p2 pressure band can also be activated by a programmable input. See the chapter "Configuration / Programmable Inputs / Pressure Band p2".

10.7 BLS Functional Description

Control Algorithm

As long as BLS is switched off, the slaves run independently of the master and use their local setpoints.

When the BLS is activated manually or by the programmed BLS timer control, the network is pressurized within a defined period of time ("Load Net in"). To do so, only the required number of compressors is switched on in order to pressurize the network within this time period. After a power loss, this function is not activated, because in this case it is important to pressurized the network as fast as possible.

In the event of a line pressure sensor fault (Fault E406:Sensor B1 (Line Press.)), the master can no longer control the group and shuts off the BLS until the fault is removed and reset. If the master compressor switches itself off because a different fault than the line pressure sensor fault has occurred, or if it is manually stopped, the master continues to control the base load sequencing using the remaining slaves.

As soon as the line pressure is above the maximum line pressure setting, the compressor to the far right in the sequence is switched off. As long as the maximum line pressure is exceeded, additional compressors are switched off in sequence at short time intervals.

If the line pressure drops below the minimum line pressure, the next available compressor is started immediately, followed by additional compressors in a defined sequence ("Start Delay") if the line pressure remains low.

RS Master – FS Slaves: The line pressure is controlled precisely between the minimum and maximum line pressure by the speed-controlled compressor, within the available speed range. If the limits of the pressure band have been reached, then compressors are switched on or off as described above.

RS Master – RS Slaves: The speed-controlled compressors run at approximately the same speed and load if they are approximately the same size. After a compressor is restarted manually (e.g., after maintenance), the speed may not be synchronous for a brief period, until the compressor reaches its minimum or maximum speed limit for the first time.

Defining a new sequence based on Hours Run (BLS)

Once the transfer interval period has elapsed, the BLS master establishes a new sequence order on the basis of the Hours Run (BLS) of the compressors. The compressor with the lowest Hours Run (BLS) is placed in first position in the sequence and so on.

RS Master – FS Slaves: The speed-controlled compressor always remains in the first place, while the position of the slaves in the sequence is changed periodically.

The freely adjustable Hours Run (BLS) counters can be used to manipulate the sequence if necessary, for example if a new compressor is installed alongside older ones. See the following examples.

Example 1

	Compressor 1	Compressor 2
Hours Run (actual)	1000 h	1 h
Hours Run (BLS)	1000 h	1h

Chart 10-8: Example 1

Hours Run (BLS) are set to the same value as the actual operating hours. The new Compressor 2 will run in the base load position for about 1000 h, as it has the lowest Hours Run (BLS) value. After this, the two compressors are operated alternately.

Example 2

	Compressor 1	Compressor 2
Hours Run (actual)	1000 h	1 h
Hours Run (BLS)	1000 h	1000 h

Chart 10-9: Example 2

The Hours Run (BLS) have been adjusted in order to integrate Compressor 2 . The alternating sequence for both compressors begins immediately.

10.8 Trend and History Charts

Additional trend charts with active Base Load Sequencing

If Base Load Sequencing is active, the following trend charts are additionally available in the "Trends" menu.

- Volume Flow (BLS)
- Statistics Weekly Profile (BLS)

Volume Flow (BLS)

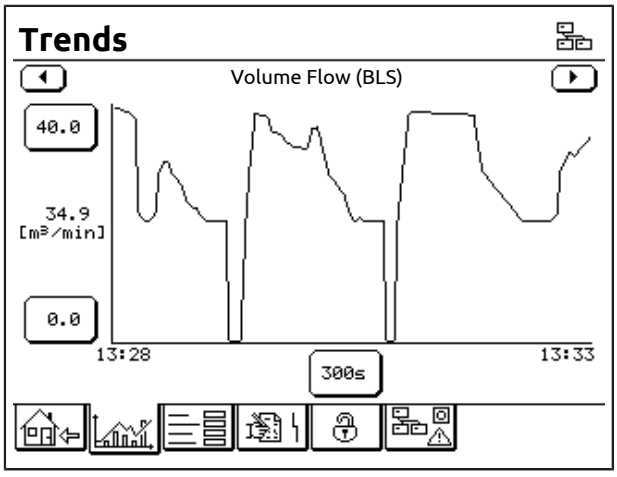


Fig. 10-13: "Volume Flow (BLS)" trend chart

This chart shows the Volume Flow curve for the Base Load Sequencing group over a defined period of time.

Statistics Weekly Profile (BLS)

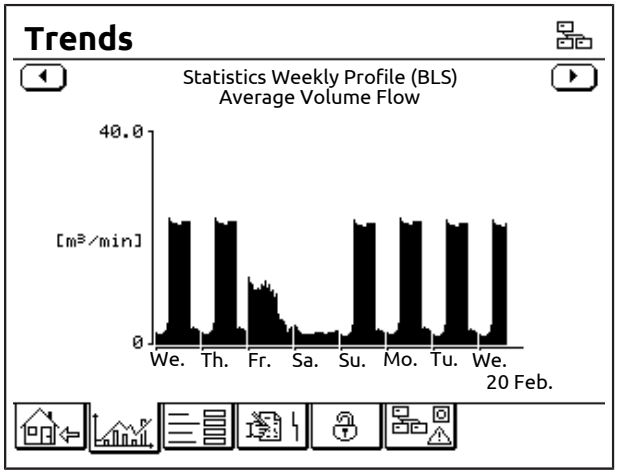


Fig. 10-14: "Statistics Weekly Profile (BLS)" trend chart

This bar chart shows the average Volume Flow for the Base Load Sequencing group for the last 8 days.

10.9 Installing the RS485:3 module

This chapter explains the retrofit installation of the RS485:3 module, if it was not already integrated in the controller at the factory. If the module is already installed then connection "X08" can be seen on the back of the controller.

The RS485:3 module expands the controller by adding a third RS485 interface.

Ordering information:

- Part no.: ZS1075506
- Scope of delivery:
  - RS485:3 module
  - Plug set for slave controllers
  - Installation instructions for the RS485:3 module

Installation

NOTE

Follow the installation instructions for the RS485:3 module in order to install the RS485:3 module.

DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed by specialized electrical technicians only.

⇨ For speed-controlled models (RS) there is a risk of electric shock from the charged capacitors. Disconnect the compressor and wait 10 minutes before touching electrical components.

⇨ Check the DC bus voltage.

1 Turn OFF the main switch.
2 Open the switch cabinet door and swing it open sufficiently.
3 Disconnect all controller connections.
4 Remove the cover from the controller.
5 Insert the RS485:3 module in the sockets provided.
6 Ensure that all pins are in the socket and not next to it.
7 Close the controller cover.
8 Restore all the connections to the controller.
9 Close the switch cabinet door.

Wiring method

We strongly recommend that you use shielded and twisted pair (TP) cables type 2 x 2 x 0.25 ... 0.75 mm².

The total bus cable length must not exceed 1200 m.

The RS485 interfaces for master and slave compressor controllers should form a bus structure, that is, all compressors are connected in series.

The following illustration shows examples of correct and incorrect wiring of the compressor station.

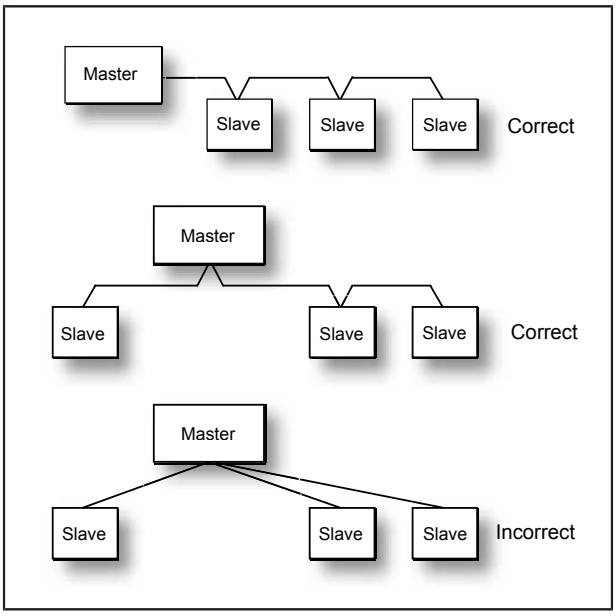


Fig. 10-15: Wiring of the compressors

Circuit Diagram

Consider only the terminal numbers on the plug in question for installation, that is, do not follow any other labeling on the slaves. The following illustration shows examples for all supported hardware models. The GD PILOT TS master can control a maximum of 3 slaves.

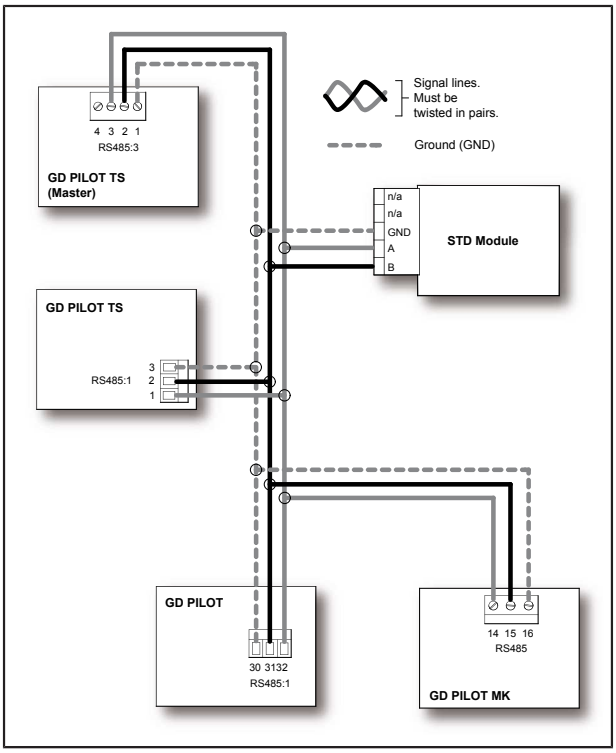


Fig. 10-16: Circuit Diagram

Setting up the communication parameters of the slave compressor controller

For proper operation, the required minimum software version must be installed on the controllers. See the table "Required Software Versions".

Set the communication parameters on the slave controllers as follows:

1 Set the RS485 protocol to ModBus. See the operating instructions for the slave controller.

2 Set the slave baud rate to "9600". See the operating instructions for the slave controller.

3 Set the RS485 address for the slave. See the operating instructions for the slave controller. The required RS485 address is indicated on the <Compressor> button in the "Base Load Sequencing (BLS)" menu.

NOTE

The STD module is set up using DIP switches. See the next chapter.

10.10 Installing the compressor module (STD)

DANGER

Electric shock

Deadly electrical voltage

⇨ Work on the electrical equipment may be performed only by authorized electrical technicians.

General

The compressor module (STD) is used in order to connect any controller other than a DELCOS XL, GD PILOT TS, DELCOS PRO, GD PILOT, or DELCOS 3100, GD PILOT MK to the GD PILOT TS master. The module is connected to the master via the integrated RS485 interface.

The status of the compressor is recognized by the digital inputs of the compressor module and is send to the master via its RS485 interface.

In addition, the commands for controlling the compressor are transmitted via the RS485 interface from the master to the compressor module (STD) and carried out by the digital outputs.

Ordering information:

- Part no.: 100016166
- Scope of delivery:
  - Compressor module (STD)
  - RS485 connector

Technical data

Part	Value
Supply voltage	110..230 V AC/DC ±10 %
Power consumption	1 VA
Digital Inputs	24..230 V AC/DC ±10 %
Digital outputs	Potential-free relay outputs, max. 240 V AC / 1 A
Ambient temperature	Operation from 0 to 55 °C (32 °F to 131 F) Storage from -25 to +75 °C (-13°F to 167 °F)
Dimensions (W x H x D)	100 x 110 x 70 mm
Protection Class	IP30
Installation	DIN rail TS35

Chart 10-10: Technical data

Setting the address of the compressor module (STD)

NOTE

The DIP switches should be set before installing the compressor module (STD) in the compressor electrical enclosure.

The DIP switches are located behind a cover on the right side of the module.

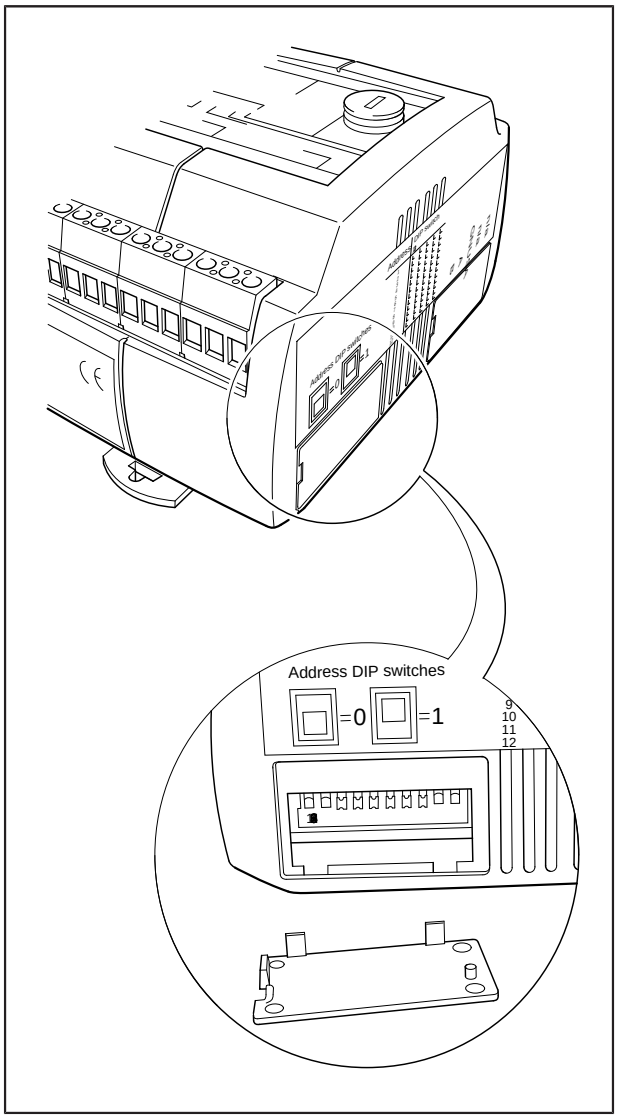


Fig. 10-17: DIP switch positions

The following table shows the required, valid DIP switch settings for communication with the GD PILOT TS Master:

Address	DIP Switch									
	1	2	3	4	5	6	7	8	9	10
2	0	1	0	0	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0	0	0

Chart 10-11: Compressor module (STD) DIP switch settings

1= On (up)

2= Off (down)

Mounting and Installation

Mounting and installation of the compressor module (STD) must be done in accordance with local conditions and must be performed by an electrician.

NOTE

The connection of the compressor module (STD) shown in these operating instructions is suitable for most compressor control systems.

These operating instructions can only describe the function of the compressor module (STD), but not the detailed installation in any possible compressor model (third party manufacturers). Installation and functional implementation must be done in accordance with the associated compressor documentation and possibly in consultation with the compressor manufacturer.

Digital Inputs

NOTICE

Property damage

If a compressor module (STD) is installed, the pressure switch on the compressor may no longer provide any protective against overpressure.

⇨ For compressors that are not equipped with an independent overpressure detection system, it is recommended that a pressure switch be integrated in the fault circuit of the compressor, so that any local overpressure situation will stop the compressor independently of the GD PILOT TS master.

The module detects the compressor status via three digital inputs, the status of which is shown by three LEDs on the module. A voltage of 24 to 230 V AC or DC may be connected to each input.

There are three connections available for each input:

- 24..48 V UC connection
- 110..230 V UC connection
- COM connection

The signal voltage used must be fed to the appropriate connection.

"Operating" digital input

A signal must be connected to this input that indicates that the compressor is ready to produce compressed air if a remote On-Load signal is sent.

For compressor controllers that do not have such a signal, the input can be connected to a common fault signal for the compressor.
This informs the GD PILOT TS master, that there is no fault at the compressor.

"Motor" digital input

Contacts A1 and A2 of a main contactor coil can be connected directly to this input.

If the compressor controller energizes the coil of the main contactor, the compressor module detects the voltage across the coil and informs the master that the motor is running.

For compressor controllers that have no main contactor, any output can be used that indicates that the motor is running, e.g., a fan contactor or soft-start signal.

"On-Load" digital input

The control valve coil can be connected directly to this input.

If the compressor controller energizes the coil of the control valve, the compressor module detects the voltage across the coil and informs the master that the compressor is On-Load.

Any output that indicates that the compressor is On-Load can also be used.

Digital outputs

Digital outputs

NOTICE

Property damage

If a compressor module (STD) is installed, the pressure switch on the compressor may no longer provide any protective against overpressure.

⇨ For compressors that are not equipped with an independent overpressure detection system, it is recommended that a pressure switch be integrated in the fault circuit of the compressor, so that any local overpressure situation will stop the compressor independently of the GD PILOT TS master.

The compressor is controlled by two or three digital outputs. The status of these outputs is indicated by three LEDs.

These digital outputs are two-way contacts and can be adjusted to the requirements of the compressor controller, in that the appropriate terminals are selected.

"Enable Remote On-Load" digital output

Do not use this output to switch the compressor on and off.

This output should cause a changeover from internal controls to control by means of the digital outputs of the compressor module.

"Remote On-Load" digital output

Do not use this output to switch the compressor on and off.

This output switches the compressor to On-Load. This remote On-Load signal should be active when the programmable output "Enable Remote On-Load" is sent to the compressor controller.

"Remote Partial On-Load" digital output

This output is not used for this application.

Connection assignments and examples

Connection assignment

Connection	Function	
6	"Operating" digital input	COM
7		110...230 V UC
8		24...48 V UC
9	"Motor" digital input	COM
10		110...230 V UC
11		24...48 V UC
12	"On-Load" digital input	COM
13		110...230 V UC
14		24...48 V UC
16	Power supply 110...230 V AC/DC (±)10%	(~) (+)
17		(~) (-)
21	"Enable Remote On-Load" digital output	COM
22		NC
23		NO
26	"Remote On-Load" digital output	COM
27		NC
28		NO
31	"Remote Partial On-Load" digital output	COM
32		NC
33		NO

Chart 10-12: Connection assignment

Compressor status messages

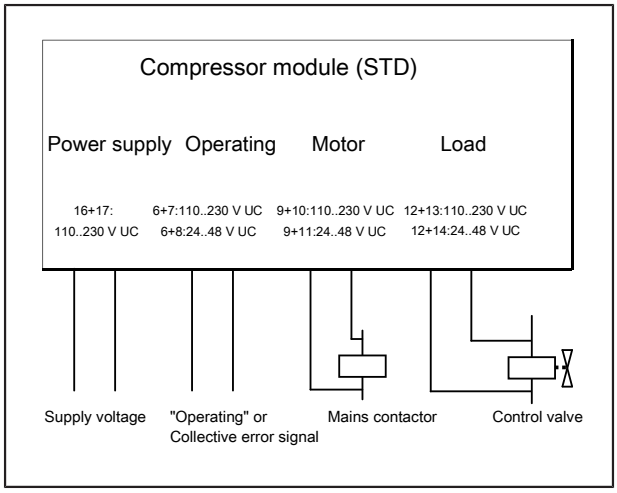


Fig. 10-18: Connections for status messages

Controlling a compressor with a line pressure sensor and electronic compressor control (example)

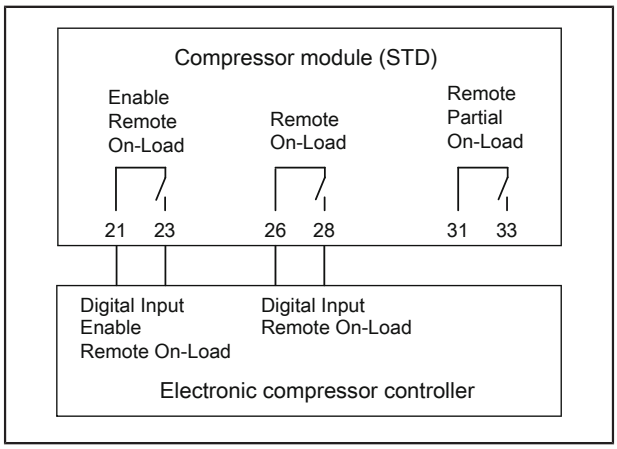


Fig. 10-19: Line pressure sensor and electronic compressor controller

Controlling a compressor with a line pressure switch (example)

NOTICE

Property damage

If a compressor module (STD) is installed, the pressure switch on the compressor may no longer provide any protective against overpressure.

⇨ For compressors that are not equipped with an independent overpressure detection system, it is recommended that a pressure switch be integrated in the fault circuit of the compressor, so that any local overpressure situation will stop the compressor independently of the GD PILOT TS master.

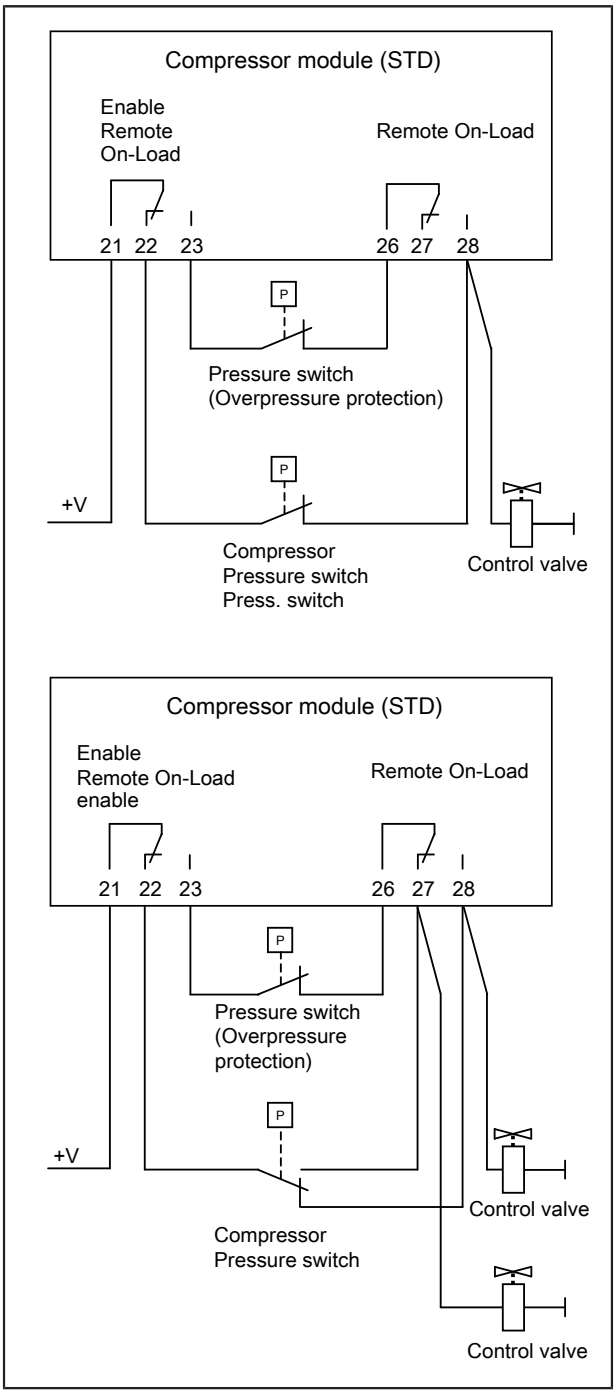


Fig. 10-20: Line pressure switch controller

11 APPENDIX

11.1 Status messages

Display	Explanation
Fault <Fault number>:<Fault message>	A fault has been detected and the compressor has been switched off. See the chapter "Troubleshooting".
Ready to start	The compressor is ready to start.
Motor starting…	The drive motor is starting.
Switch-off phase "x" s	The soft-stop is in progress and will be completed in "x" seconds.
On-Load "x" rpm (min.)	(**RS**) The compressor is running under load at "x" rpm ("min" indicates that the drive motor is currently running at the lowest permissible speed.)
On-Load "x" rpm	(**RS**) The compressor is running On-Load at "x" rpm.
On-Load "x" rpm (max)	(**RS**) The compressor is running under load at "x" rpm ("max" indicates that the drive motor is currently running at the highest permissible speed.)
On-Load	(**FS**) The compressor is running under load.
Off-Load "xxx" rpm	(**RS**) The compressor is currently running in Off-Load in continuous operation at the lowest permissible speed.
Off-Load	(**FS**) The compressor is currently running Off-Load in continuous operation.
Off-Load Run-On Time "x" s	(**FS**) The run-on timer has been activated and the compressor will switch to standby mode in "x" seconds.
Off-Load "xxx" rpm Run-On Time "x" s	(**RS**) The Run-On Timer has been activated and the compressor will switch to standby mode in "x" seconds.
Caution: Start by remote control…	Caution: The compressor can be started by remote control at any time.
Caution: Start by timer control on <Day of the Week> at <Time> ...	Caution: The compressor is started automatically by the timer control on the day of the week indicated, at the time indicated.
Caution: Start on ?? at ??:??.	This message (including all the "????") is displayed if no valid timer schedule has been programmed (all 8 channels are "Off"). This means that the compressor will never be started. Check the settings in the "Timer Control" menu.
Caution: Start with Pressure Requirement...	Caution: This Compressor will automatically start up as soon as there is a pressure demand on the network.

Chart 11-1: Status messages

Display	Explanation
Caution: Start after pressure relief...	Caution: The compressor is started automatically as soon as the internal pressure in the compressor stage has fallen below the start enable value.
Caution: Start with external start approval…	If a programmable input has been activated with the function "Start Protection", the compressor starts as soon as the approval that this input is waiting for is provided.
Caution: Start in "x" s after power loss…	Caution: A power failure occurred for this compressor. The compressor will be restarted automatically in "x" seconds.
Caution: Start in "x" min after dryer pre-run…	Caution: This compressor will be started automatically as soon as the dryer pre-run time has elapsed.
VSD Initializing...	(**RS**) The converter is initialized.
VSD is setting parameters (x %)…	(**RS**) Parameters are being sent to set up the converter.

Chart 11-1: Status messages

11.2 Settings

Compressor data

The compressor reference number and setup codes can be entered in this table.

Compressor Reference Number	
Setup Code	

Chart 11-2: Compressor data

Setting values

The set values from the "Settings" menu can be entered in this table.

Parameter	Number / Setting
Hour Meters	
Hours Run	
Hours On-load	
Hours to Next Service	
Control	
p1 Cut-Out Point	
p1 Cut-In Point (**FS**) / p1 Target Pressure (**RS**)	
p2 Cut-Out Point	

Chart 11-3: Setting values

Parameter	Number / Setting
p2 Cut-In Point (**FS**) / p2 Target Pressure (**RS**)	
Operating Mode	
Remote Start Enabled	
Timer Start Enabled	
p2 Timer Enabled	
Auto. Restart Enabled	
- Max. downtime	
- Restart delay	
Dryer Pre-Run Time	
Timer Start/Stop	
Channel 1	
Channel 2	
Channel 3	
Channel 4	
Channel 5	
Channel 6	
Channel 7	
Channel 8	
Timer Pressure Band p2	

Chart 11-3: Setting values

Parameter	Number / Setting
Channel 1	
Channel 2	
Channel 3	
Channel 4	
Channel 5	
Channel 6	
Channel 7	
Channel 8	
Programmable Inputs and Outputs	
Input 1	
Input 2	
Input 3	
Input 4	
Input 5	
Output 1	
Output 2	
Output 3	
Output 4	
Communication	
RS485:1 Address	
RS485:1 Baudrate	
RS485:3 Address	
RS485:3 Baudrate	
Configuration	
Language	
Temperature Unit	
Pressure Unit	
Volume Flow Unit	
Maximum Volume Flow	
Minimum Volume Flow (**RS**)	
Ext. Speed Limit (min) (**RS**)	
Ext. Speed Limit (max) (**RS**)	
Factory Settings	

Chart 11-3: Setting values

Parameter	Number / Setting
Compressor Rated Pressure	
Start Protection	
Heavy Startup (**FS**)	
Discharge Temp. Warning	
Discharge Temp. Fault	
Minimum Start Temperature	
Run-On Time	
Soft Stop Time	
Star-Delta (**FS**)	
Cooling Control	
Software Version	
Controller Ref.-No.	
Base Load Sequencing	
Setpoints	
p1 Cut-Out Point	
p1 Cut-In Point	
p2 Cut-Out Point	
p2 Cut-In Point	
Timer Start Enabled	
P2 Timer Enabled	
Behavior	
Start Delay	
Load Net in	
Network Size	
Timer Control	
Channel 1	
Channel 2	
Channel 3	
Channel 4	
Channel 5	
Channel 6	
Channel 7	
Channel 8	

Chart 11-3: Setting values

Parameter	Number / Setting
Configuration	
Number of Slaves	
Transfer Interval	

Chart 11-3: Setting values

1 Depends on the version; see the compressor operating instructions

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