hydrovane

User Manual (Original Instructions)

HYDROVANE *Pro*
Electronic Controller

Stationary Air Compressors

GB

CC1092267A 04/2013

Attention: Important for RS compressors

Risk of electric shock from charged capacitors!

Always disconnect the system from the power supply and then wait a further 10 minutes before touching electrical components. The power capacitors take this time to discharge.

Check the DC bus voltage at the system terminal strip of the inverter by measuring between the +DC and -DC terminals and the chassis. The exact position can be found in the operating manual of the inverter, the voltage must read zero for all three measurements.

Controller Ref: CC1054325 Single Speed (SS)
Software version HPro-V1.02

Controller Ref: CC1068566 Regulated Speed (RS)
Software version HPro-RS-V1.04

Hydrovane adopt a policy of continual product development. The information in this handbook, whilst fully up to date when issued, may be subject to change without notice.

Contents

1.1 Keys

When power is applied the controller display illuminates to show compressor output values and status messages.

The two keys on the left above and below the green and red LED's have a single function:

Start key.

Stop key.

The three keys on the right next to the display have a dual function:

+ Call up or exit menu / sub-menu.

Switch to next sub-menu / menu item, or reduce a value.

Switch to previous sub-menu / menu item, or increase a value.

Reset/Enter key.
In a menu / sub-menu, the reset key functions as an enter key.

1.2 Status indicator (display / light signals)

The controller is fitted with a three-row display.

The first row permanently displays compressor discharge temperature and system pressure.

The following symbols may also be used in the 1st row:

p_2 Second pressure range

Remote start / stop activated

The second row is reserved for menu items, values like the total service hours and set values like nominal pressure are viewed here.

The third row shows status, fault and warning messages.

The HYDROVANE *Pro* is fitted with two light signals (red, green).

Flashing, system is ready, the motor may start up automatically at any time.
Lit up permanently, the drive motor is running

Flashing slowly, warning, maintenance due
Flashing rapidly, fault, unit is stopped until fault has been rectified

The red light signal only goes out once the warning or fault has been rectified and confirmed using the Reset/Enter key.

1.2.1 Speed indicator in the display

The speed is displayed in the 2nd row of the display. If the menu navigation is displayed, the speed display is faded out.

Examples of speed displayed:

[_____▮___] 3290rpm

Speed in controlled range.

[▮_____] 1300rpm

Speed in lower controlled range, minimum speed not yet reached.

[|◄_____] 1280rpm

Minimum speed reached.

[_____►|] 3650rpm

Maximum speed reached.

1.2.2 Status messages in display

The status messages are shown in the 3rd row of the display. With longer texts, the indication may 'alternate'.

Status messages:

INITIALIZATION VSD...

The compressor's supply voltage has been switched on. The control system is being initialised and is setting up communication to the inverter (VSD).

READY TO START

The unit is ready to start and can be switched on (see Section 2.1).

WARNING START WITH ...

alternating with

... PRESSURE REQUIREMENT

The unit has been switched on and is ready. The unit starts automatically following the pressure requirement from your system.

WARNING START AFTER ...

alternating with

... DE-PRESSURISE

The unit has been switched on and is ready. However the internal unit pressure is above the start-up protection level. Once the unit has been de-pressurised, the compressor starts automatically.

WARNING START WITH ...

alternating with

... TIMER CONTROL

The unit has been switched on and is ready. The compressor is now waiting for start approval from the timer (see Section 3.3)

WARNING START BY ...

alternating with

... REMOTE OPERATION

The unit has been switched on and is ready. Remote unit operations have been activated in the control menu. The unit starts via a remote signal (see Section 3.8).

WARNING START IN xxs

alternating with

... AFTER POWER LOSS

A power loss has caused the unit to shut down. The 'automatic restart' function has been selected in the control menu. The unit now starts automatically after a previously set time (see Section 3.1.5)

WARNING START IN

alternating with

... AFTER DRYER PRE-RUN

The unit has been switched on and is ready. The unit starts automatically after the dryer pre-run (see Section 3.1.3).

MOTOR START PHASE

The unit has been switched on and the motor is starting

ON-LOAD

The compressor is on-load (see Section 2.4).

OFF-LOAD

The Compressor is running off-load (see Section 2.4).

OFF-LOAD XXs

Compressor is running off-load and will shut down in XX seconds (see Section 2.4).

SOFT STOP TIME in xxs

The system has been switched off. The unit stops after the soft-stop time of xx seconds.

FAULT: <fault text>

The unit has been shut down due to a fault. You will find explanations of the fault texts in Section 4.

WARNING <warning text>

There is a warning in place. Ignoring a warning may result in a fault and shut down the compressor. You will find explanations of the warning texts in Section 4.5.

MAINTENANCE DUE

A maintenance interval is about to lapse or has already done so, you will find more details in Section 2.6.

1.3 Displaying / changing values

1.3.1 Selecting values

You can display values, e.g. total hours, and set the control system, e.g.cut-in and cut-out times, in the sub-menu.

To reach the main menu, you must press the ↑+↓ keys at the same time.

Use the ↑ or ↓ keys to switch between the following sub-menus:

[MAINTENANCE SCHED.]
[CONTROL MENU]
[FAULT MEMORY]
[TIMER CONTROL]
[LIMIT VALUES]
[OPTIONAL IN-/OUTPUTS]

Enter a sub-menu by pressing the ↵ key.

Use the ↑ or ↓ keys to go to a menu item.

To exit the sub-menu, you must press the ↑ + ↓ keys at the same time.

To exit the main menu, you must press the ↑ + ↓ keys at the same time again.

1.3.2 Changing values

Enter the sub-menu and then the menu item containing the value you wish to change.

Press the ↵ key, the value flashes. Press the ↑ or ↓ key to change the value, then press the ↵ key again to confirm the value.

1.4 Selecting language

Change the language by pressing the ↵ + ↑ or ↵ + ↓ keys. Press these keys at the same time until the right language appears.

1.5 Setting pressure

Compressor control/speed is achieved using a pressure transducer signal to the controller and/or inverter PID to match output to system demand.

In the [CONTROL MENU] menu you have to set the maximum pressure CUT-OUT POINT and the minimum pressure CUT-IN POINT or TARGET PRESSURE.

In the range between the CUT-IN POINT or TARGET PRESSURE and CUT-OUT POINT the output or speed of the compressor is controlled or regulated to match the compressed air requirement.

Example:

CUT-OUT POINT	8.5 bar (123 psi)
CUT-IN POINT (SS)	7.5 bar (109 psi)
TARGET PRESSURE (RS)	8.0 bar (116 psi)

The output of the compressor is controlled between these points or speed is regulated so that the set pressure of 8.0 bar (116 psi) is maintained.

When pressure reaches the CUT-OUT POINT of 8.5 bar (123 psi), the compressor switches to off-load.

If pressure falls to the CUT-IN POINT of 7.5 bar (109 psi), the compressor is switched back into on-load.

Maximum pressure is set in the [CONTROL MENU]-sub-menu. The ↑ + ↓ keys have to be pressed at the same time. You are then taken to the main menu. Use the ↓ key to switch to the [CONTROL MENU] sub-menu, then press the ↵ key.

The CUT-OUT POINT menu item now appears on the display. Pressing the ↵ key causes the value to flash. Increase or decrease this value using the ↑ or ↓ keys, confirm the value set by pressing the ↵ key.

Note

The controller checks that the value set can be used. The maximum pressure CUT-OUT POINT must be at least 0.2 bar more than the CUT-IN POINT or TARGET PRESSURE.

You may therefore have to set the minimum pressure first. To keep the number of stop/starts to a minimum, the difference between the CUT-OUT POINT and CUT-IN POINT or TARGET PRESSURE should not be too small.

Minimum pressure is set in the [CONTROL MENU] sub-menu press the ↓ key to go to the CUT-IN POINT or TARGET PRESSURE menu item.

Pressing the ↵ key causes the value to flash.

You can increase or decrease this value using the ↑ or ↓ key, confirm the value set by pressing the ↵ key.

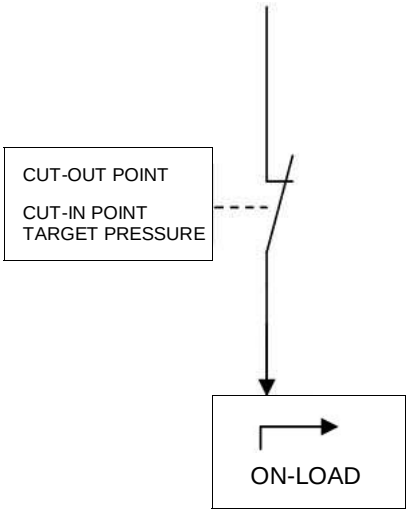


Fig. 1 Pressure Settings

1.6 Setting time/date (timer)

The HYDROVANE *Pro* will retain its settings after a power loss lasting about two to three weeks. If power is lost for longer periods, the timer's time and date are lost and have to be re-entered.

Press the ↑ + ↓ keys at the same time. Use the ↓ key to go to the [TIMER CONTROL] sub-menu and press the ↵ key.

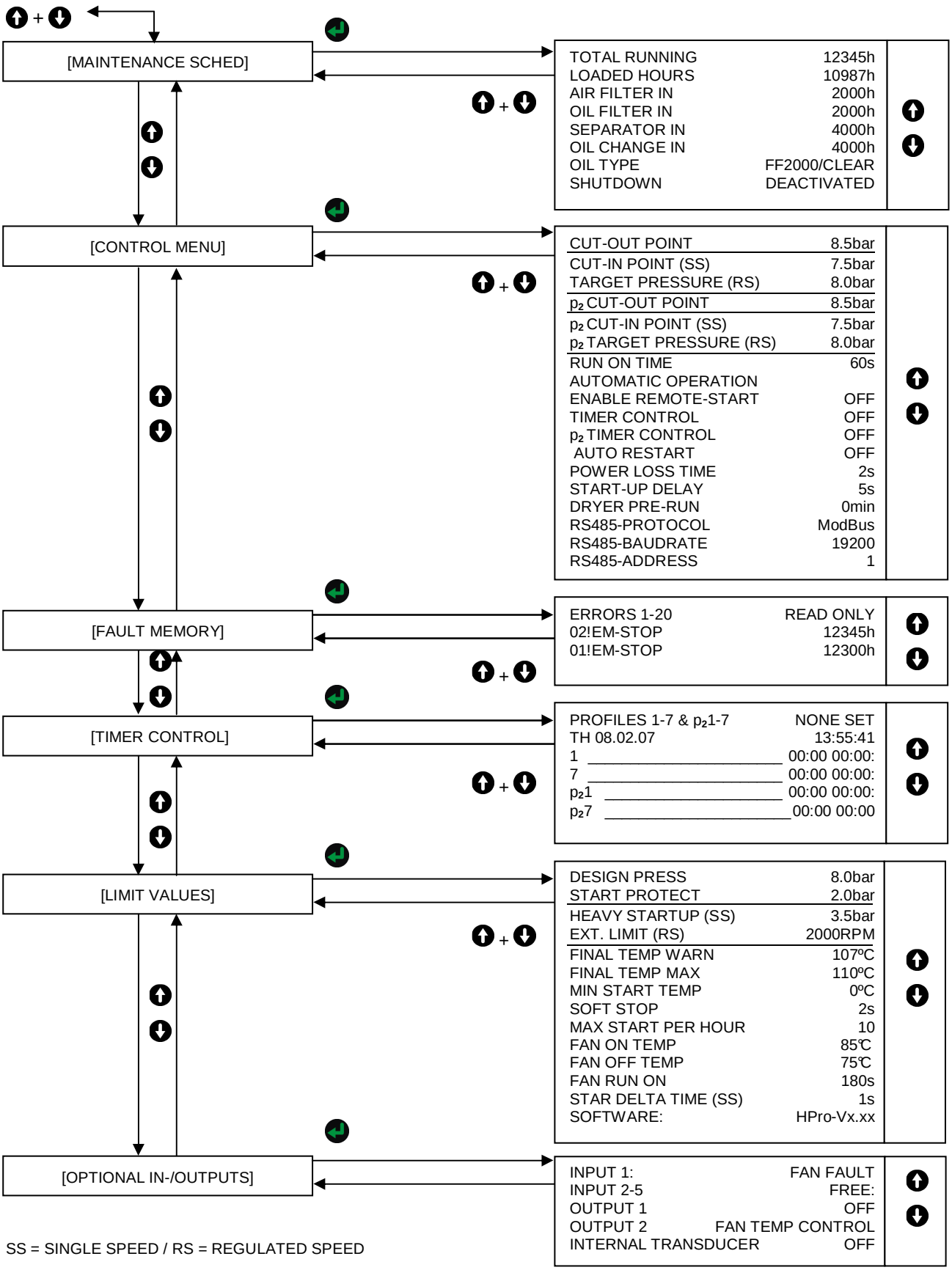
The date and time are displayed in the following format:

TU 30.10.07 12:10:34

Press the ↵ key, the left-hand value (day of the week) starts to flash. Use the ↑ or ↓ keys to select, confirm by pressing the ↵ key.

All values can now be set in succession using this procedure. When the last value (seconds) has been set, the timer is active, exit the menu by pressing the ↑ + ↓ keys twice at the same time.

1.7 Menu structure (values are examples)



SS = SINGLE SPEED / RS = REGULATED SPEED

2.1 Starting the unit

Caution

If the unit is ready, i.e. the green LED is flashing, the compressor may automatically start at any time.

Use the isolator to switch the unit on.

If warning or fault messages appear in the third row of the display, these first have to be rectified and confirmed using the key.

Then start the unit by pressing the key on the HYDROVANE *Pro*.

2.2 Emergency stop button

The EMERGENCY stop button is located below the HYDROVANE *Pro*. Only use the emergency stop button to shut down the unit in real emergencies. When shutting down normally, always use the key.

2.3 Switching off the unit

The unit is switched off by pressing the key on the HYDROVANE *Pro*. However the unit will only stop after a 2-second soft-stop.

The soft-stop is preset to protect the compressor.

2.4 On-load/off-load

Descriptions of the CONTINUOUS OPERATION and AUTOMATIC OPERATION modes can be found in section 3.1.1.

OFF-LOAD:

If there is no pressure requirement from the system with the unit in CONTINUOUS OPERATION, it switches to OFF-LOAD. This means that the motor and compressor run but no air is delivered into the system.

The unit behaves differently in AUTOMATIC OPERATION mode. If there is no pressure requirement, the compressor switches to OFF-LOAD. The unit is switched off after a run-on time that is shown on the display. If there is another pressure requirement during the run-on time, the unit is automatically switched on.

ON-LOAD:

If the unit is in ON-LOAD, air is delivered into the system.

2.5 Warning/fault messages

Warning and fault messages are shown in the third row of the display. The red light signal flashes at the same time.

A table containing messages and suggestions for how to remedy them is in Section 4.5.

2.5.1 Warning messages

If there are warnings, the red light signal flashes slowly. The unit does not automatically shut down when there are warnings. However ignored warnings may cause faults.

Rectify what is causing the warning and press the key to cancel the warning.

2.5.2 Fault messages

Fault messages result in the unit automatically shutting down or do not permit the unit to be started.

Once you have rectified the problem, you must confirm by pressing the key.

2.6 Maintenance

Maintenance intervals are preset when the compressor is supplied, more information is available in the unit's user handbook.

It may be necessary to adjust maintenance intervals to suit ambient conditions. For example, the air filter‘s level of contamination depends on the compressor's intake conditions.

The HYDROVANE *Pro* allows the operator to program various maintenance intervals (see section 2.7).

If there is a maintenance interval at +200h (hours), the compressor is not automatically shut down. The MAINTENANCE DUE message appears on the display.

If you want the compressor to automatically shut down when a maintenance interval is due, you have to set this function.

Go to the [MAINTENANCE SCHED.] sub-menu. Go to the last SHUTDOWN OFF menu item, press the key. The OFF value starts to flash. By pressing the key you can change the value to ON, confirm by pressing the key.

The compressor now automatically shuts down when the -100h maintenance interval is displayed.

Once maintenance is complete the interval should be reprogrammed back to 2000h. Confirm the maintenance message using the key.

2.7 Programming maintenance intervals

To program a maintenance interval, go to the [MAINTENANCE SCHED.] sub-menu. Here you can program the maintenance intervals for:

AIR FILTER IN	2000h
OIL FILTER IN	2000h
SEPARATOR IN	4000h
OIL CHANGE IN	4000h

Go to the menu item required and press the key, the value then starts to flash. Use the or key to set the value to an interval of 0….9999, confirm your entry with the key.

If you do not want the maintenance intervals to be monitored, program the intervals to more than 9999 hours in the various menu items. ---- appears on the display. The maintenance interval is then blocked.

Note

Values shown are examples only, those used in your unit may be different.

2.8 Total/load hours counter

Press the + keys at the same time to reach the main menu. Press the key, you are now in the [MAINTENANCE SCHED.] sub-menu. Use the or keys to go to the various menu items.

The total hours counter states the time for which your unit has been in on-load and off-load.

The load hours counter states the time for which your unit has been in on-load.

Note

The total and load hours are lost if the HYDROVANE *Pro* is replaced.

3.1 [CONTROL MENU] sub-menu

The most important parameters of the [CONTROL MENU] menu have already been explained in Section 1.5 Operator Controls. This section simply contains an overview and explanation of additional functions.

3.1.1 Operating modes

Go to the [CONTROL MENU] sub-menu, use the ↓ key to go to the AUTOMATIC OPERATION menu item. Press the ↵ key, AUTOMATIC OPERATION starts to flash. Use the ↑ key to switch to CONTINUOUS OPERATION, confirm selection by pressing the ↵ key.

You can choose from two operating modes:

AUTOMATIC OPERATION is the most economical of your compressor's operating modes. If there is no system demand, the compressor is shut down after the RUN-ON TIME. The control system automatically recognises when compressed air is needed again. The unit then starts up straight away.

CONTINUOUS OPERATION is only needed for some special applications. When in this operating mode, the motor is not shut down if there is no system demand. The compressor runs continually in off-load mode when there is no pressure requirement.

3.1.2 Second pressure range (p_2)

The difference between the maximum and minimum pressure is called the pressure range. The second pressure range function allows you to use another pressure range in addition to the pressure range already set (see Section 1.5). This could be used for example to implement night-time running at lower pressures.

The settings for the second pressure range function are in the [CONTROL MENU] sub-menu. Menu items are:

p_2 CUT-OUT POINT	8.5 bar (123 psi)
p_2 CUT-IN POINT (SS)	7.5 bar (109 psi)
p_2 TARGET PRESSURE (RS)	8.0 bar (116 psi)
p_2 TIMER CONTROL	OFF

Use p_2 CUT-OUT POINT and p_2 CUT-IN POINT or p_2 TARGET PRESSURE to set the pressure switching points. Use the p_2 TIMER CONTROL ON menu item to activate the timer for the second pressure range.

You can also activate / deactivate the second pressure range using an external potential-free contact (see Section 3.5).

Section 3.3.2 contains a description of how to set the timer for the second pressure range.

Note

Values shown are examples only, those used in your unit may be different.

3.1.3 Dryer pre-run

If using an external dryer, you can provide the dryer with a specified pre-run time. The compressor is then only started after this pre-run time.

To set the pre-run time, go to the [CONTROL MENU] sub-menu. From there use the ↓ key to go to the DRYER PRE-RUN 0min menu item. Once you have pressed the ↵ key, the 0min value starts to flash. Use the ↑ or ↓ keys to set the pre-run time you want, confirm your entry using the ↵ key.

3.1.4 RS 485 communication

You can perform the settings for RS 485 communication in the [CONTROL MENU] sub-menu.

These menu items are of relevance.

RS485-PROTOCOL	ModBus
RS485-BAUDRATE	19200
RS485-ADDRESS	1

The HYDROVANE *Pro* has a serial RS485 interface. This interface uses the ModBus RTU protocol.

ModBus interfaces and drivers are available from many well-known manufacturers of programmable logic controllers (PLC).

You can set the baud rate you want in the RS485-BAUDRATE menu item.

You can set the participant number you want in the RS485-ADDRESS menu item.

Note

Values shown are examples only, those used in your unit may be different.

3.1.5 Automatic re-start

Caution

In this operating mode, the compressor may start automatically at any time and after an unlimited length of power loss.

Always fit the compressor with warning signs, lock the room containing the compressor and instruct your staff.

Fit the isolator specified by EN60204 and fit the appropriate warning signs on it.

After a power loss that has not exceeded the preset time, the unit can re-start automatically.

The settings needed must be undertaken in the [CONTROL MENU] sub-menu. Menu items are:

AUTO RESTART	OFF
POWER LOSS TIME	Xs
START-UP DELAY	Xs

Use the AUTO RESTART ON menu item to activate the automatic re-start.

You can state the time for which a power loss may last and after which the compressor is to automatically re-start in the POWER LOSS TIME menu item. The time can be set within a period of 2 - 999 seconds. If the power loss lasts longer than the time you have set, the unit does not automatically re-start. The POWER LOSS. fault message then appears on the display

You can also program a start-up delay of 1 – 60 seconds. This is set in the START-UP DELAY menu item and ensures a staggered start-up if the installation features several compressors. This ensures that the power supply is not loaded unnecessarily.

3.1.6 Unlimited autom. re-start after power loss

The control system can perform an automatic re-start after any power loss period.

You must read and apply the following safety notices before setting unlimited automatic re-start.

Caution

In this operating mode, the compressor may start automatically at any time and after an unlimited length of power loss.

Check the safety notices (e.g. EN1012-1, EN60204) that apply in your country to find out whether you can run an unlimited autom. re-start and what safety precautions must be taken.

Always fit the compressor with warning signs, lock the room containing the compressor and instruct your staff.

Fit the isolator specified by EN60204 and fit the appropriate warning signs on it.

To set unlimited automatic restart, proceed as follows:

1. Press the ↵ key for 5 seconds.
2. Use the ↑ or ↓ keys to enter code 8888.
3. Press the ↵ key to transfer the set code

The menu item for the max. power loss time can also be programmed to [POWER LOSS TIME –s]. This is the setting for an unlimited automatic re-start.

If you re-enter the code, you cancel the function.

Note

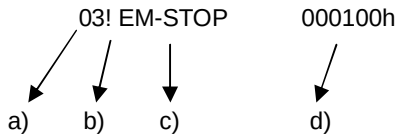
Details for locking sub menus by code can be found in Section 3.6

3.2 [FAULT MEMORY]sub-menu

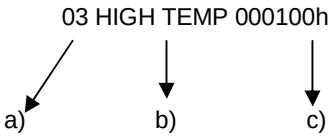
Warning messages and faults are stored in the fault memory. The last warning message or fault recorded is always at the top. In order to distinguish between faults and warning messages, faults are marked with an exclamation mark !.

Use the ↑ or ↓ key to switch between the individual memory areas in the fault memory.

The faults are displayed as follows:



a) The same fault has occurred three times.
b) This relates to a fault.
c) Fault has occurred due to the emergency stop button being pressed.
d) Fault occurred at 100 running hours.



a) The same warning has occurred three times.
b) Warning resulting from compressor temperature being too high
c) Warning occurred at 100 running hours.

The last eight warning messages or faults recorded are displayed in the fault memory. All messages and faults occurring before that are retained in the long-term memory. The frequency with which a warning or fault occurs is therefore always recorded.

You can access more detailed information on warning messages and faults that have been recorded in the fault memory. The following are saved for every warning message/fault recorded:

- time and date
- compressor status (e.g. on-load)
- speed (RS)
- compressor temperature and pressure

When accessed, these values flash to clearly show that they are not the current display values.

Use the ↑ or ↓ key to go to the warning or fault message of interest. Press the ↵ key, day of the week, date and accurate time are now displayed (flashing) in the first row. Press the ↵ key again, the status of the warning/fault of the compressor is displayed (flashing) in the first row. If the ↵ key is pressed again, the compressor temperature and pressure are displayed (flashing) in the first display row. Press the ↵ key again to return to the normal fault memory view.

3.3 [TIMER CONTROL]sub-menu

Caution

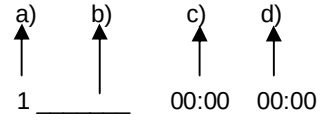
When programming in standby, the compressor may start up at any time.

The timer allows you to switch the compressor on and off at permanently set (programmed) times. You can also change over the pressure level (e.g. night-time running at lower pressures).

3.3.1 Setting for timer units

You will have already set the time and date as described in Section 1.6. This setting serves as the basis for accurate timer operations.

Go to the [TIMER CONTROL] sub-menu, use the ↑ or ↓ key to select from seven different timer units. The status line of each switching unit is as follows:



a) Unit no.
b) Days of the week [SMTWTFS] = Sunday, Monday.

c) Switch-in point.
d) Switch-out point

If there are no days of the week selected in the switching unit line, the switching unit is not active. The unit only becomes active when the day of the week is set. When the ↵ key is pressed, the first underscore _ starts to flash. Use the ↑ key to set the first day of the week (Sunday). Use the ↵ key to confirm the day of the week, the next underscore _ starts to flash. If you do not want to confirm a day of the week as set, immediately press the ↵ key. Run through all seven days of the week this way. Once you confirm the last day of the week (Saturday), the first unit of the switch-in point starts to flash, set this using ↑ or ↓.

Once the last unit of the switch-out point has been confirmed, the whole timer sequence is activated.

The next step is to go to the [CONTROL MENU] sub-menu and then the TIMER CONTROL menu item. You will see the default setting TIMER CONTROL OFF. If you press the ↵ key, the OFF value starts to flash. Use the ↑ key to change the value to ON. Then press the ↵ key again to confirm the entry. The timer is now switched on.

Timer sequence settings are explained by the examples below.

Example 1:

Switching unit 1 not active:

1 _____ 00:00 00:00

Example 2:

The unit should run Monday to Friday between 7.30 am and 4.15 pm.

2 _MTWTF_ 07:30 16:15
a) b) c)

a) Days of the week Monday to Friday
b) Switch-in point
c) Switch-off point

Example 3:

The unit is to run from Sunday 10 pm through continuously to Saturday 2 pm. During the daily break (12 midday to 12.30 pm), the unit is to be shut down.

You will now have to use various switching units. The following settings would be needed in this case:

1 S_____ 22:00 00:00 → a)
2 _MTWTFS 00:00 12:00 → b)
3 _MTWTF_ 12:30 00:00 → c)
4 _____S 12:30 14:00 → d)
5 _____ 00:00 00:00
6 _____ 00:00 00:00
7 _____ 00:00 00:00

a) Start of operating period
b) Operating period up until lunch break
c) Start of operation after lunch break
d) End of operating period.

3.3.2 Pressure changeover setting

Go to the [TIMERCONTROL] sub-menu. Use the ↑ or ↓ key to select between various timer units. The timer units of the 2nd (p_2) pressure range are in the menu under the normal timer units.

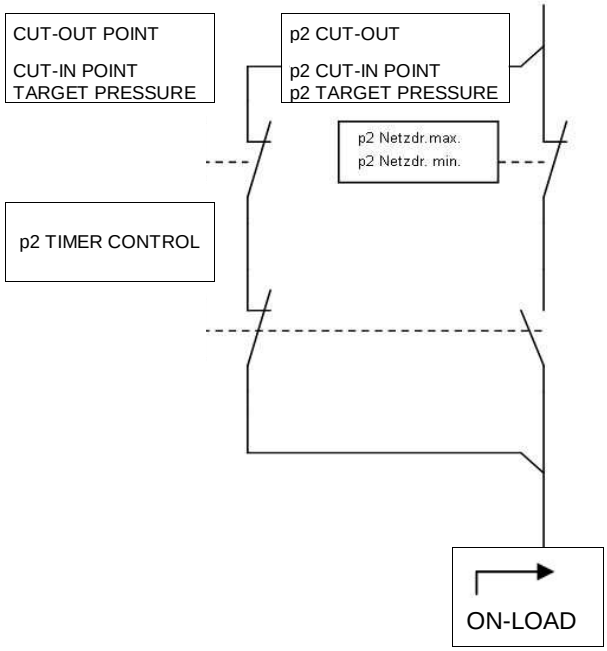


Fig. 2 Pressure Changeover

Seven timer units are available for programming. Values that you have set for the second pressure range supersede the values for CUT-OUT POINT and CUT-IN POINT or TARGET PRESSURE as soon as a switching unit is active. The 1st row on the display then shows the p_2 symbol for the second pressure range. If the switching unit becomes inactive, the values for CUT-OUT POINT and CUT-IN POINT or TARGET PRESSURE are used again.

The status line of each switching unit is as follows:

a) b) c) d) e)
$p_2$1 _____ 00:00 00:00

a) 2nd pressure range
b) Unit no.
c) Days of the week [SMTWTFS] = Sunday, Monday...
d) Switch-in point
e) Switch-out point

When the ↵ key is pressed, the first underscore _ starts to flash. Use the ↑ key to set the first day of the week (Sunday). Use the ↵ key to confirm the day of the week. The next underscore _ now flashes. If you do not want to confirm a day of the week as set, immediately press the ↵ key. Run through all seven days of the week this way. Once you have confirmed the last day of the week (Saturday), the first unit of the switch-in point starts to flash, set this using the ↑ or ↓ key. Once the last unit of the switch-out point has been confirmed, the whole switching unit is activated.

Go to the [CONTROL MENU] sub-menu and then the p_2TIMER CONTROL menu item. You will now see the p_2TIMER CONTROL OFF default setting. If you press the key, the OFF value starts to flash. Use the key to change the value to ON. Then press the key again to confirm the entry. The timer is now switched on for the second pressure range. Refer to Section 3.1.2 for how to set the parameters for the 2nd pressure range.

3.4 [LIMIT VALUES] sub-menu

Sub-menu [LIMIT VALUES] are the factory-set and changeable parameters, SS or RS represent single or regulated speed:

a)	DESIGN PRESS	8.0 bar (116 psi)
b)	START PROTECT	2.0 bar (29 psi)
c)	HEAVY STARTUP (SS)	3.5 bar
d)	EXT. LIMIT (RS)	2000RPM
e)	FINAL TEMP WARN	107℃ (225℉)
f)	FINAL TEMP MAX	110℃ (230℉)
g)	MIN START TEMP	0℃ (32℉)
h)	RUN-ON TIME	60s
i)	SOFT STOP	2s
j)	STAR DELTA TIME (SS)	1s
k)	SOFTWARE (SS)	HPro-V1.xx
l)	SOFTWARE(RS)	HPro-RS-V1.xx

Note

Values shown are examples only, those used in your unit may be different.

a) This is your unit's operating pressure. This is also stamped on the compressor's rating plate.

b) As protection, the compressor only starts up when the internal pressure is less than or equal to the set value. If the internal pressure is higher when starting up, the following appears in the display's third row.

WARNING START AFTER ...

alternating with

... DE-PRESSURISE

c) If the internal pressure builds up too quickly when the compressor starts up, there is an error in the unit. To protect the motor in the case of an error, the compressor shuts down if pressure builds up too quickly. FAULT HEAVY STARTUP appears in the third row on the display.

d) If an input is programmed on the function [EXT. RPM LIMIT] and its contact is closed, the speed of the compressor will be restricted to the value set here.

e) If the compressor temperature reaches 107℃ (225℉), WARNING HIGH TEMP appears in the display's third row.

f) If the compressor temperature reaches 110℃ (230℉), the compressor shuts down. FAULT COMP TEMP then appears in the third row on the display

g) If the compressor temperature is below 0℃ (32℉), the compressor cannot start up.

h) If the compressor is in automatic mode and there is no pressure requirement, the RUN-ON TIME xxxs indication appears and the compressor goes into off-load. After the run-on time (xxx), the compressor automatically shuts down and is ready to start again. If using the timer or the remote start / stop function, the run-on time is also used.

i) In order to protect the compressor, once the key has been pressed, the compressor is switched off 2 seconds later. If using the timer or the remote start / stop function, the run-on time is also used.

j) During the start-up phase, a change is made from star to delta (contactors in starter panel) following the set value.

k) Shows the software version of your single speed (SS) electronic controller CC1054325.

l) Shows the software version of your regulated speed (RS) electronic controller CC1068566.

3.5 [OPTIONAL IN-/OUTPUTS] sub-menu

3.5.1 Inputs

Attention

Only potential-free contacts may be connected to the terminal strip. External voltages will destroy the HYDROVANE *Pro*.

The potential-free contacts must not be more than 20 metres away from the terminal strip. If necessary coupling relays must be fitted in the control cabinet.

The HYDROVANE *Pro* has programmable inputs, some are already assigned (programmed) when supplied. Inputs and their functions are shown in the circuit diagram of the compressor.

Inputs are programmed in the [OPTIONAL IN-/OUTPUTS] sub-menu. In the sub-menu press the key to display the INPUT 1: menu item.

If you press the key, the function starts to flash. By pressing the or key, you can change the function. Once you have set the function you want, confirm using the key. The input is now programmed.

You access all other programmable inputs by pressing the or key.

Each input can be programmed with any of the functions listed below.

Explanation of functions:

FREE
Input is not assigned (programmed).

EXT FAULT
If the contact is opened, the EXT FAULT fault message appears on the display and the unit is shut down (shutting down is delayed by 1sec.).

EXT WARNING
If the contact is opened, the EXT WARNING warning message appears on the display (the indication is delayed by 1sec.). This function does not result in the unit shutting down.

DRYER FAULT
If the contact is opened, the DRYER FAULT fault message appears on the display and the unit is shut down (shutting down is delayed by 1sec.).

DRYER WARNING
If the contact is opened, the DRYER WARNING warning message appears on the display (the indication is delayed by 1 sec.). This function does not result in the unit shutting down.

ENAB.REM.LOAD
For use and examples, see Section **3.8.3.**

REMOTE LOAD
For use and examples, see Section **3.8.3**.

EXT. RPM LIMIT
When the contact is closed the speed of the compressor is restricted to the set speed in the menu [LIMIT VALUES] in menu item EXT. LIMIT.

RTC OVERRIDE
The timer can be overridden using this input.

Example: The compressor has been shut down by the timer. If the contact is now closed, the compressor starts up.

2nd PR. RANGE
If the contact is closed, the system changes over to the second pressure range. Also refer to section 3.1.2.

ENAB.REM-START
For use, see section 3.8.5.

OPERATE_B1
For use, see section 3.8.4.

3.5.2 Outputs

Attention

The maximum connected loads for the programmable outputs (relay contacts) are 4,5A / 240V.

The HYDROVANE *Pro* has programmable outputs, some are already assigned (programmed) when supplied. Outputs and their functions are shown in the circuit diagram of the compressor.

Outputs are programmed in the [OPTIONAL IN-/OUTPUTS] sub-menu. In the sub-menu press the ↵ key to display OUTPUT 1: menu item

If you press the ↵ key, the function starts to flash. By pressing the ↓ or ↑ key, you can now change the function. Once you have set the function you want, confirm using the ↵ key. The output is now programmed.

You access the other programmable output by pressing the ↓ key.

Each output can be programmed with any of the functions listed below.

Explanation of functions:

OFF
Output is not programmed.

OPERATING
The output (relay) is activated when the compressor's motor is switched on or when the compressor is ready.

ON-LOAD
The output (relay) is activated when the compressor is in on-load.

OFF-LOAD
The output (relay) is activated when the compressor is in off-load.

FAULT
The output (relay) is activated when there are no faults on the compressor.

WARNING
The output (relay) is activated when there are no warnings on the compressor.

MAINT.DUE
The output (relay) is activated when there are no maintenance messages on the compressor.

WARNING/MAINT.
The output (relay) is activated when there are no warnings and no maintenance messages on the compressor.

WARN/MA/FAULT
The output (relay) is activated when there are no warnings, no maintenance messages and no faults on the compressor.

REM.STARTABLE
The output (relay) is activated when the compressor is ready for the remote start.

RUNNING
The output (relay) is activated when the compressor's motor is running (is switched on).

2nd PR. RANGE
The output (relay) is activated when the 2nd pressure range is applicable.

TIMER
The output (relay) is activated when the compressor is switched on by the internal timer.

3.6 Locking / unlocking code

Settings (sub-menus) can be locked using a code to prevent unauthorised programming.

Limit values cannot be changed by the operator.

Locking

Press the ↵ key for 5 seconds, the following message appears on the display:

CODE: UNLOCK (for 1 second) followed by CODE INPUT 0000 (0000 value flashes)

Enter code: 3031, the following message appears:

CODE: LOCK (for 1 second)

The sub-menus are locked and cannot be changed.

If the wrong code is entered, the following message appears:

CODE: UNLOCK (for 1 second)

The display then automatically jumps back to where it started from.

Unlocking

If the code is to be unlocked again, either:

Press the ↵ key for 5 seconds when not in the menu or when attempting to change a protected value in a sub-menu.

The code prompt then appears:

CODE LOCK (for 1 second) followed by CODE INPUT 0000 (0000 value flashes)

Enter code: 3031.

If the code is entered correctly, the following message appears:

CODE: UNLOCK (for 1 second)

If the code is entered incorrectly, the following message appears:

CODE: LOCK (for 1 second)

The display then automatically jumps back to where it started from.

3.7 Replacing the HYDROVANE *Pro*

Once a new HYDROVANE *Pro* has been fitted, switch the isolator back on.

One of the following now appears on the display with either the 6.0 BAR or KEB 400V flashing:

```
*** Hydrovane ***
SETUP PRESSURE: 6.0 BAR
```

```
*** Hydrovane ***
VSD-TYPE:   KEB 400V
```

Use the ↑ key to select either the working pressure or a KEB 460V/Mitsubishi VSD, press the ↵ key to confirm your entry.

The following now appears on the display with the 07 figure flashing (11 if Mitsubishi is selected):

```
***..Hydrovane..***
HV MODEL:   07RS
```

Use the ↑ key to select the required model, press the ↵ key to confirm your entry, the following message appears on the display.

```
INITIALIZATION VSD...
```

After a short delay the displayed message will change to

```
READY TO START
```

If the wrong selection is made, WRONG VSD MODEL appears, hold the ↑ key to reach 2222 and press the ↵ key to start again.

If the correct entry is made, the compressor automatically switches to its delivery status.

The language has been reset to English. If you need a different language, set as described in Section 1.4.

You now have to set the maximum and minimum supply pressure as shown in Section 1.5.

You then have to repeat the individual programming for the inputs and outputs. Consult your compressor's circuit diagram, it shows how inputs and outputs are configured.

The [OPTIONAL IN-/OUTPUTS] Section 3.5 shows how to program inputs and outputs.

3.8 Remote control

Caution

In this operating mode, the compressor may start automatically at any time.

Attention

Only potential-free contacts may be connected to the terminal strip. External voltages will destroy the HYDROVANE *Pro*.

The potential-free contacts must not be more than 20 metres away from the terminal strip.

If necessary coupling relays must be fitted in the control cabinet.

Important: The warnings above are applicable to all the following items 3.8.1 to 3.8.5 inclusively.

3.8.1 Remote control for pressure changeover

Sections 3.1.2 and 3.3.2 contain explanations of how to set the second pressure range including timer operations.

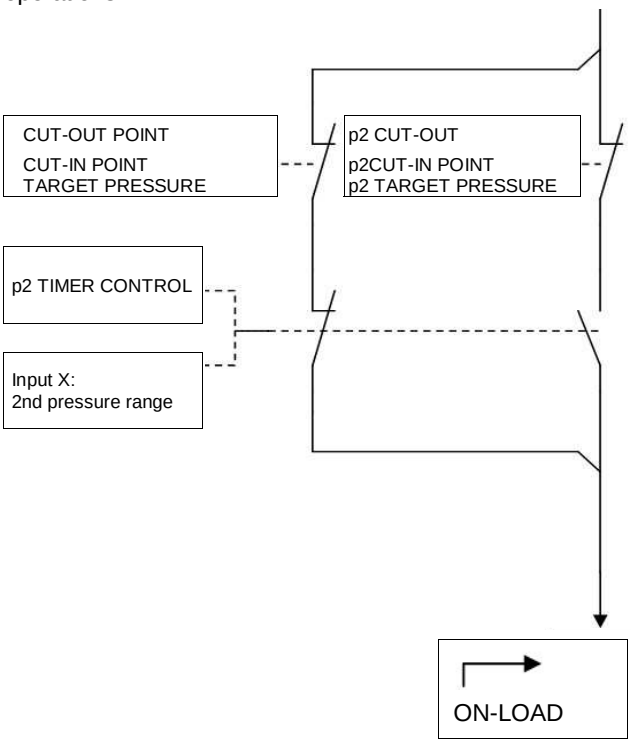


Fig. 3 Remote Pressure Changeover.

You can also activate the second pressure range remotely. This is done using a digital input X (Fig. 3) on the HYDROVANE *Pro* (see Section 3.5.1 and circuit diagram).

In the [OPTIONAL IN-/OUTPUTS] menu you have to program the inputs using the 2nd PR. RANGE function.

A potential-free contact can now be connected to the terminal strip of the programmable input. If this contact is closed, the system changes over to the second pressure range.

You can also use this contact to take the programmed timer for the second pressure range out of service.

3.8.2 Enabling on-load operation

The HYDROVANE *Pro* controller allows the operator to switch the compressor into off-load from a remote point through the connection of a potential-free contact. This function is needed when using an external control for example.

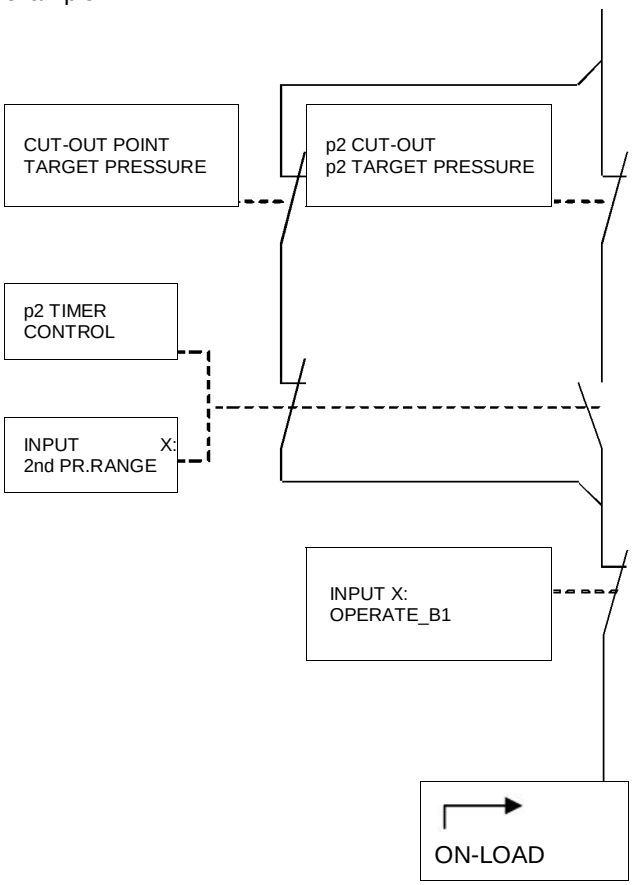


Fig. 4 On-load/Off-load Remote Control

Go to the [OPTIONAL IN-/OUTPUTS] menu where you must program one input with the OPERATE_B1 function (Fig. 4). The unit can now be switched to off-load using the input.

3.8.3 On-load/off-load remote control

The HYDROVANE *Pro* control system allows the operator to switch the compressor into on-load or off-load from a remote point through the connection of two potential-free contacts. This function is needed when using an external control for example.

Go to the [OPTIONAL IN-/OUTPUTS] menu where you must program one input with the ENAB.REM.LOAD function and another with the REMOTE LOAD function. The unit can now be switched to on-load or off-load using these two inputs.

In the circuit diagram (Fig. 5) we have assigned inputs as follows:

INPUT 1:ENAB.REM.LOAD

INPUT 2:REMOTE LOAD

You can of course program the inputs any way you choose.

If input 1 is activated, the unit can only be switched into on-load or off-load by remote control. Both pressure ranges and time control mode are interrupted (decoupled). If input 2 is now activated, the compressor is in on-load. If input 2 is not activated, the compressor is in off-load.

If the supply pressure exceeds the preset operating pressure of 0.5 bar (7 psi), the WARNING LINE PRESS indication appears on the display. Remote control is deactivated at the same time. The unit now runs again using one of the preset pressure ranges until the WARNING LINE PRESS is acknowledged.

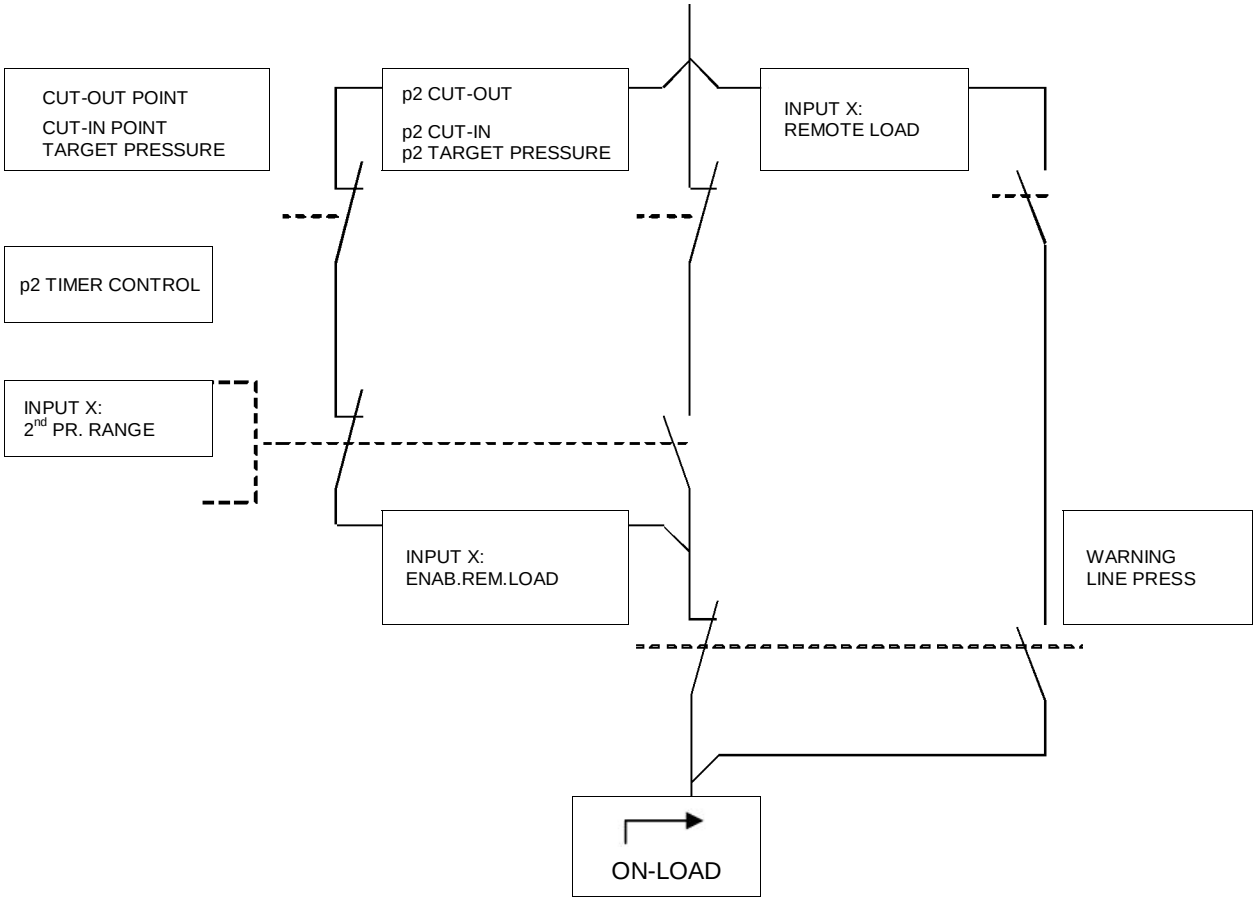


Fig. 5 On-load/Off-load Remote Control

3.8.4 Enabling on-load operation

The HYDROVANE *Pro* controller allows the operator to switch the compressor into off-load from a remote point through the connection of a potential-free contact. This function is needed when using an external control for example.

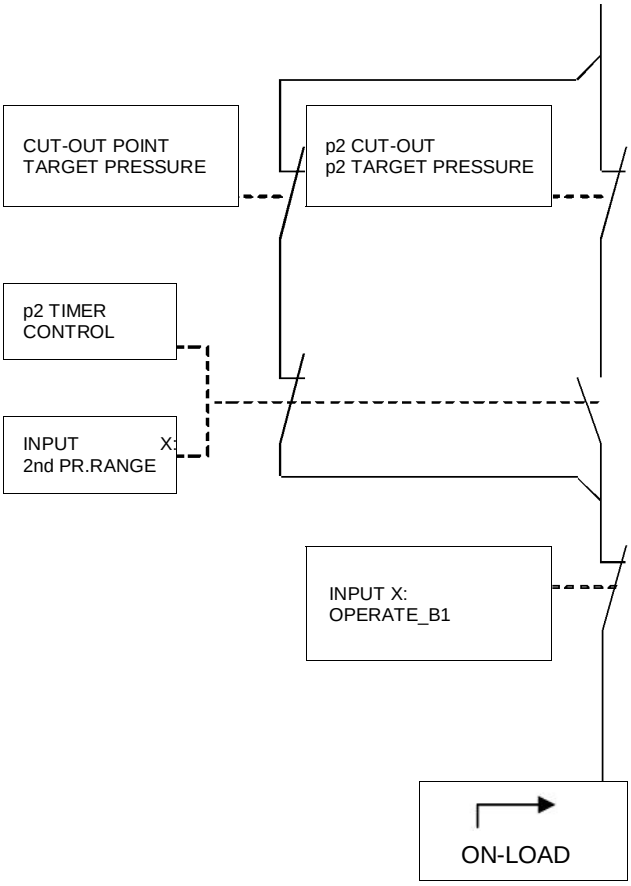


Fig. 6 On-load/Off-load Remote Control

Go to the [OPTIONAL IN-/OUTPUTS] menu where you must program one input with the OPERATE_B1 function (Fig. 6). The unit can now be switched to off-load using the input.

3.8.5 Remote start / stop

This function allows the operator to externally switch the compressor on and off. You have two ways of implementing this function. The remote start / stop function is permanently programmed, this relates to terminals X10 and X12 (see circuit diagrams).

The unit continues to run while the potential-free contact is closed. If the contact is opened, the soft-stop is undertaken and the unit stops.

Note

The unit is controlled using the remote start / stop function. If the unit is shut down during operations, e.g. due to power loss, it does not automatically start up when the power is restored. The potential-free contact must first be re-opened and then closed to restart the unit.

1st option

The compressor is to be activated using a potential-free contact.

Activate this function in the [CONTROL MENU] sub-menu. Go to the ENABLE REMOTE-START menu item. Once you have pressed the key, the OFF value starts to flash. You can now use the key to change the value to ON. The symbol appears in the first display row.

Connect the potential-free contact that you need for the remote start / stop function to the X10 and X12 terminals (see circuit diagram). This input is permanently programmed for the remote start / stop function.

If the remote start / stop function is activated, you can no longer control the compressor using the and keys. Only the emergency stop button remains activated. The compressor can now only be switched on and off using the potential-free contact.

2nd option

A control room is to decide whether the enable for the remote start / stop function is issued. The function for the enable is implemented using a digital input. If the enable is issued, the compressor can only be switched on and off using the external potential-free contacts (X10 and X12). If the enable is not issued, the compressor can only be switched on and off on the HYDROVANE *Pro*.

Connect the potential-free contact for the remote start / stop function to the permanently programmed X10 and X12 terminals.

In the [OPTIONAL IN-/OUTPUTS] menu you now have to program one input with the ENAB.REM-START function (see Section 3.5.1).

The symbol appears in the first display row. In the [CONTROL MENU] sub-menu behind the ENABLE REMOTE-START menu item, EXT. appears.

If the input is closed, the unit can only be switched on and off using the potential-free contact.

If the input is opened, the unit can only be switched on and off using the HYDROVANE *Pro*.

4.1 Safety Regulations

Attention

Important for RS compressors

Risk of electric shock from charged capacitors!

Always disconnect the system from the power supply and then wait a further 10 minutes before touching electrical components. The power capacitors take this time to discharge.

4.2 Warnings

Warning messages are shown in the 3rd display row. The red light signal on the HYDROVANE *Pro* flashes slowly.

Warning messages do not result in the compressor shutting down. However ignored warnings may cause faults.

4.3 Faults

In order to protect the unit, all detected faults result in the compressor shutting down immediately or do not permit the compressor to be started.

The faults are shown in the third display row, the red light signal flashes quickly.

Faults must be rectified before re-start, and confirmed using the ↵ key. The unit can now be started again.

4.4 Checklist

Loose connections, connection plugs, defective power supplies or non-observance of installation notes generally result in a large number of error patterns. It is therefore not unusual for the errors shown to be traced back to another cause.

Always observe the following checklist:

1. The unit's supply voltage must be within permissible limits.
2. The control transformer must be set to any local deviating mains voltages (see circuit diagram).
3. The switch panel temperature should be maintained between -20 C (-4℉) and 55 C (131℉).
4. All remote controls fitted at a later date (remote On/Off) must be managed without a connection relay at max. 20 metres from the control cabinet.
5. When commissioning and carrying out maintenance work, check that all connection screws and plugs are tight.
6. The power supply must have adequate cross-section cable, note the type of routing, cable length and the conductor temperatures expected.
7. When retrofitting switching devices, the control transformers must never be 'tapped' as they could be overloaded.
8. Only ever use genuine Hydrovane spare parts.
9. Do not connect extra switching or measurement devices without the consent of Hydrovane.
10. Do not route any measurement recorders out of the unit.
11. For technical queries, please provide the following information to assist with a quick and specific fault diagnosis:
    - Model type and serial number
    - Circuit diagram drawing number
    - Information about the unit's operating conditions
    - Information on accessories fitted since purchase (remote controls etc.)
    - Other modifications/additions to your unit
    - An accurate description of the fault.

4.5 Table of faults / warnings

The next pages contain fault tables for the HYDROVANE *Pro*, possible causes of faults and suggestions on how to rectify them.

[Indication] / Problem	Possible cause	Remedy
FAULT POWER LOSS	Power loss	Find cause
	Voltage dip	Find cause
	Cabling damaged	Check, repair if necessary
	Loose terminals	Check that all connecting terminals and plugs are tight, retighten if necessary
FAULT EM-STOP	Emergency stop is being/has been activated	Unlock
	Emergency stop switch defective	Check, replace if necessary
	Cabling damaged	Check, repair if necessary
FAULT MOTOR TEMP	Motor started too frequently	Limit number of starts/hour
	Inadequate motor cooling	Improve
	Excessive power consumption	Check, find cause
	Defective power supply	Check, find cause
	Motor faulty	Check, replace if necessary
	Contactor-type star delta starter defective	Check repair if necessary
FAULT COMP TEMP	Final compression temperature exceeded (1)	Find cause
WARNING HIGH TEMP	Approach temperature too high	Improve
	Defective cooling	Improve
	Unit being operated with enclosure open	Close enclosure
	Incorrect oil grade/viscosity	Check, replace oil if necessary
	R1F temperature sensor defective (indication too high)	Check, replace if necessary
FAULT START TEMP	Start attempt at too low a temperature (1)	Heat up compressor room
	R1F temperature sensor defective (indication too low)	Check, replace if necessary
WARNING HIGH PRESS	Operating pressure exceeded by 1.0 bar / 14 psi (1)	
FAULT OVER PRESS	Operating pressure exceeded by 1.5 bar / 21 psi (1)	
	Pressure losses in the system too high	Check, find cause
	System switching points(4) too high	Correct
	External pressure requirement too high	Check remote on-load/off-load switching points
	Intake unloader valve not closing	Check, find cause
	Pressure sensor B1N or B2N defective (incorrect indication)	Check, replace if necessary
FAULT SENSOR B1N	Faulty supply pressure sensor	
	Pressure and/or temperature sensor defective	Check, replace if necessary
	Cabling to sensor damaged	Check, replace if necessary

[Indication] / Problem	Possible cause	Remedy
FAULT SENSOR B2N	Faulty system pressure sensor	
	Pressure and/or temperature sensor defective	Check, replace if necessary
	Cabling to sensor damaged	Check, replace if necessary
FAULT SENSOR R1F	Faulty system temperature sensor	
	Pressure and/or temperature sensor defective	Check, replace if necessary
	Cabling to sensor damaged	Check, repair if necessary
FAULT DIRECT ROT	Drive motor running in wrong direction (see circuit diagram)	Connect up correct phase sequence
FAULT MAINT PER	Shutdown maintenance (2) activated and maintenance interval exceeded by 100 hours(2)	Carry out maintenance and reset service interval
FAULT HEAVY START (Internal transducer fitted)	System pressure too high during motor's start phase (1).	Check whether intake unloader valve is closing in sealed manner.
FAULT EXT FAULT	Shutdown resulting from external fault (monitored by INPUT: EXT FAULT (3))	Check, find cause.
WARNING EXT WARNING	Warning from external device (monitored by INPUT: EXT WARNING (3))	Check, find cause
WARNING DRYER WARNING	There is an external dryer error (3)	Check dryer
FAULT DRYER FAULT	There is an external dryer error (3)	Check dryer
FAULT HYDROVANE	HYDROVANE *Pro* hardware error	Replace HYDROVANE *Pro* electronics
WARNING TIMER	Wrong date and time setting The real timer's battery is flat	The real timer must be reset (see Section 1.6).
WARNING INPUT 1 WARNING INPUT 2 WARNING INPUT 3 WARNING INPUT 4 WARNING INPUT 5	One of the reserve inputs 1...5 has been activated, but is programmed as FREE.	Check the assignment of the input in question. (3)
A fault/warning cannot be cancelled	Fault/warning still in place	Find cause and remedy
No indication on the display	Compressor not energised	Check fuses, replace if necessary
Unit not automatically starting after power loss	AUTO RESTART function not activated	Activate (4)
	Power loss lasted too long (4)	
Unit runs continuously in off-load without independently switching to readiness (standby	CONTINUOUS OPERATION operating mode selected (4)	Select AUTOMATIC OPERATION operating mode
	Very brief pressure requirements during the run-on time	
No compressed air requirements within the switching points set (4)	Pressure changeover by timer or external contact active (5)	

[Indication] / Problem	Possible cause	Remedy
WARNING LINE PRESS	The LINE PRESS is larger than the DESIGN PRESS + 0.5 bar (7 psi) and simultaneously a load request was given via the RS485 interface.	Suppress load requests via the RS485 interface if the LINE PRESS is higher than the DESIGN PRESS + 0.5 bar (7 psi).
Pressure and temperature indicator failed, indicator (----)	Ground fault or short circuit for sensor B1N, B2N or R1F	Check fuses, changing if necessary
FAULT VSD COMMUNIC.	Communication to inverter disrupted, inverter not responding	Check , Main contactor and ModBus interface wiring If no fault can be found, notify Hydrovane service engineer.
FAULT VSD FAULT xx	The inverter (VSD) detected a fault with error number xx that was not subsequently listed.	Contact a Hydrovane Service Engineer.
FAULT VSD FAULT 1	Overvoltage on DC link	Check supply voltage is not above 500 volts
FAULT VSD FAULT 2 FAULT VSD FAULT 3 FAULT VSD FAULT 15	Undervoltage on DC link Input Phase failure Load-shunt relay has not energised	Check supply voltage Check the supply cable, main contactor poles, input choke and EMC filter for high resistance and voltage drop.
FAULT VSD FAULT 4	Overcurrent.	Check for short circuit at the VSD output. Check the compressor motor is wired correctly.
FAULT VSD FAULT 6 FAULT VSD FAULT 7 FAULT VSD FAULT 8 FAULT VSD FAULT 36	VSD Internal Overheat VSD Internal Overheat Cleared VSD Power module Overheat VSD Power module Overheat Cleared	Check the starter enclosure filters are not blocked. Reduce the ambient temperature of the cooling fan intake.
FAULT VSD FAULT 12	VSD Power Unit Failure	Contact a Hydrovane service engineer.
FAULT VSD FAULT 16 FAULT VSD FAULT 17 FAULT VSD FAULT 30 VSD OVERLOAD (unloads compressor)	VSD Overload Shutdown VSD Overload Cleared Motor Overload The Hydrovane Pro has detected the VSD OL-counter has reached 20%	Check for mechanical faults in the compressor application. Check the compressor motor is wired correctly. VSD configuration may have been adjusted incorrectly
FAULT SPEED LOW	Speed is below permissible minimum speed. Oil level too low.	Notify Hydrovane Service Engineer. Check.
WRONG SERIAL NUMBER	The Hydrovane Pro has detected a VSD that has not been programmed	Select the appropriate HV MODEL to program the VSD
WRONG VSD MODEL	The Hydrovane Pro has detected a VSD that is the incorrect model	Select the correct HV MODEL

(1) Unit-specific setting: see Section 3.4 [LIMIT VALUES] menu
(2) Individual setting: see Section 2.6 [MAINTENANCE SCHED.] menu
(3) Individual setting: see Section 3.5 [OPTIONAL IN-/OUTPUTS] menu
(4) Individual setting: see Section 3.1 [CONTROL MENU] menu
(5) Individual setting: see Section 3.3 [TIMER CONTROL] menu

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