PLC Manual

L-PAK Series

L-PAK 150/250 Standard

50Hz, 60Hz
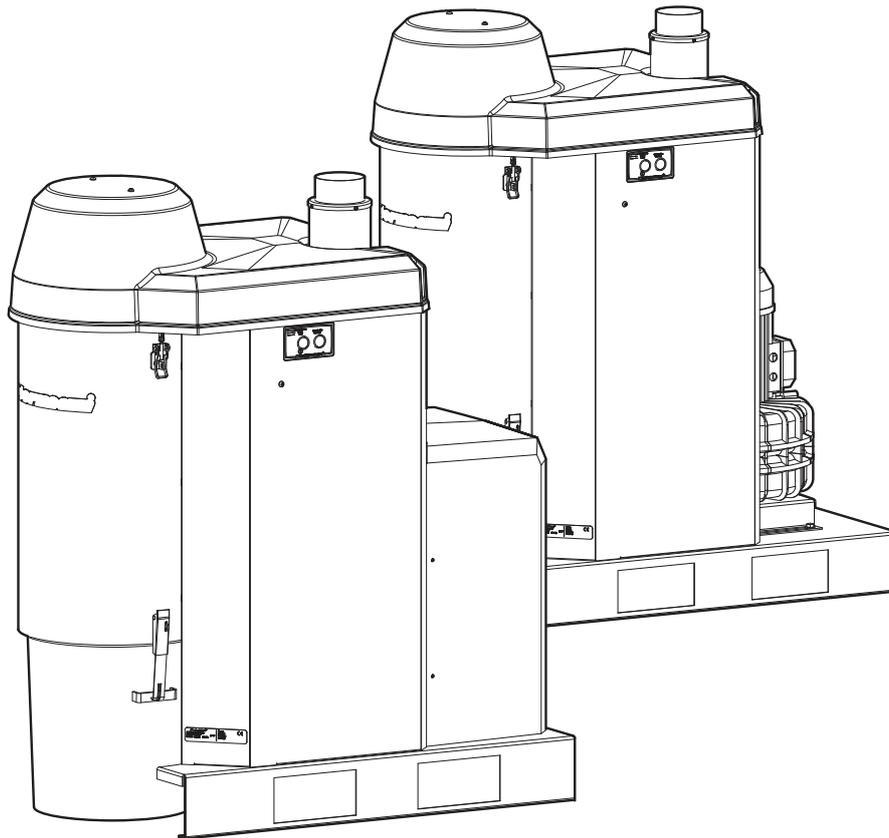
Original PLC manual
EN   PLC MANUAL

Figures

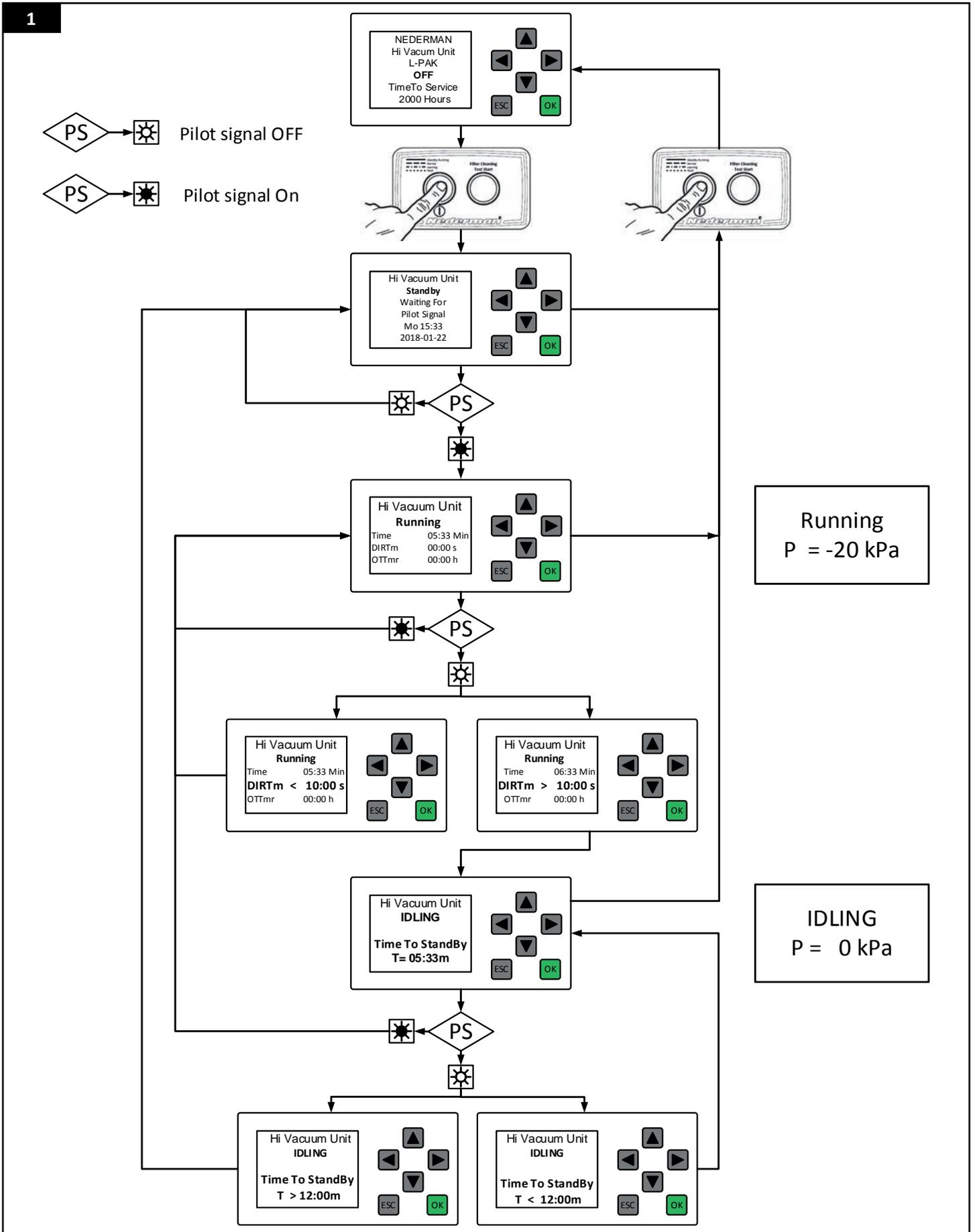**1**

PS ▷ ☼   Pilot signal OFF

PS ▷ ✸   Pilot signal On

NEDERMAN
Hi Vacuum Unit
L-PAK
OFF
TimeTo Service
2000 Hours

Hi Vacuum Unit
Standby
Waiting For
Pilot Signal
Mo 15:33
2018-01-22

Hi Vacuum Unit
Running
Time   05:33 Min
DIRTm   00:00 s
OTTmr   00:00 h

Running
P = -20 kPa

Hi Vacuum Unit
Running
Time   05:33 Min
DIRTm < 10:00 s
OTTmr   00:00 h

Hi Vacuum Unit
Running
Time   06:33 Min
DIRTm > 10:00 s
OTTmr   00:00 h

Hi Vacuum Unit
IDLING
Time To StandBy
T= 05:33m

IDLING
P = 0 kPa

Hi Vacuum Unit
IDLING
Time To StandBy
T > 12:00m

Hi Vacuum Unit
IDLING
Time To StandBy
T < 12:00m

Table of contents

1 Preface

Read this manual carefully before installation, use and service of this product. Replace the manual immediately if lost. Nederman reserves the right, without previous notice, to modify and improve its products including documentation.

This product is designed to meet the requirements of relevant EC directives. To maintain this status, all installation, maintenance and repair is to be done by qualified personnel using only Nederman original spare parts and accessories. Contact the nearest authorized distributor or Nederman for advice on technical service and obtaining spare parts. If there are any damaged or missing parts when the product is delivered, notify the carrier and the local Nederman representative immediately.

2 Safety

This document contains important information that is presented as either a warning, caution or note. See the following examples:

⚠ **WARNING! Risk of personal injury.**
Warnings indicate a potential hazard to the health and safety of personnel, and how that hazard may be avoided.

⚠ **CAUTION! Risk of equipment damage.**
Cautions indicate a potential hazard to the product but not to personnel, and how that hazard may be avoided.

ⓘ **NOTE!** Notes contain other information that is important for personnel.

3 Description

⚠ **WARNING! Risk of personal injury.**
See the User manual.

4 Unit operation

4.1 Software with extended functionality

L-PAK 150/250 Advanced comes with extended software and standard Logo! PLC display that allows a technician to easily set parameters and read status messages.

ⓘ **NOTE!** If the software is used in a logo without a display, it is not possible to change parameter settings.

4.2 Unit operation modes

L-PAK 150/250 Advanced has the following four operation modes:

1. Off mode
2. Standby mode
3. Running mode
4. Idling mode

See Section *5.1. Status messages* for more information about each mode. How the unit moves from one operation mode to another is explained below. See also Figure 1 for a flow chart showing how the unit goes through its four different operation modes.

When the unit is in Off mode, the unit can be put into Standby mode (the unit is ready) with its motor off and the Filter Cleaning Valve (FCV) closed by pressing the Standby/ Running button. While the unit is in Standby mode, the unit can be put back into Off mode again by pressing the Standby/Running button.

The unit goes from Standby mode into Running mode when it receives a pilot signal by a valve being opened at one or more work stations (in other words, someone starts to work). The unit's motor is now on and the FCV is closed. The DIR_Time and SSR_Time timers are not started, see Sections *6.2.4. DIR_Time* and *6.2.3. SSR_Time*.

The unit stays in Running mode as long as there is an active pilot signal. However, the unit can still be put into Off mode by pressing the Standby/ Running button.

Note that if only one workstation is connected to the unit, or if only one work station is in use and work stops at that one station, the pilot signal stops. If there is more than one work station connected to the unit, and more than one work station is in use, the pilot signal only stops if work stops at all workstations (in other words, all valves close).

When the pilot signal stops, the DIR and SSR timers start. If work resumes at one or more work stations within 10 seconds, the unit stays in Running mode. The DIR and SSR timers are reset back to zero and are stopped.

If DIR_Time is set for 10 seconds (default), and the pause in work is longer than 10 seconds, DIR_Time elapses. The unit then goes into Idling mode with its motor on and the FCV open.

If a new pilot signal is sent within 12 minutes, the unit goes back into Running mode. The DIR and SSR timers are again reset to zero and are stopped. However, if SSR_Time is set for 12 minutes, which is the default setting, and there is no new pilot signal within 12 minutes, SSR_Time also elapses.

The unit then goes into Standby mode until it either receives a new pilot signal that puts the unit back into Running mode, or the unit is turned off (in other words, put into Off mode) by pressing the Standby/Running button.

5 PLC messages

The following sections show the different status, warning and alarm messages that can be seen in the PLC display.

5.1 Status messages

The following status messages give information about what mode the unit is in or what routine service is being performed.

5.1.1 L-PAK Off (Off mode)

The unit is in Off mode, which is also the unit's start menu. The unit can also go into Off mode if something is wrong, such as if an alarm is activated. The pump motor is off, there is no vacuum, the FCV is closed, and the unit cannot be activated by a pilot signal.

```
Nederman
Hi Vacuum Unit
L-PAK
OFF
Time To Service
2000 hours
```
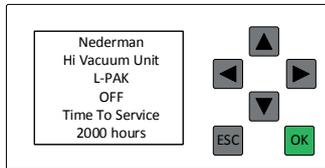
TimeToService: The amount of time until next scheduled service. The default setting is 2000 hours. See Section *6.2.2. H-Meter 1*.

5.1.2 L-PAK Standby (Standby mode)

The unit is in Standby mode and is ready. The pump motor is off, there is no vacuum, the FCV is closed, and the unit is waiting for a pilot signal to go into Running mode.

```
Hi Vacuum Unit
Standby
Waiting For
Pilot Signal
Mo 15:33
2018-01-22
```
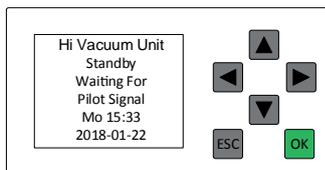
5.1.3 Running (Running mode)

The unit in Running mode. The pump motor is on and the unit generates a vacuum. The FCV is closed.

```
Hi Vacuum Unit
Running
Time    05:33    Min

DIRTm          00:00 s
```
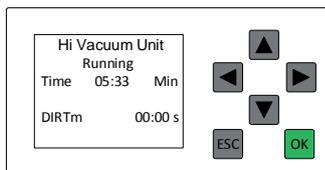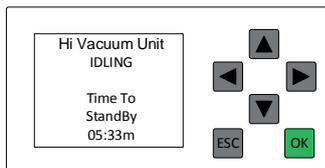
DIRTm: The amount of time before the unit goes into Idling mode. The default is 10 seconds. See also Section *6.2.4. DIR_Time*.

OTTmr: If the Overtime timer has been activated, OTTmr shows the elapsed time since the overtime timer started.

Time: The number of minutes the fan engine has been running since the last start.

5.1.4 Idling (Idling mode)

The unit in Idling mode. The pump motor is on, there is no vacuum, and the FCV is open. The unit goes into Idling mode when there has been no pilot signal for the time set in DIR_Time, see Section *6.2.4. DIR_Time*.

```
Hi Vacuum Unit
IDLING

Time To
StandBy
05:33m
```

Time to Standby: The amount of time until the unit goes into Standby mode. The default setting is 12 minutes. See Section *6.2.3. SSR_Time.*

5.1.5 Filter Cleaning

The unit is cleaning its filter.

```
        Filter
      Cleanining
Cycles          1
Elapsed         0
Clean      00:00 s
Charge     00:00 s
```
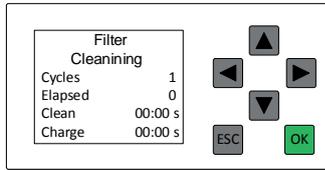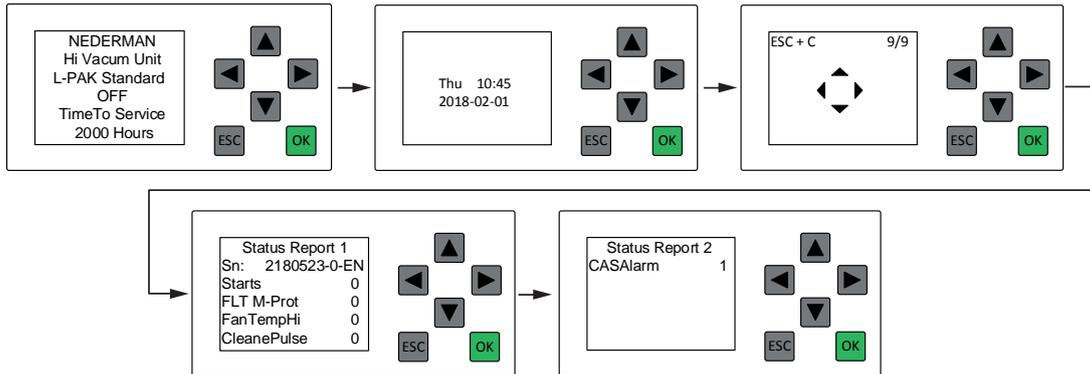
Cycles: How many cleaning pulses will be carried out.

Elapsed: How many cleaning pulses are made.

Clean: Remaining time for cleaning pulse.

Charge: Remaining vacuum build time; the time until cleaning pulse is activated.

5.1.6 Status report

```
NEDERMAN
Hi Vacum Unit
L-PAK Standard
OFF
TimeTo Service
2000 Hours
```
→
```
Thu   10:45
2018-02-01
```
→
```
ESC + C        9/9
```

```
  Status Report 1
Sn:   2180523-0-EN
Starts          0
FLT M-Prot      0
FanTempHi       0
CleanePulse     0
```
→
```
   Status Report 2
CASAlarm        1
```

1. Press the down arrow ▼ once to show the time and date screen.

2. Press the right arrow ▶ until the arrow screen appears.

   1) Press Escape ESC and the up arrow ▲ at the same time to show the Status Report screen.

   2) Press Escape ESC and the up arrow ▼ at the same time to show the next Status Report screen.

Sn	Software number– Revision- Language.
Starts	The number of motor starts.
FLT M-Prot	Number of times motor overload protector has been activated.
FanTempHi	Number of times Hi Temp Fan, thermostat has activated fan Cooling.
CleanePulse	Number of cleaning pulses by the cleaning valve.
CASAlarm	How many times Compressed Air Switch has alerted for low pressure.

5.2 Warning messages

If a warning is activated, there is a problem that needs to be corrected, but the unit continues to work.
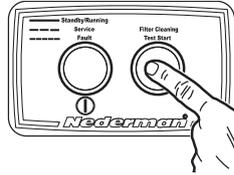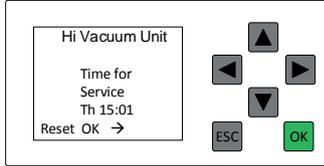
When a warning is activated, Output Q4 and White lamp button "Filter Cleaning/ Test start" flash with intervals, 1 second On/3 second Off.

If the flush valve function is chosen, it disconnects Output Q4 as a warning/Alarm signal output. See section *6.5. Warning-Alarm output Q4*.

5.2.1 Time for service

The time interval set in the 'Service Interval Setting' menu has expired. If this alarm is activated, the light in the Standby/Running button is lit one second and then again in 7 seconds. This 1/7 on/off sequence continues until the warning is reset.

Reset the alarm by first putting the unit into Off mode. Press the manual filter cleaning button for 10 seconds.

5.2.2 Warning! Fan Hi Temp

The fan is overheated. The temperature is greater than 125°C, and the filter cleaning valve is open to cool the fan. When the Fan-temperature is below 90°C, the filter cleaning valve closes and vacuum is reestablished again.

When the fan cooling function activates a timer start, which is shown in the display, if the fan does not cool down when the timer elapses, the vacuum unit will stop and the Alarm message, "Alarm Fan Hi Temp" is activated.
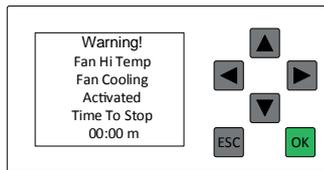
Time to Stop: Remaining time until L-Pak is stopped.

5.3 Alarm messages

When an Alarm is activated, Output Q4 and White lamp button "Filter Cleaning/ Test start" flash with intervals, 1 second On/1 second Off. If an alarm is activated, the unit goes into Off mode until the problem is corrected. Specific Alarm Motor Protector Activated, and Alarm Fan Hi Temp are critical alarms and need to be Acknowledged by pressing 'OK' OK.

Other Alarms such as Low Pressure CAS, Alarm Bin Level High and Alarm Filter Clogged are not critical alarms and do not need to be Acknowledged.

If the flush valve function is chosen, it disconnects Output Q4 as a warning/Alarm signal output. See section *6.5. Warning-Alarm output Q4.*

5.3.1   Alarm! Fan Hi Temp

When the fan temperature passes above 125°C, a Warning Fan Hi Temp message is displayed, and the filter cleaning valve opens to let air in to cool the fan.

If the filter-cleaning valve has been open to cool the fan more than 8 minutes, and the temperature has not gone below 90°C. The unit shuts off and the message Alarm Fan Hi Temp is displayed. Correct the problem, and press 'OK' OK to reset the warning.

```
Alarm!
Fan Hi Temp
Vacuum Unit
Off
Th 11:23
Reset OK →
```
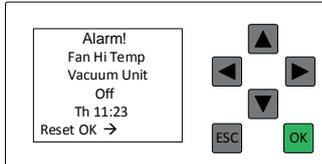
Th: The actual day and time when L-Pak was stopped.

5.3.2   Alarm! Motor Protector Activated

The motor is overheated. Correct the problem, and press 'OK' OK to reset the warning.

```
Alarm!
Motor
Protector
Activated
Th 11:23
Reset OK →
```
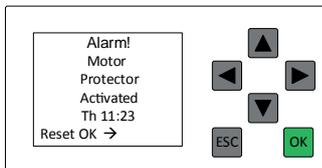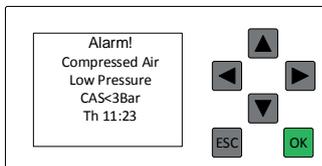
Th: The actual day and time when L-Pak was stopped.

5.3.3   Alarm! Low Pressure CAS

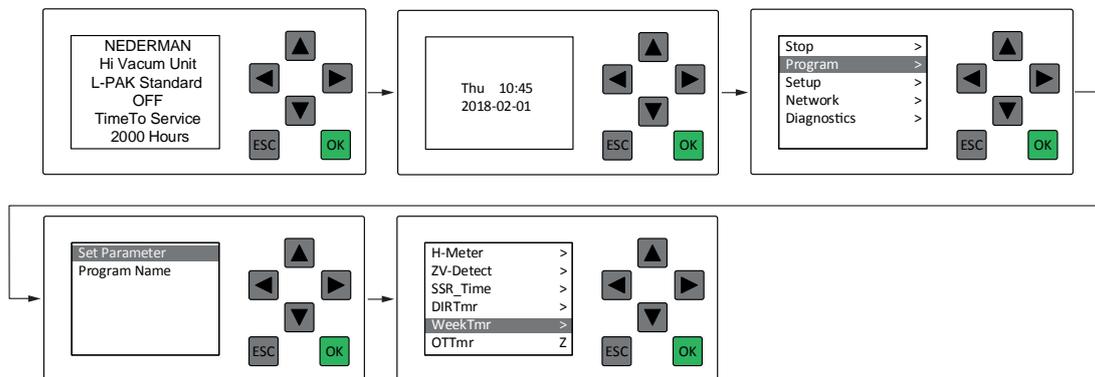This alarm is only shown when the Compressed Air Switch (CAS) is installed.

The compressed air level is low. When the accurate pressure is established, No reset is required after active alarm message.

```
Alarm!
Compressed Air
Low Pressure
CAS<3Bar
Th 11:23
```

Th: The actual day and time when L-PAK was stopped.

6 PLC settings

6.1 Find a parameter and set its value

Do the following to find a parameter and set its value:

1. From the PLC status screen, press the down arrow ▼ to go to the date and time screen.
2. Press 'Escape' ESC to go to the main menu.
3. Press the down arrow ▼ to go to '**Program'**. Press 'OK' OK to confirm.
4. Select **'Set Parameter'**. Press 'OK' OK to confirm.
5. Use the up or down arrows ▲ ▼ to find the parameter. Press 'OK' OK to confirm.
6. Use the left and right arrows ◄ ► to select a value.
7. Use the up or down arrows ▲ ▼ to set the value. Press 'OK' OK to confirm.
8. Press 'Escape' ESC to go to the main menu.
9. Press 'Escape' ESC to go to go to the date and time screen.
10. Press the up arrow ▲ to exit.

> **NOTE!** There are several other input menus on the same level as the date and time screen. If pressing the down arrow ▼ takes the PLC to one of those menus, use the left arrow ◄ to get to the date and time screen.

> **NOTE!** The blinking cursor shows the current value that can be changed.

6.2 Parameter settings

The following PLC displays show the different settings that can be configured for the unit.

6.2.1 Adjust the time and date
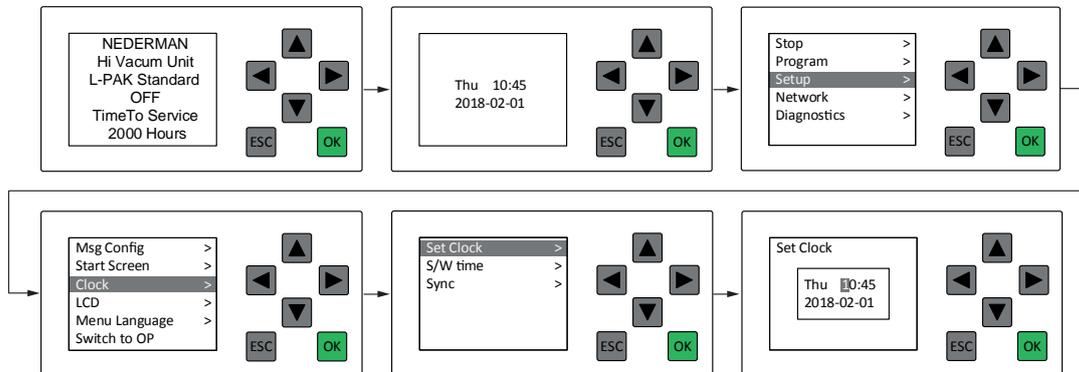
Do the following to adjust the time and date:

1. From a PLC status screen, press the down arrow ▼ to go to the date and time screen.
2. Press 'Escape' ESC to get to the main menu.
3. Press the down arrow ▼ to go to **'Setup'**. Press 'OK' OK to confirm.
4. Press the down arrow ▼ to go to **'Clock'**. Press 'OK' OK to confirm.
5. Press the down arrow ▼ to go to **'Set Clock'**. Press 'OK' OK to confirm.
6. Use the left and right arrows ◄ ► to move to cursor to parameter value. Press 'OK' OK to confirm.
7. Use the up or down arrows ▲ ▼ to set Time or Date. Press 'OK' OK to confirm. Weekday is automatically set by the date.
8. Press 'Escape' ESC 3 times to go to the time screen.
9. Press the up arrow ▲ to exit.

> (i) **NOTE!** There are several other input menus on the same level as the date and time screen. If pressing the down arrow ▼ takes the PLC to one of those menus, use the left arrow ◄ to get to the date and time screen.

6.2.2 H-Meter 1

Menu for setting the service interval. The default value is 2000 hours.
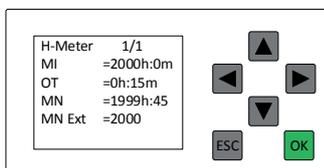
MI = Configured, time, between, maintenance interval
OT = Accumulated, total operating time
MN = Time left until next maintenance
MI = 2000h: The amount of time between service intervals.
MI = 2000h: The amount of time between service intervals.

6.2.3   SSR_Time

Menu for setting the SSR timer. The SSR timer is for the amount of time before the unit goes from Idling mode to Standby mode when the pilot signal disappears.

```
SSR_Time    1/1
T    = 12:00m
Ta   = 00:00
```
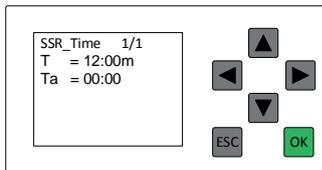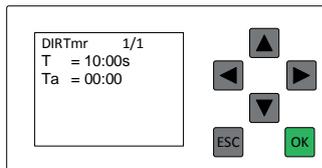
T = 12:00m: Time before SSR_Time is activated. The default setting is 12 minutes. The minimum setting is 5 minutes.

Ta = 00:00: The elapsed time since the pilot signal disappeared.

6.2.4   DIR_Time

Menu for setting the DIR timer. The DIR timer is the amount of time before the unit goes from Running mode into Idling mode when the pilot signal disappears.
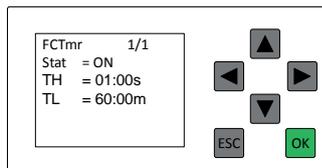
```
DIRTmr      1/1
T    = 10:00s
Ta   = 00:00
```

T = 10:00s: Time before DIR_Time is activated. The default setting is 10 seconds The minimum setting is 5 seconds.

Ta = 00:00: The elapsed time since the pilot signal disappeared.

6.2.5   FCTmr

Menu for activating and setting time between timer controlled filter cleaning.

```
FCTmr       1/1
Stat   = ON
TH     = 01:00s
TL     = 60:00m
```

Stat =On Filter Cleaning timer activated Default is On.

TH=01:00s: Do not change the default setting of 1 second.

TL=60:00m: Time between automatic filter cleanings. The default setting is 60 minutes.

Ta=00:00: The elapsed time since the last automatic cleaning was activated.

6.2.6   Clean cycle

Menu for setting the opening and closing times for the "FCV" Filter Cleaning Valve.

FCV cleaning cycle repeats X times depend on value of parameter 'On'.

This function is always active when filter cleaning takes place.

```
Clean Cyc   1/1
Tch    = 05:00s
Tpu    = 01:00s
On     = 1
Cnt    = 0
```
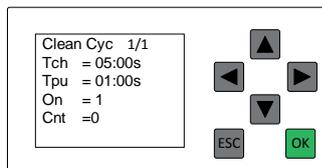
Tch = Vacuum Building time (Charge Time): Default is 5 seconds.

Tpu = Clean pulse time. Default 1 second.

On = Number of cleaning pulses.

Cnt = 0: Elapsed cleaning pulses.

> ℹ **NOTE!** For the parameter 'On', the minimum value = 1.

> ℹ **NOTE!** If On is set to 0, No filter cleaning is performed.

Time duration for a cleaning cycle below:

Example: 1 Cleaning pulse
On=1, Tch=5, Tpu=1 → On * (Tch + Tpu) = 1*(5+1) =6s where Tch=05:00s and Tpu=01:00s.

The default time for a complete cleaning cycle is 6 seconds.

Example: 2 Cleaning pulses
On=2, Tch=5, Tpu=1 → On * (Tch + Tpu) = 2*(5+1) =12s where Tch=05:00s and Tpu=01:00s.

The default time for a complete cleaning cycle is 12 seconds

6.3 Standard Cleaning process

The filter cleaning process is always activated after the pilot signal (PS) or (PSIFC) has disappeared and DIR Time has elapsed.

If flushing function is activated, flushing will be done before filter cleaning takes place.

The filter cleaning valve opens and the filter cleaning process generates a preset number of cleaning pulses. The unit then goes into Idle mode keeping cleaning valve open.

See function in section *6.2.6. Clean cycle* to set numbers of pulses and related parameters.

See function in section *6.2.5. FCTmr* to activate Timer controlled Filter cleaning.

6.4 Warning-Alarm output Q4

Potential free output Terminal X1:33-34.

When an alarm is activated, Output Q4 and White lamp button on the control box side flash with interval 1 second on / 1 second off .

Warning -Alarm Output Q4, switch with an interval 1 second on / 1 seconds Off, if one or more of the alarms listed below are active:

- The fan temperature is over 125°C see section *5.3.1. Alarm! Fan Hi Temp*.
- The motor is overheated see section *5.3.2. Alarm! Motor Protector Activated*.
- The compressed air level is low see section *5.3.3. Alarm! Low Pressure CAS*.

Warning -Alarm Output Q4, switch with an interval 1 second on /3 seconds Off, if one or more of the warnings listed below are active:

- Warning Fan Hi Temp see *5.2.2. Warning! Fan Hi Temp*.

6.5 Standby (Ready) indicator

The H1 lamp/Output DO1 acts as a Standby (unit ready) indicator. The H1 Lamp/DO1 is activated when the unit is in Standby mode or the fan is running. The H1 lamp/Output DO1 is available on terminal X1:3 and X1:4 for remote indication.