

L-PAK Series L-PAK 150/250 Advanced 50 Hz, 60 Hz



Original instruction manual, plc

EN INSTRUCTION MANUAL, PLC

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1 Preface

Thank you for using a Nederman product!

The Nederman Group is a world-leading supplier and developer of products and solutions for the environmental technology sector. Our innovative products will filter, clean and recycle in the most demanding of environments. Nederman's products and solutions will help you improve your productivity, reduce costs and also reduce the impact on the environment from industrial processes.

Read all product documentation and the product identification plate carefully before installation, use, and service of this product. Replace documentation 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

2.1 Classification of important information

This document contains important information that is presented either as a warning, caution or note, according to 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 a standard Logo! PLC display that allows a technician to easily set parameters and read status messages.

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 <u>Section 5.1 Status messages</u> 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.

If power is lost to the unit, for example, if there is a power outage, and Zero voltage detection is set to OFF, see <u>Section 6.2.3 ZV-Detect</u>, the unit goes immediately back into Standby mode once power is resumed without having to push 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 <u>Section 6.2.5 DIR_Time</u> and <u>Section 6.2.4 SSR_Time</u>.

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 workstation 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 the weekly timer, see <u>Section 6.2.6 Weekly timer</u>, or 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.



TimeToService: The amount of time until the next scheduled service. The default setting is 2000 hours. See <u>Section 6.2.2 H-Meter 1</u>.

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.



5.1.3 Running (Running mode)

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



DIRTm: The amount of time before the unit goes into Idling mode. The default is 10 seconds. See also <u>Section 6.2.5 DIR_Time</u>.

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 is 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 <u>Section 6.2.5 DIR_Time</u>.



Time to Standby: The amount of time until the unit goes into Standby mode. The default setting is 12 minutes. See <u>Section 6.2.4 SSR_Time</u>.

5.1.5 Filter Cleaning

The unit is cleaning its filter.

Filt	ter		
Cleanining			
Cycles	1		
Elapsed	0		
Clean	00:00 s		
Charge	00:00 s	ESC C	שר

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





- 1 Press the down arrow once to show the time and date screen.
- 2 Press the right arrow until the arrow screen appears.
 - Press Escape and the up arrow at the same time to show the Status Report screen.
 - Press Escape 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, the thermostat has activated fan Cooling.
CleanePulse	The number of cleaning pulses by the cleaning valve.
CASAlarm	How many times Compressed Air Switch has alerted for low pressure.
FCTmr	If the Filter cleaning timer is activated On/Off.
Clean Puls	How many cleaning pulses that is selected.
ZV Detect	Auto Standby, On = Unit going to Off mode at Power on.
PSILFC-I2	Input 2 selection Off = normal PS input, On = PSILFC input.

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 <u>Sec-</u><u>tion 6.5 Warning-Alarm output Q4</u>.

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 the 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'.

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 <u>Sec-</u><u>tion 6.5 Warning-Alarm output Q4</u>.

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 for 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' to reset the warning.



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' to reset the warning.



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 the active alarm message.



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' to go to the main menu.
- 3 Press the down arrow to go to 'Program'. Press 'OK' to confirm.
- 4 Select 'Set Parameter'. Press 'OK' to confirm.
- 5 Use the up or down arrows to find the parameter. Press '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' to confirm.
- 8 Press 'Escape' to go to the main menu.
- 9 Press 'Escape' to go to the date and time screen.
- 10 Press the up arrow to exit.

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' to get to the main menu.
- 3 Press the down arrow to go to 'Setup'. Press 'OK' to confirm.
- 4 Press the down arrow to go to 'Clock'. Press 'OK' to confirm.
- 5 Press the down arrow to go to 'Set Clock'. Press 'OK' to confirm.
- 6 Use the left and right arrows to move to cursor to the parameter value. Press 'OK' to confirm.
- 7 Use the up or down arrows to set Time or Date. Press 'OK' to confirm. Weekday is automatically set by the date.
- 8 Press 'Escape' 3 times to go to the time screen.
- 9 Press the up arrow to exit.

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 ZV-Detect

The default setting for ZV-Detect is ON. When ZV-Detect is ON or activated, and power is lost to the unit, for example, if there is a power outage, the unit must be restarted and put into Standby (ready) mode by pressing the Standby/Running button.



Switch = On: Default setting.

6.2.4 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.



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.

6.2.5 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.



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.

6.2.6 Weekly timer

The weekly timer sets the unit to "Stand By" mode and "Off Mode" at preset times. If the pilot signal "PS" is active and the Vacuum unit is in Standby mode, the unit starts.





Do the following to set the weekly timer:

- 1 From the PLC status screen, press the down arrow to go to the date and time screen.
- 2 Press 'Escape' to go to the main menu.
- 3 Press the down arrow to go to 'Program'. Press 'OK' to confirm.
- 4 Select 'Set Parameter'. Press 'OK' to confirm.
- 5 Use the up or down arrows to find 'WeekTmr'. Press 'OK' to confirm.
- 6 Use right, left, up and down arrows to select a value and change settings. Press 'OK' to confirm.

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.

Daily AM setting



Friday. On1 = Time the unit is set to 'Standby' at chosen D1 days. Default setting is

D1: = MTWTF: Default setting; Monday, Tuesday, Wednesday, Thursday and

no preset time. Off1 = The time the unit is set to 'Off' on chosen D1 days. Default setting is no preset time.

Daily PM setting

We D1 Or Of D2 Or	eekTmr 1/2 = MTWTF 1 = 00:00 f1 = = MTWTF 12 =	- -	

D2 = MTWTF: Default setting; Monday, Tuesday, Wednesday, Thursday and Friday.

On2 = Time the unit is set to 'Standby' at chosen D2 days. Default setting is no preset time.

Off2 = The time the unit is set to 'Off' on chosen D2 days. Default setting is no preset time.

Weekend or second shift setting

WeekTmr 2/2	
Off2 =	
D3 =SS	
On3 =	
Off3 =	
Pulse = Off	ESC OK

D3 = ____SS: Default setting; Saturday and Sunday.

On3 = __: Default setting Time the unit set to 'Stand By' on chosen D3 days. Default setting is no preset time.

Off3 = The time the unit is set to 'Off' on chosen D3 days. Default setting is no preset time.

Example			
D3=SS	Saturday, Sunday		
0n3 = 09:00	Unit starts at 9:00 in the morning	Saturday, Sunday	
Off3 = 13:00	Unit stops at 13:00 in the after- noon	Saturday, Sunday	

Pulse = Off: The pulse parameter must always be set to Off.

NOTE!

When the timer stops the unit and a valve at a workstation is in its open position, the unit will start immediately once the timer puts the unit in standby mode.

It is not necessary to use the timer function. The function can be switched off by setting the display to show only dashes. However, it is recommended that the timer function is used, as this ensures that the unit is switched off even when a valve remains open, for example, overnight.

If the weekly timer has been activated, the amount of time the unit can be used during the day before it automatically goes into Off mode can be extended if the optional external standby button accessory is used, see <u>Section 6.2.7 OTTmr</u>.

6.2.7 OTTmr

Menu for setting the overtime timer. If the unit needs to be used after the weekly timer has expired, the unit can be turned on for a set number of hours by pressing the external standby button. When the OTTmr expires, the machine goes back into Off mode.

If the unit is in Off mode and the weekly timer is not used, quickly pressing the external standby button (less than 2 seconds) puts the unit into Standby mode for the time set in 'T', for example, two hours. See the figure below.

If the unit is in Standby mode and the weekly timer is not used, quickly pressing the external standby button (less than 2 seconds) puts the unit into Off mode after the time set in 'T', for example, two hours. See the figure below.

If the weekly timer is being used, quickly pressing the external standby button (less than 2 seconds) keeps the unit into Standby mode for an additional two hours after the closing time set in the weekly timer, see <u>Section 6.2.6 Weekly timer</u>.

To reset OTTmr so that the time is not extended, press the external standby button longer than 2 seconds and then release.



T = 02:00h: Extra time before the unit goes into Off mode. The default setting is 2 hours.

Ta = 00:00: The elapsed time since the overtime timer started.

6.2.8 PSIFC-I2

Standard Pilot Signal input Terminal 13-14 is now configurable.

When the input is activated, the unit starts as usual but depends on the setting below for filter cleaning. Filter cleaning can be done during the running mode.

Standard input

Switch = Off: It is possible to activate filter cleaning any time when the motor is running by either timer or by manual cleaning.

PSIFC input

Switch = On: Cleaning process cannot be activated by the timer or by manual cleaning. Cleaning starts after PS = off.



Switch = Off: Default setting.

6.2.9 FCTmr

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

ESCOK

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.

6.2.10 Clean cycle

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

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

This function is always active when filter cleaning takes place.





Tch = Vacuum Building time (Charge Time): Default is 5 seconds.

Tpu = Clean pulse time. Default is 1 second.

On = Number of cleaning pulses. Default is 3 pulses.

Cnt = 0: Elapsed cleaning pulses.

NOTE!

For the parameter 'On', the minimum value = 1.

NOTE!

If On is set to O, No filter cleaning is performed.

Time duration for a cleaning cycle below: Example: 1 Cleaning pulse On=1, Tch=5, Tpu=1 \rightarrow 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 \rightarrow 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.

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 the cleaning valve open.

See function in Section 6.2.10 Clean cycle to set numbers of pulses and related parameters.

See function in Section 6.2.9 FCTmr to activate Timer controlled Filter cleaning.

The Filter cleaning process can be interrupted by Pilot Signal Interlocking functions, PSIFC = Pilot Signal Interlocking Filter Cleaning.

See Section 6.4 Standard Pilot Signal (PS) input.

6.4 Standard Pilot Signal (PS) input

6.4.1 PS Input 2

Input 2, terminals 13 and 14 are for the standard pilot signal input. It is possible to set this input into 2 state Standard or PSIFC mode.

Standard mode

Switch = Off: Filter cleaning by timer or manual cleaning is possible any time when PS is activated.

PSIFC mode

Switch = On: Filter cleaning by timer or manual cleaning is not possible when PS is activated.

Cleaning starts after PS = off.



Switch = off: Default setting.

6.4.2 PS Input 8

Default Advanced PSIFC (Pilot Signal Interlock Filter Cleaning)

L-PAK Advanced models are configured with Input 8 as a pilot signal input for the PSIFC filter cleaning process.

Input 8, terminals 11 and 17 act as pilot signal inputs and interlock the cleaning process. When this input is used as a pilot signal input, filter cleaning cannot be activated until this PS input is deactivated. If this input activates during a filter cleaning sequence, the filter sequence stops immediately and the unit establishes a vacuum.

Input 8 can be combined with input 2.

Example: Input 2 = (PSIFC-I2 = Off)

When PS Input 2 is used the filter cleaning can proceed any time but if Input 8 is activated the input will interlock all filter cleaning attempts "Input 8 has the highest priority".

6.5 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 second 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 <u>Section 5.2.2 Warning! Fan Hi-Temp</u>.

6.6 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 terminals X1:3 and X1:4 for remote indication.

