

Original program manual

EN PROGRAM MANUAL

Table of contents

1	Preface	4
1.1	PAK-M specifics	4
2	Safety	4
2.1	Classification of important information	4
2.2	Overall PAK-M safety	4
3	Electrical schematic overview	6
4	System status	7
5	Filter cleaning valve (FCV)	8
6	Vacuum setpoint reference	9
7	Cooling valve function	10
8	Settings	11
8.1	Security	11
8.2	Motor settings	12
8.3	Cleaning settings	13
8.4	I/O settings	14
8.4.1	Pilot Signal	14
8.4.2	Main filter dP switch (DPS1)	14
8.4.3	Configurable input (factory is Bin Level indicator)	15
8.4.4	Secondary filter dP switch (DPS2)	16
8.5	Warning and alarm settings	17
8.5.1	dP over main filter high	17
8.5.2	Configurable input (default Container Level Sensor)	17
8.5.3	Secondary filter dP high	18
8.5.4	Low vacuum	18
8.5.5	Faulty temperature sensor	19
8.5.6	Faulty vacuum sensor	20
9	Timed functions	21
10	Backup and restore	22
11	Warning and alarm messages	23

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.

1.1 PAK-M specifics

The Vacuum and Control unit can be used as a standalone vacuum source or be part of a complete PAK-M fitted with different dust separators, filters and accessories.

PAK-M comes in three main configurations:

- 1 A stand alone Vacuum and Control unit.
- 2 A Vacuum and Control unit with a Standard Dust Separator.
- 3 A Vacuum and Control unit with a Dust Separator in a DX/EX configuration.

The main manual is the User Manual for the stand alone Vacuum and Control unit. Other manuals are extensions of this manual. Please consider these notes:

NOTE!

- For each variant of PAK-M: Manuals are separated into User Manuals, Installation and Service Manuals, a Program Manual and accessory manuals.
- Refer to the correct manual in case of missing information. A manual generally describe the specific configuration; Dust Separator, ATEX, accessory, and so on.
- All manuals must be kept with care and made available to all persons involved in operating the equipment.
- Images in this User Manual may differ slightly from your model.

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.

2.2 Overall PAK-M safety

- PAK-M, including its configurations must be installed, used and maintained according to the related manual in such a way that safety not will be neglected.
- Read all related manuals for safety, use and installation. Important information therein must be read and followed.
- The documentation must be supplied and kept together with the product; otherwise, the product will lack one of its fundamental safety requisites.

**WARNING! Risk of personal injury**

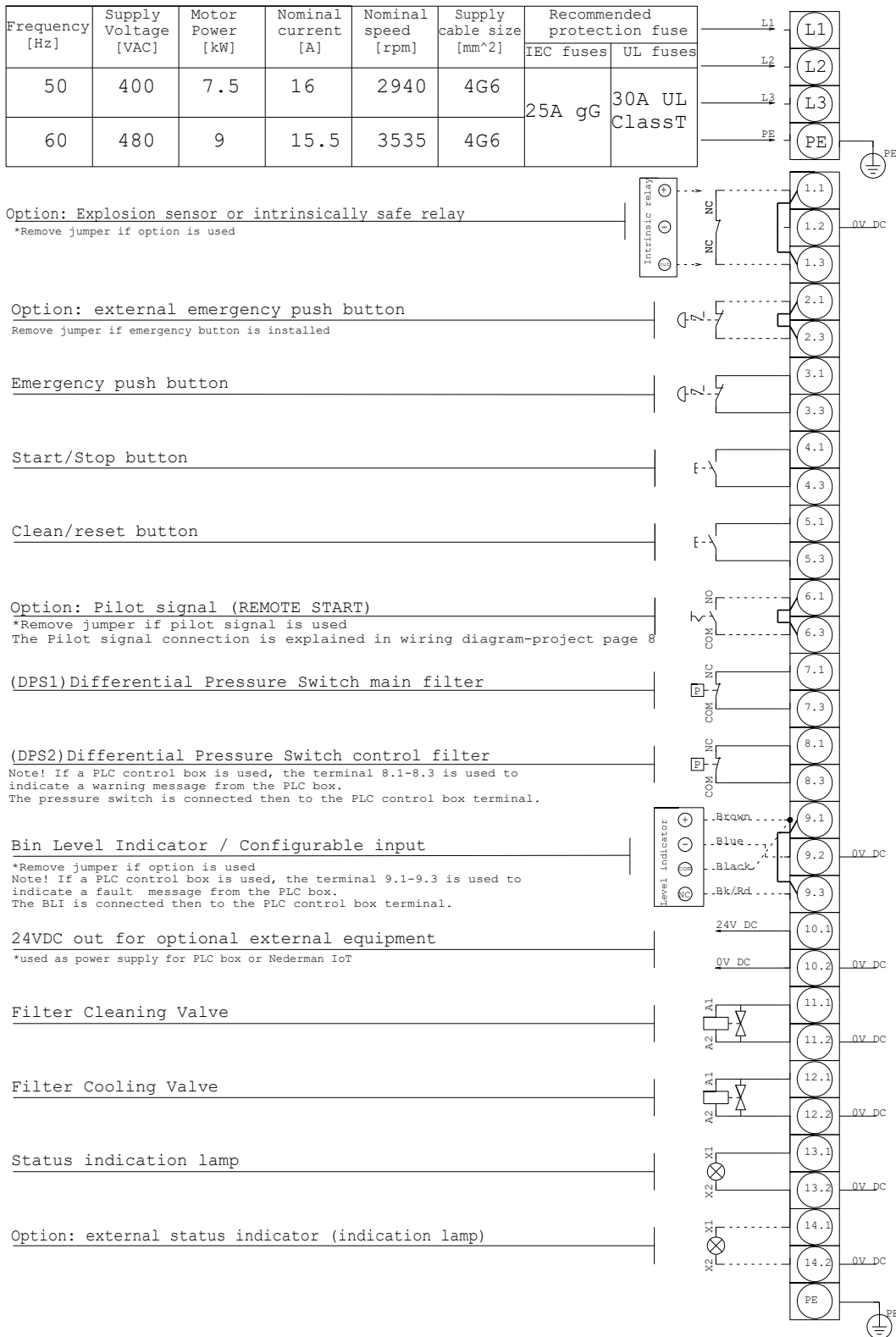
- Any functional disorders, especially those affecting the safety of the machine, must be rectified immediately. If improperly used, poorly connected, or altered, no matter how minor, the safety and reliability could be jeopardized.
- Grinding, welding or other hot works on PAK-M or the duct system should not be done without first stopping and cleaning the system.
- Do not collect items that may cause ignition or blocking. It is strictly prohibited to collect material that can undergo dangerous chemical or thermal reactions and/or self-ignite.
- Each PAK-M system must be dimensioned individually. To ensure that your system will be safe, a risk analysis must be performed for each installation and intended use.
- Do not make any changes to this product without consulting Nederman.
- Place fire alarms and an appropriate extinguishing system in all locations where collected dust is stored.

**NOTE!**

Some materials may undergo chemical reactions in combination with humidity/water. Such humidity may, for example, form if the humidity in the extracted air is condensed in the filters.

3 Electrical schematic overview

General overview



4 System status

The status of a control system provides information about its current operation, performance, and whether it is functioning as intended.

Status	Description	Indication lamp status
OFF	<p>The unit is in OFF mode.</p> <p>The unit can also go into OFF mode if something is wrong, such as if an alarm is activated.</p> <ul style="list-style-type: none"> • The pump motor is off. • There is no vacuum. • The Filter Cleaning Valve (FCV) is closed. • The unit cannot be activated by a pilot signal. 	OFF
Standby	<p>The unit is in Standby mode.</p> <ul style="list-style-type: none"> • The pump motor is off. • There is no vacuum. • The FCV is closed. • The unit is waiting for a pilot signal to go into Running mode. 	ON
Running	<p>The unit is in Running mode.</p> <ul style="list-style-type: none"> • The pump motor is on. • The unit generates a vacuum. • The FCV is closed. • The current vacuum of the unit is shown on the display. 	ON
Running/Active warning	<p>If a warning is activated, a problem needs to be corrected, but the unit continues to work.</p> <p>If a warning message is displayed, the light in the Standby/Running button flashes. The lamp continues to flash until the problem is corrected.</p>	Flashing
Idling	<p>The unit is in Idling mode.</p> <p>The unit goes into Idling mode when there is no pilot signal for the time set in Pilot Signal - Off delay, see Section 8.4.1 Pilot Signal. The unit maintains its Idling mode for a time set in Idling mode time, see Section 8.3 Cleaning settings.</p> <ul style="list-style-type: none"> • The pump motor slows down to 20Hz. • There is no vacuum. • The FCV is open. 	ON
Alarm	<p>The unit has stopped due to an active alarm. To restart the unit an alarm reset is required.</p> <p>The alarm can be reset only if the alarm reset conditions are met.</p>	Flashing

5 Filter cleaning valve (FCV)

The solenoid valve opens the airflow to the pneumatic piston, which moves the lid on top of the filter upwards, letting in the air with atmospheric pressure to the filter top.

This sudden opening of the lid on the top lets in the air with great speed which creates a sudden pressure rise above the filters.

The pressure increase blows air through the filter bags removing the dust from the filters.

When power to the solenoid valve disappears, the valve closes and evacuates the pneumatic piston. The lid falls down and closes the opening of the filter top.

Filter cleaning modes

Mode	Description	Default settings
Manual (push button)	<p>The filter cleaning button will only work when the system is in Running mode.</p> <p>Start the filter cleaning by pressing the filter cleaning button.</p> <p>The unit will now open (for 2s) and close the Filter Cleaning Valve (FCV) and then leave the FCV in its closed position.</p>	N/A
Time cleaning	<p>The cleaning timer, see parameter 47.02 in Section 8.3 Cleaning settings, is initiated by the pump run confirmation signal. Once the designated time cleaning interval elapses, a single cleaning pulse will be executed.</p> <p>The counter is reset upon receiving the signal to open the cleaning valve.</p>	3600 s
dP cleaning (on-demand)	<p>The cleaning on-demand mode detects dP over the main filter and performs a cleaning pulse to reduce the differential pressure drop across the filter.</p> <p>The dP cleaning time delay, see parameter 47.03 in Section 8.3 Cleaning settings, is used to establish the minimum duration during which the dP switch must detect a high differential pressure (dP) across the main filter before initiating a cleaning cycle.</p> <p>On-demand cleaning can work in parallel with time-based cleaning.</p>	120 s
Interlock	<p>The cleaning interlock function, see parameter 47.04 in Section 8.3 Cleaning settings, can be used in transport applications where constant vacuum is required.</p> <p>The cleaning interlock function locks only the time cleaning mode. The dP cleaning function is still active.</p>	Disabled

6 Vacuum setpoint reference

The control system is designed to maintain constant pressure (vacuum) across the ducting network.

A vacuum sensor measuring point (PID) is placed upstream of the filter (on the dirty side of the filter) providing stable pressure independent of a pressure drop over the main (and secondary) filter.

The pressure regulation is based on PID control loop.

The PID controller adjusts the output based on the difference between a desired setpoint and the actual measured value by the system.

Vacuum set point reference

The maximum setpoint can differ due to derating factors, see chapter Capacity adjustments in the Installation and Service Manual.

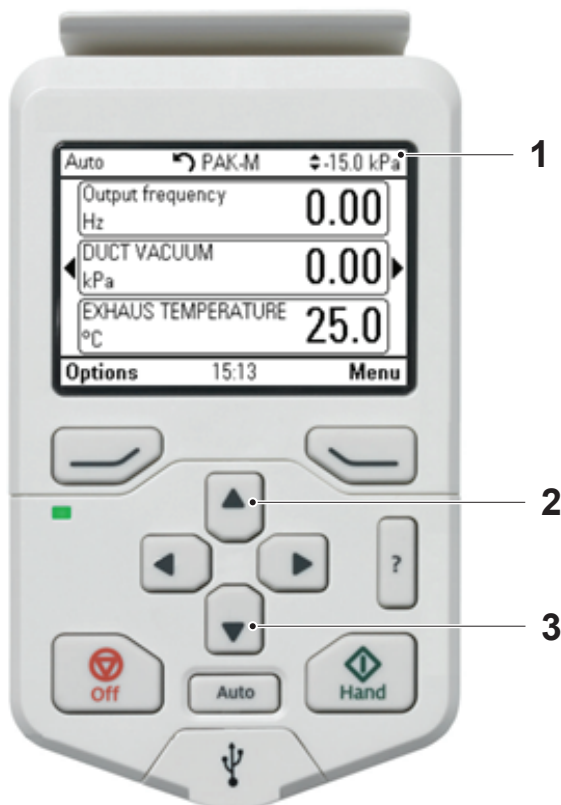
Minimum	Maximum	Default
-10 kPa	-25kPa	-15 kPa



WARNING!

It is important to avoid accidentally changing the vacuum setpoint by pressing the up or down arrows. Verify the setpoint configuration accuracy before finalizing start-up.

To adjust a new setpoint navigate to the Home screen and press the up arrow (2) key to decrease the setpoint (1), or the down arrow (3) key to increase the setpoint (1). The setpoint can be adjusted within the range specified in the table above.



Pressing the up arrow (2) once will decrease the vacuum setpoint (1) by +0,1kPa.

Pressing the down arrow (3) once will increase the vacuum setpoint (1) by -0,1kPa.

7 Cooling valve function

A cooling valve is used to control and regulate the temperature of the fan's outgoing air temperature and support vacuum regulation when sudden vacuum increases occur.

The below table shows the cooling valve operation principle.

Threshold	Action	Description
+5kPa above the pressure setpoint, see parameter 32.60 in Section 8.5.4 Low vacuum .	Open the cooling valve	When the vacuum in the system exceeds the pressure setpoint, the cooling valve will open to reduce the pressure spike in the system. This function is employed to avoid the closure of the isolation duct damper and enhances the stability of pressure regulation.
> 98°C	Open the cooling valve	When the outgoing air temperature exceeds the threshold the cooling valve will open. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE! When the valve is open, the vacuum level from the workstation pipes leading to the main pipe can be reduced.</p> </div>
< 96°C	Close the cooling valve	When the outgoing air temperature falls below the threshold, the cooling valve will close.
> 105°C	Warning (cooling valve remains open)	The outgoing air temperature continues to increase. The amount of cooling air is not enough to cool down the pump. This event will trigger a warning ID A492, see Chapter 11 Warning and alarm messages .
108°C	Open the cleaning valve	The outgoing air temperature continues to increase. When the outgoing air temperature exceeds the threshold the cleaning valve will open. This event will trigger a warning ID A491, see Chapter 11 Warning and alarm messages . <div style="border: 1px solid black; padding: 5px;"> <p>NOTE! When the cleaning valve is open, there is no vacuum in the main pipe.</p> </div>
110°C	Stop the pump	When the outgoing air temperature exceeds the threshold the pump will stop to prevent overheating. This event will trigger an alarm ID 4981, see Chapter 11 Warning and alarm messages . An alarm reset is required to restart the system.

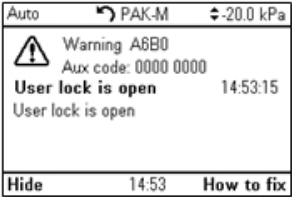
8 Settings


NOTE!

To access the keypad with the setting menu, lift the cover off the Vacuum unit.

8.1 Security

Navigation path for the security settings: **Main Menu** → **Primary settings** → **Security**

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Security code	Unlock this menu	Enter the user passcode (by default, "51200000").
Access parameters	<input checked="" type="checkbox"/> Lock all parameters.	<p>To make any changes in the drive parameters the Lock all parameters field must be unticked.</p> <p>The Lock all parameters field is ticked as per factory default.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE! After finishing commissioning, lock the Lock all parameters field again to prevent unauthorized users from making changes.</p> </div>
User lock is open		<p>When the user lock menu opens, the warning light will start flashing until the lock is closed.</p> <p>To close the user lock, select Lock this menu in the security tab.</p>

8.2 Motor settings

Navigation path for the motor settings: **Main Menu** → **Parameters** → **Complete list**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
99.16	Motor phase order	Motor phase order	Switches the rotation direction of the motor. This parameter can be used if the motor turns in the wrong direction (for example, because of the wrong phase order in the motor cable), and correcting the cabling is considered impractical.
	U V W (Factory default)	0 (Factory default)	Normal
	U W V	1	Reversed rotation direction.
95.01	Supply voltage	Supply voltage	Selects the supply voltage range. This parameter is used by the drive to determine the nominal voltage of the supply network. The parameter also affects the current ratings and the DC voltage control functions (trip and brake chopper activation limits) of the drive.
	Automatic/not selected (Factory default)	0 (Factory default)	The drive estimates the supply voltage itself.
	380...415 V	1	380...415 V
	440...480 V	2	440...480 V
99.06	Motor Nominal current	17 A (Factory default)	Defines the nominal motor current. Default value is set to 400V/50Hz network supply. For details see Chapter 3 Electrical schematic overview .
99.07	Motor Nominal voltage	400 V (Factory default)	Defines the nominal motor voltage. Default value is set to 400V/50Hz network supply. For details see Chapter 3 Electrical schematic overview .
99.08	Motor Nominal frequency	50 Hz (Factory default)	Defines the nominal motor frequency. Default value is set to 400V/50Hz network supply. For details see Chapter 3 Electrical schematic overview .
99.09	Motor Nominal speed	2940 rpm (Factory default)	Defines the nominal motor speed. Default value is set to 400V/50Hz network supply. For details see Chapter 3 Electrical schematic overview .
99.10	Motor Nominal power	7.5 kW (Factory default)	Defines the nominal motor power. Default value is set to 400V/50Hz network supply. For details see Chapter 3 Electrical schematic overview .

8.3 Cleaning settings

Navigation path for the cleaning settings: **Main Menu** → **Parameters** → **Complete list** → **Data Storage**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
47.01	Idling mode time	Data storage 1 real32	<p>When the pilot signal off-time delay expires, see Section 8.4.1 Pilot Signal, the unit transitions to idle mode.</p> <p>While in idle mode, the motor operates at minimum speed, and the cleaning valve remains open (resulting in no vacuum in the pipework).</p> <p>The unit continues to operate in idle mode until the idle mode timer expires. If the pilot signal is not received within this timeframe, the unit will stop and enter standby mode.</p>
		60s (Factory default)	Unit: seconds <div style="border: 1px solid black; padding: 5px;"> <p>NOTE! The idling mode is always used in combination with the pilot signal (PS). If the PS is frequently used (e.g. 10 times per hour) it is recommended to use longer idling mode time.</p> </div>
47.02	Time cleaning interval	Data storage 2 real32	Time cleaning interval. The timer is activated by a motor run signal.
		3600s (Factory default)	Unit: seconds
47.03	dP cleaning time delay	Data storage 3 real32	The dP cleaning time delay establishes the minimum duration during which the dP switch must detect a high differential pressure (dP) across the main filter before initiating a cleaning cycle.
		120s (Factory default)	Unit: seconds
47.04	Cleaning interlock	Data storage 4 real32	Filter cleaning does not take place until the pilot signal has stopped. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE! The cleaning interlock function locks only the time cleaning function. The dP cleaning function is still active.</p> <p>To disable the dP cleaning function, set the cleaning parameter 47.03 to +999999s.</p> </div>
		0 (Factory default)	Function OFF
		1	Function ON

8.4 I/O settings

Navigation path for the I/O settings: **Main Menu** → **I/O Settings**

8.4.1 Pilot Signal

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Pilot signal	DI1	DI1: Digital input 1 Pilot signal (Remote Start/Stop)
Actual value (read-only)	0 1	0 - Pilot signal inactive 1 - Pilot signal active
Forced input state	<input checked="" type="checkbox"/> Forced input state <input type="checkbox"/> Factory disabled (Factory default)	This option is used to simulate a pilot signal status. If ticked, the pilot signal status is always high (active). NOTE! Function can be used for test purposes only, after repowering the forced input state is disabled.
Input State	OFF ON	OFF - Pilot signal OFF ON - Pilot signal ON
Off delay	15s (Factory default)	Defines the deactivation delay for digital input DI1.
On delay	2s (Factory default)	Defines the activation delay for digital input DI1.

8.4.2 Main filter dP switch (dPS1)

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Main filter dP switch	DI4	DI4: Digital input 4 Main filter dP switch monitoring
Actual value (read-only)	0 1	0 - dP above value set on dPS1 switch 1 - dP below value set on dPS1 switch
Forced input state	<input checked="" type="checkbox"/> Forced input state <input type="checkbox"/> Factory disabled (Factory default)	When DI4 input is in a forced input state the signal from the main filter dP switch is ignored. NOTE! Function can be used for test purposes only, after repowering the forced input state is disabled.
Input State	OFF ON	OFF - main filter dP High ON - main filter dP Normal
Off delay	90s (Factory default)	Defines the deactivation delay for digital input DI4.
On delay	0s (Factory default)	Defines the activation delay for digital input DI4.

8.4.3 Configurable input (factory is Bin Level indicator)

The configurable input is factory-assigned to the bin level indicator (BLI), a sensor installed in the dust bin to detect when the bin is full.

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Configurable input	DI5	DI5: Configurable input In a factory setting, the input is set up as a Bin level indicator.
Actual value (read-only)	0 1	0 - Dust detected 1 - No dust detected
Forced input state	<input checked="" type="checkbox"/> Forced input state <input type="checkbox"/> Factory disabled (Factory default)	When DI5 input is in a forced input state the signal from DI5 signal is ignored. <div style="border: 1px solid black; padding: 5px;">NOTE! Function can be used for test purposes only, after repowering Forced input state is disabled.</div>
Input State	OFF ON	OFF - BLI high (detect dust) ON - BLI low (no dust detected)
Off delay	120s (Factory default)	Defines the deactivation delay for digital input DI5.
On delay	0s (Factory default)	Defines the activation delay for digital input DI5.

The input can be reconfigured to detect other events or malfunctions if the bin level indicator is not utilized.

To assign a new identifier to the configurable input, navigate to:

Primary Settings → **Clock, Region, Display** → **Edit Texts** → **External Event 2**

To define the event type (warning/fault) or adjust the input delay, see table below.

Recommended setting for the Compressed Air Switch:

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
10.14	DI5 OFF delay	120s	Defines the deactivation delay for digital input DI5.
31.04	External event 2 type	Warning (recommended)	Generates a warning. Compressed air pressure is continuously monitored regardless of the operational state of the PAK-M unit.
		Fault	Generates a fault and stops the system.

Recommended setting for the Vibration sensor:

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
10.14	DI5 OFF delay	60s	Defines the deactivation delay for digital input DI5. The time delay can be configured directly on the sensor. When a delay is set, the message will be triggered upon meeting the specified condition (vibration exceeding the set threshold) and the expiration of the combined delay times: the sensor-configured delay and the off-delay time defined in parameter 10.14.
31.04	External event 2 type	Warning	Generates a warning.
		Fault (recommended)	Generates a fault and stops the system.



NOTE!

If a PLC control box is employed, Configurable input is used to indicate "PLC fault" messages, see fault 9082 in [Chapter 11 Warning and alarm messages](#).

Preset Off delay time is set to 0s.

The bin level indicator is moved to the PLC box, see the PLC settings manual for PAK-M.

8.4.4 Secondary filter dP switch (DPS2)

PAK-M Settings Name	ABB Parameter name/value	Description/Range
Configurable input	DI6	DI6: Secondary filter dP switch monitoring
Actual value (read-only)	0 1	0 - dP above value set on dPS2 switch 1 - dP below value set on dPS2 switch
Forced input state	<input checked="" type="checkbox"/> Forced input state <input type="checkbox"/> Factory disabled (Factory default)	When DI6 input is in a forced input state the signal from the secondary filter dP switch is ignored. <div style="border: 1px solid black; padding: 5px;"> NOTE! Function can be used for test purposes only, after repowering the forced input state is disabled.</div>
Input State	OFF ON	OFF - secondary filter dP High ON - secondary filter dP Normal
Off delay	30s (Factory default)	Defines the deactivation delay for digital input DI6.
On delay	0s (Factory default)	Defines the activation delay for digital input DI6.



NOTE!

If PLC control box is employed, DI6 is used to indicate the general warning from PLC box.

Preset Off delay time is set to 0s.

The Secondary dP switch is moved to the PLC box, see the PLC settings manual for PAK-M.

8.5 Warning and alarm settings

8.5.1 dP over main filter high

Navigation path for the warning and alarm settings: **Main Menu** → **Parameters** → **Complete list** → **Fault functions**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
31.01	External event 1 source	P.10.2.3 (Factory default)	DI4 delayed status
		Inactive (true)	Disable the dP over main filter alarm if, for instance, the pressure switch experiences a malfunction.
31.02	External event 1 type	Warning	Generates a warning.
		Fault (Factory default)	Generates a fault and stops the system.

8.5.2 Configurable input (default Container Level Sensor)

Navigation path for the warning and alarm settings: **Main Menu** → **Parameters** → **Complete list** → **Fault functions**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
31.03	External event 2 source	P.10.2.4 (Factory default)	DI5 delayed status
		Inactive (true)	Disable the configurable input alarm (factory associated with container dust level) if, for instance, the dust level sensor experiences a malfunction.
31.04	External event 2 type	Warning	Generates a warning.
		Fault (Factory default)	Generates a fault and stops the system.



NOTE!

If a PLC control box is employed, Configurable input (External Event 2 source) is used to indicate "PLC fault" messages, see fault 9082 in [Chapter 11 Warning and alarm messages](#).

8.5.3 Secondary filter dP high

Navigation path for the warning and alarm settings: **Main Menu** → **Parameters** → **Complete list** → **Fault functions**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
31.05	External event 3 source	P.10.2.5 (Factory default)	DI6 delayed status
		Inactive (true)	Disable the dP over secondary filter alarm if, for instance, the pressure switch experiences a malfunction.
31.06	External event 3 type	Warning	Generates a warning.
		Fault (Factory default)	Generates a fault and stops the system.



NOTE!

If a PLC control box is employed, Secondary filter dP high (External Event 3 source) is used to indicate "PLC warning" messages, see warning A983 in [Chapter 11 Warning and alarm messages](#).

Consequently, the "External event 3 type" is preconfigured as a warning.

8.5.4 Low vacuum

Navigation path for the warning and alarm settings: **Main Menu** → **Parameters** → **Complete list** → **Fault functions**

ID	PAK-M Settings Name	ABB Parameter name/value	Description/Range
31.07	External event 4 source	Adaptive program (Factory default)	Low vacuum. Event is stored in the program memory. Cannot be changed.
31.08	External event 4 type	Warning	Generates a warning.
		Fault	Generates a fault and stops the system.
32.55	Supervision 6 function	High (Factory default)	Action is taken whenever signal is above the Supervision High limit + 0.5 * hysteresis.
		Disable	Disable the low vacuum warning if, for instance, the vacuum pressure sensor experiences a malfunction.
32.60	Supervision 6 high	5 [kPa]	The low vacuum warning is triggered when the pump is running at maximum speed and the disparity between the vacuum pressure setpoint and the measured actual vacuum pressure exceeds the predefined threshold (par.32.60) When the warning conditions are met and the predefined time delay expires, warning A984 will pop out, see Chapter 11 Warning and alarm messages .


8.5.5 Faulty temperature sensor

Navigation path for the supervision settings: **Main Menu** → **Primary settings** → **Advanced functions** → **Supervision**

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Faulty temperature sensor	Supervision 2 function	The faulty temperature sensor alarm detects a PT100 sensor malfunction when the sensor readings fall outside the predefined low limit and high limit thresholds.
Action	Fault (Factory default)	Generates a fault and stops the system.
	Warning	Generates a warning.
	No action	Disable supervision. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE! Continuous temperature monitoring is essential to prevent the pump from overheating. Do not disable the sensor. If malfunctions occur, replace the sensor with a new one. Disabling the sensor may lead to pump overheating.</p> </div>
Low limit	-30 °C	Defines the low threshold for the faulty temperature sensor supervision.
High limit	150 °C	Defines the high threshold for the faulty temperature sensor supervision.
Hysteresis	0	Action is taken whenever the signal rises above the value defined by threshold + 0.5 * hysteresis.
Label	Faulty temperature sensor	Provides up to 35 characters of free/custom text describing the event.

8.5.6 Faulty vacuum sensor

Navigation path for the supervision settings: **Main Menu** → **Primary settings** → **Advanced functions** → **Supervision**

PAK-M Settings Name	ABB Parameter name/ value	Description/Range
Faulty vacuum sensor	Supervision 3 function	The faulty vacuum sensor alarm detects a vacuum (PID) sensor malfunction when the sensor readings fall outside the predefined low limit and high limit thresholds.
Action	Fault (Factory default)	Generates a fault and stops the system.
	Warning	Generates a warning.
	No action	Disable supervision. <div style="border: 1px solid black; padding: 5px;"> <p> NOTE! Continuous vacuum monitoring is essential to prevent the pump from overload/overheating. Do not disable the sensor. If malfunctions occur, replace the sensor with a new one. Disabling the sensor may lead to pump overload/overheating.</p> </div>
Low limit	0,5V	Defines the low threshold for faulty vacuum sensor supervision.
High limit	12V	Defines the high threshold for faulty vacuum sensor supervision.
Hysteresis	0	Action is taken whenever the signal rises above the value defined by threshold + 0.5 * hysteresis.
Label	Faulty temperature sensor	Provides up to 35 characters of free/custom text describing the event.

9 Timed functions

The base entity of the timed functions is called a timer. A timer can be active based on the time of the day, day of the week, and season of the year.

In addition to these time-related parameters, the timer activation can be influenced by so-called days of exception (configurable as holidays or workdays). For example, 25.12. (Dec 25th) can be defined as a holiday in many countries. A timer can be set to be active or inactive during the days of exception.

Several timers can be connected to a timed function with the OR function. Thus, if any of the timers connected to a timed function is active, the timed function is also active. The timed function is then, in turn, controlling normal drive functions like starting the drive and choosing the right speed or right setpoint for the PID loop controller.

If the timed function is used together with the pilot signal, the active timer is putting the system into the standby mode. The system will wait for pilot signal to start.

Before configuring the timed function, ensure the date & time are set correctly.

Navigation path to the date & time settings: **Main Menu** → **Primary settings** → **Clock, region, display** → **Date & time**

Example on how to set a timed function

In order to set a timed function with three timers, as shown in the example table below:

Timed function timers	Desired operation days	Desired operation time
Timer 1	Monday - Friday	06:00 - 14:00
Timer 2	Monday - Friday	14:30 - 22:30
Timer 3	Saturday	08:00 - 14:00

Timer 1

Navigate to **Main Menu** → **Primary settings** → **Advanced functions** → **Timed functions** → **Timed function 1** → **Used for** → **Timer 1** and set the following values:

START	DURATION	DAYS
6:00	8 h	Mon-Fri

Timer 2

Navigate to **Main Menu** → **Primary settings** → **Advanced functions** → **Timed functions** → **Timed function 1** → **Used for** → **Timer 2** and set the following values:

START	DURATION	DAYS
14:30	8 h	Mon-Fri

Timer 3

Navigate to **Main Menu** → **Primary settings** → **Advanced functions** → **Timed functions** → **Timed function 1** → **Used for** → **Timer 3** and set the following values:


START	DURATION	DAYS
8:00	6 h	Saturday

10 Backup and restore

You can make backups of the settings manually to the assistant control panel. The assistant control panel also keeps one automatic backup. You can restore a backup to another drive, or a new drive replacing a faulty one. You can make backups and restore on the assistant control panel.

Manual backup


Make a backup when necessary, for example, after you have started up the drive or when you want to copy the settings to another drive.

Manual backups are marked with an  icon.

Automatic backup


The assistant control panel has dedicated space for one automatic backup. An automatic backup is created two hours after the last parameter change.

After completing the backup, the control panel waits for 24 hours before checking if there are additional parameter changes. If there are, it creates a new backup overwriting the previous one when two hours have passed after the latest change. You cannot adjust the delay time or disable the automatic backup function.

Automatic backups are marked with an  icon.

Restore

The backups are shown on the control panel. To restore a backup:

- 1 On the control panel, navigate to **Menu** → **Backup**.
- 2 Select a backup and press the  icon. In the following display you can view backup contents and restore all parameters or select a subset to be restored.

**NOTE!**

To restore a backup, the drive has to be in local control.

11 Warning and alarm messages

If a warning is activated, a problem needs to be corrected, but the unit continues to work.

If a warning message is displayed, the light in the standby/running button flashes one second on, and one second off. This 1/1 on/off sequence continues until the problem is corrected.

If an alarm is activated, the unit goes into off mode until the problem is corrected.

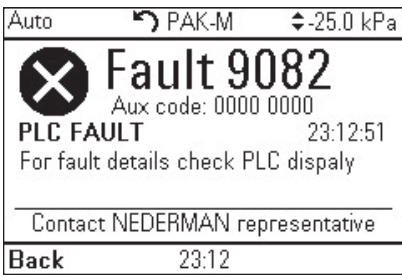
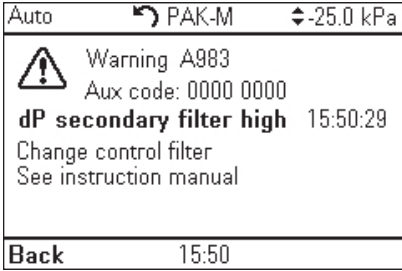



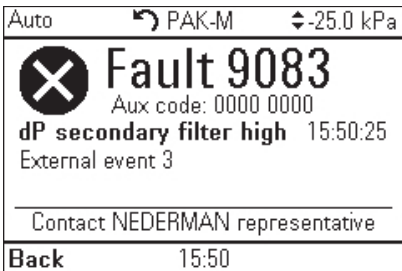

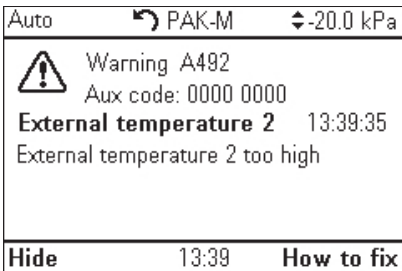

If an alarm message is displayed, the light in the standby/running button flashes one second on, one second off. This 1/1 on/off sequence continues until the problem is corrected and the alarm reset.

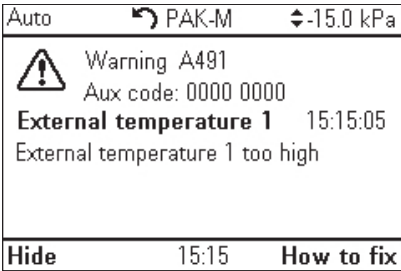
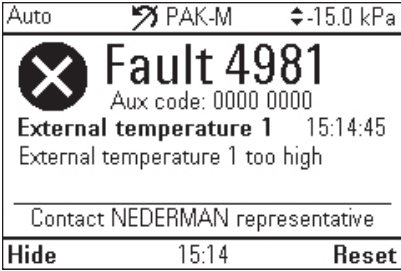
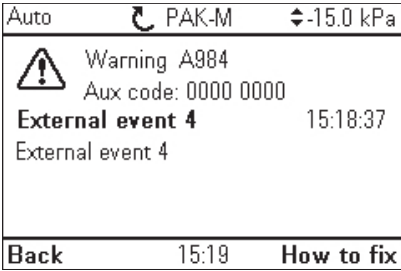
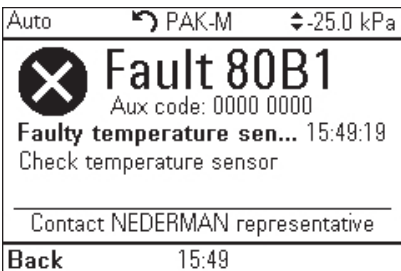


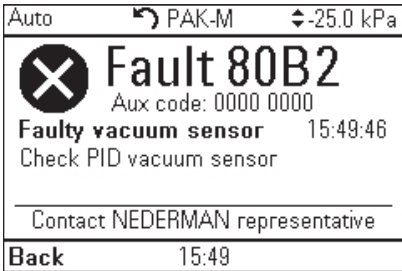
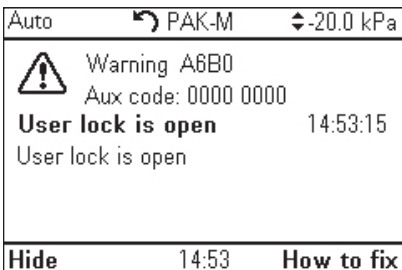
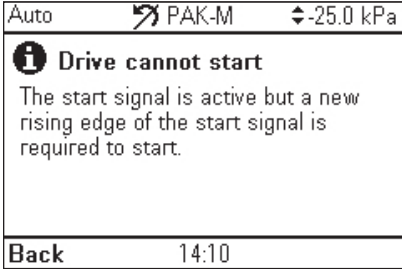
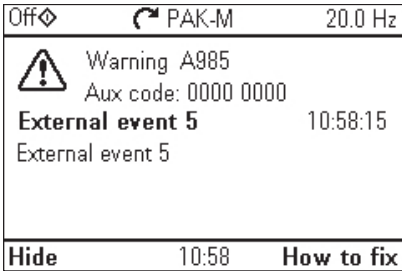
CAUTION!

If you cannot find the warning/alarm below table, please refer to the: *ACH580 HVAC* control program manual which can be found on the ABB website.

Code	Warning / Fault	Cause	What to do
A981		<p>The main filter is clogged.</p> <p>The pneumatic hose (P1) is pulled out.</p>	<p>Replace the filter.</p> <p>Ensure that the pneumatic connection between the filter and the pressure switch (DPS1) is not pulled out/clogged or broken.</p>
9081		<p>The pressure switch point is set too low (see knob position at pressure switch DPS1).</p>	<p>Ensure that the pressure setpoint (know position at pressure switch DPS1) is set correctly.</p>
A982		<p>The container dust level is high.</p> <p>The dust sensor is malfunction.</p>	<p>Empty the dust container.</p> <p>Test the dust level sensor in terms of correct operation.</p>
9082		<p>Normally open (NO) contact has been connected.</p>	<p>Ensure that the Normally closed (NC) contact has been connected. The contact is closed when the sensor is not active (no dust detected).</p>

Code	Warning / Fault	Cause	What to do
	 <p>Auto PAK-M -25.0 kPa Fault 9082 Aux code: 0000 0000 PLC FAULT 23:12:51 For fault details check PLC display Contact NEDERMAN representative Back 23:12</p>	<p>PLC fault (message available when PLC box is used).</p>	<p>PLC box general fault. To see the fault details, check PLC display.</p>
A983	 <p>Auto PAK-M -25.0 kPa  Warning A983 Aux code: 0000 0000 dP secondary filter high 15:50:29 Change control filter See instruction manual Back 15:50</p>	<p>The secondary filter is clogged.</p> <p>The pneumatic hose (P2) is pulled out.</p>	<p>Replace the filter.</p> <p>Ensure that the pneumatic connection between the filter and pressure switch(DPS2) is not pulled out/clogged or broken.</p>
	 <p>Auto PAK-M -25.0 kPa  Warning A983 Aux code: 0000 0000 PLC WARNING 23:13:05 For warning details check PLC display Back 23:13</p>	<p>PLC warning (info available when PLC box used)</p>	<p>PLC box general warning. To see the warning details, check PLC display.</p>
9083	 <p>Auto PAK-M -25.0 kPa  Fault 9083 Aux code: 0000 0000 dP secondary filter high 15:50:25 External event 3 Contact NEDERMAN representative Back 15:50</p>	<p>The pressure switch point is set too low (see knob position at pressure switch DPS2).</p>	<p>Ensure that the pressure setpoint (know the position at the pressure switch DPS2) is set correctly.</p>
A491	 <p>Auto PAK-M -20.0 kPa  Warning A492 Aux code: 0000 0000 External temperature 2 13:39:35 External temperature 2 too high Hide 13:39 How to fix</p>	<p>The measured temperature has exceeded the warning temperature, cooling valves should be open.</p> <p>The pump is running against a closed inlet.</p> <p>The vacuum pressure is set too high.</p>	<p>Check the exhaust air temperature and ensure that the filter cooling valve is not broken. Check the compressed air pressure.</p> <p>Check if the pilot signal works correctly. Fix the pilot signal malfunction.</p> <p>Reduce the vacuum setpoint to avoid pump overheating.</p>

Code	Warning / Fault	Cause	What to do
A492	 <p>Auto PAK-M -15.0 kPa Warning A491 Aux code: 0000 0000 External temperature 1 15:15:05 External temperature 1 too high Hide 15:15 How to fix</p>	<p>The measured temperature has exceeded the warning temperature, cooling valve should be open, cleaning valve should be open.</p> <p>The pump is running against a closed inlet.</p> <p>The vacuum pressure is set too high.</p>	<p>Check the exhaust air temperature and ensure that the filter cooling valve is not broken. Check the compressed air pressure.</p> <p>Check if the pilot signal works correctly. Fix the pilot signal malfunction.</p> <p>Reduce the vacuum set-point to avoid pump overheating.</p>
4981	 <p>Auto PAK-M -15.0 kPa Fault 4981 Aux code: 0000 0000 External temperature 1 15:14:45 External temperature 1 too high Contact NEDERMAN representative Hide 15:14 Reset</p>	<p>The measured temperature has exceeded the alarm temperature.</p> <p>The pump is running against a closed inlet.</p> <p>The vacuum pressure is set too high.</p> <p>A faulty temperature sensor (80B1).</p>	<p>Check the exhaust air temperature and ensure that the filter cooling valve and the cleaning valve are not broken. Check the compressed air pressure.</p> <p>Check if the pilot signal works correctly. Fix pilot signal malfunction.</p> <p>Reduce the vacuum set-point to avoid pump overheating.</p> <p>See 80B1 fault root cause.</p>
A984	<p>Low duct pressure (External event 4)</p>  <p>Auto PAK-M -15.0 kPa Warning A984 Aux code: 0000 0000 External event 4 15:18:37 External event 4 Back 15:19 How to fix</p>	<p>The pump is running at max speed and cannot maintain the set vacuum.</p> <p>The pneumatic hose (P3) is pulled out.</p>	<p>Check the filter resistance (main and secondary filter).</p> <p>Ensure that the pneumatic connection between the filter and the pressure sensor (PID) is not pulled out/clogged or broken.</p>
80B1	 <p>Auto PAK-M -25.0 kPa Fault 80B1 Aux code: 0000 0000 Faulty temperature sen... 15:49:19 Check temperature sensor Contact NEDERMAN representative Back 15:49</p>	<p>The PT100 sensor is defective.</p> <p>The temperature readings do not match the operation range (see</p>	<p>Check the PT100 sensor by measuring the resistance between the white and red wire. The resistance for 20°C should equal 107,79 Ohm.</p> <p>Check the exhaust air temperature. The alarm cannot be reset until the</p>

Code	Warning / Fault	Cause	What to do
		chapter faulty temperature sensor). The temperature reading settings have been changed.	temperature drops below 110°C. Contact Nederman technical support.
80B2		The vacuum sensor (PID) is malfunctioning or the sensor feedback does not match the operation range. The vacuum sensor settings have been changed.	Measure the sensor output value when the pump is not running. For 0 kPa the sensor output should equal 10V. Contact Nederman representative.
A6B0		The user lock is open, and user lock configuration parameters 96.100... 96.102 are visible.	Close the user lock by entering a valid passcode in parameter 96.02 Passcode.
N/A		The rotation direction arrow is crossed. The drive cannot start due to safety reasons. (The alarm state has been reset, the time function is active and PS is high, but the rising edge of the start signal is required to start) NOTE! It is not allowed to start the pump automatically after the alarm reset.	To see active inhibits navigate to: Options - Active inhibits. If a pilot signal is used, switch the signal off/on to start the drive. If the pilot signal is not used, press the start/standby button.
A985	<p>Drive in Hand mode (External Event 5)</p> 	The drive has been switched to hand mode.	Press the auto button on drive keyboard to set the system into AUTO mode.

Nederman

www.nederman.com