# MPXS

Controlled Communicating Micro Vacuum Pumps

COVAL
vacuum managers

EN

## OPERATING INSTRUCTIONS

This manual is intended for users of **MPXS** series controlled communicating micro vacuum pumps.
It contains all the information you need to integrate the vacuum pumps, as well as the instructions for use and maintenance.

The operating instructions were originally drafted in French (original version).
They must be kept for any future use.
Subject to technical changes, mistakes or printing errors.

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IO-Link
AIR Saving Control

**PRIOR TO COMMISSIONING THIS PRODUCT,
PLEASE CAREFULLY READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS.**

Retrouvez tous les documents en différentes langues sur le site COVAL : https://doc.coval.com/MPXS

All documents are available in multiple languages on the COVAL website: https://doc.coval.com/MPXS

Finden Sie alle Dokumente in verschiedenen Sprachen auf der COVAL-Homepage: https://doc.coval.com/MPXS

Tutti i documenti nelle differenti lingue sono presenti sul sito COVAL: https://doc.coval.com/MPXS

Podrá encontrar todos los documentos en diferentes idiomas en la página web de COVAL: https://doc.coval.com/MPXS

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# 1. IMPORTANT INFORMATION

This document contains important instructions and information regarding various stages in the life cycle of the product:
- Transporting, storing, commissioning, and decommissioning.
- Operating and servicing.

The operating instructions correspond to the product actually delivered.

This document is part of the product and the instructions below must be followed:
- Read this document carefully and observe the instructions to ensure safe installation, optimal operation of the product and to avoid any malfunction.
- Keep the document within reach of the product so that the staff can easily access it.



- **Failure to observe the instructions specified in this document may lead to injury or even death!**
- **COVAL will not be held liable for any damage or breakdown as a consequence of failure to observe instructions.**

For any additional information, please contact COVAL:

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# 2. OPERATING AND SAFETY INSTRUCTIONS

## 2.1. Assembly / Dismantling

Only qualified personnel is authorized to use the components. Such personnel must be trained in the following areas:
- Installing pressure and electrical equipment.
- Applicable safety rules and requirements for using components and installing them in devices, machines, and machine lines.
- Appropriate handling of components and their respective products.
- Proper use with the operating materials and supplies.

The improper use of components with other operating materials and supplies than those defined, other voltages, and under other environmental conditions can lead to failure, damage, and injury.
***This list must be considered as an overview and does not claim to be exhaustive. It can be further expanded by users according to their particular needs.***

## 2.2. Safety instructions

In order to ensure flawless installation and operation, the following rules must also be observed:
- Vacuum pumps must be carefully removed from their packaging.
- Vacuum pumps must be protected against any and all damage.
- During installation and maintenance work, the vacuum pump must be de-energized and secured against any unauthorized activation.
- Any attempt to alter the vacuum pump is strictly prohibited.
- The area surrounding the vacuum gripper and the location where it is used must be kept clean.
- It is forbidden for persons to remain under the payload handled by the vacuum pump in its transport area.
- Only appropriate fittings and connectors must be used.
- During installation, only flexible tubes and tubes that are suitable for the specific operating material may be used (tubes that come loose or electrical connection lines constitute a major safety hazard—**including risk of death!**).
- Conductive and live cable lines must be insulated, of an adequate size, and properly installed.
- Pneumatic and electric lines must be connected to the component in a stable and safe manner.
- Ensure that any physical contact with electric parts is prevented (protect electrical contacts).
- Only available fastening means described in chapter 7.6 maybe used and tightening torques must be used accordingly.
- The possibility of power or pneumatic supply interruption must be taken into consideration to ensure people and systems are protected at all times.
- Emergency stops should be accounted for when designing the system.

- The latest applicable EC directives, legislations, decrees, and standards, as well as the current state of the technology for its intended use.
- Taking any special measures to meet above said requirements, as well as the current state of the technology.

- **Failure to observe the above safety instructions may lead to failure, damage, and injury—even risk of death.**
- **The components of the device that are no longer in working order must be recycled in an environmentally-friendly manner! (see chapter RECYCLING) !**

## 2.3. Commissioning and decommissioning

### Commissioning:

- Ensure the flexible tubes for compressed air and power supply are connected correctly using the appropriate connectors.

### Decommissioning (prior to any disassembly or maintenance work):

- Check that the parts to be handled are not held by the system (load may drop).

## 2.4. Disposal

When disposing of the system or any of its constituent parts that are no longer functional, follow the procedure below:
Waste electrical and electronic equipment (WEEE) must not be disposed of in urban waste collection bins but given to the appropriate recycling organization (see section on RECYCLING).

# 3. NAMEPLATE

The nameplate is affixed under the head module of the bank in such a way that it is legible at all times.
It includes the following information:

- Part number
- Serial number
- A datamatrix code containing the reference and serial number of the vacuum pump
- CE marking




*Sample nameplate*

# 4. MAIN FUNCTIONS OF MPXS MICRO VACUUM PUMPS

**MPXS** micro vacuum pumps have the following characteristics:

- Vacuum generated by a Venturi effect (maximum negative pressure: -85 kPa, i.e. 85% vacuum).
- Intelligent vacuum regulation system ASC (Air Saving Control)
- NC or NO vacuum control and NC blow-off control.
- Standard or adjustable powerful blow-off, controlled or automatic timed.
- Electronic vacuum switch and 24 V DC contact output.
- Vacuum check valve.
- Open clog-free silencer or exhaust collector.
- Standalone micro vacuum pumps or bankable from 1 to 8 modules with common pressure and collectable exhaust.
- Standard Input/Output (SIO) / IO-Link mode.

### INSTRUCTION FOR USE

**MPXS** micro vacuum pumps are designed for the generation of vacuum allowing the gripping and the transfer of parts by means of suction cups.
Authorized gases: only neutral gases such as air, nitrogen.

Once the device is installed, make sure that the device remains clear of any moving parts.

MPXS micro vacuum pumps are not suitable for the following purposes:

- Transporting liquids or granules
- Filling compressed air tanks, driving pressure elements (valves, cylinders, etc.)
- Vacuuming dangerous materials
- Vacuuming any aggressive gases or products
- Handling people or animals
- Usage in environments subject to explosion hazard
- Usage in medical applications.

COVAL is not liable for any damage resulting from improper use of the vacuum pump.

## 5. CONFIGURATION REMINDER

### STANDALONE MPXS MICRO VACUUM PUMP



| MPXS90X | 10 | S | C16 | P | R2 | F1 | E |
|---|---|---|---|---|---|---|---|

**NOZZLE DIA.**

| | |
|---|---|
| 0.7 mm dia. | 07 |
| 1.0 mm dia. | 10 |

**GENERATOR CONTROL**

| | |
|---|---|
| Vacuum **NC** and blow-off **NC** | S |
| Vacuum **NO** and blow-off **NC** | V |

**BLOW-OFF**

| | |
|---|---|
| Standard blow-off | F1 |
| Adjustable powerful blow-off | F3 |

**EXHAUST COLLECTION**

| | |
|---|---|
| X | Without |
| E | With |

### MPXS MICRO VACUUM PUMPS IN BANK



| MPXS90X | 10 | S | C16 | P | R2 | F1 | EB4 | | L | X |
|---|---|---|---|---|---|---|---|---|---|---|

**NOZZLE DIA.**

| | |
|---|---|
| 0.7 mm dia. | 07 |
| 1.0 mm dia. | 10 |

**GENERATOR CONTROL**

| | |
|---|---|
| Vacuum **NC** and blow-off **NC** | S |
| Vacuum **NO** and blow-off **NC** | V |

**BLOW-OFF**

| | |
|---|---|
| Standard blow-off | F1 |
| Adjustable powerful blow-off | F3 |

**NUMBER OF MODULES**

| | |
|---|---|
| EB1 | Bank of 1 MPXS module |
| EB2 | Bank of 2 MPXS modules |
| EB3 | Bank of 3 MPXS modules |
| EB4 | Bank of 4 MPXS modules |
| EB5 | Bank of 5 MPXS modules |
| EB6 | Bank of 6 MPXS modules |
| EB7 | Bank of 7 MPXS modules |
| EB8 | Bank of 8 MPXS modules |

**BANK END SETS**

| | |
|---|---|
| L | **Single Left** End Set for a bank of 1 to 4 MPXS modules with a 1.0 mm nozzle, and up to 8 MPXS modules with a 0.7 mm nozzle.<br>▪ 1 x common pressure connection, push-to-connect 8x10 mm<br>▪ 1 x Exhaust collector, push-to-connect 10x12 mm |
| D | **Double** End Set for a bank of 1 to 8 MPXS modules.<br>▪ 2 x common pressure connections, push-to-connect 8x10 mm<br>▪ 2 x Exhaust collectors, push-to-connect 10x12 mm |

# 6. COMPOSITION

## 6.1. Overview

**Ultra-compact and lightweight design**
- 12.5 mm wide
- 87 g minimum
- Volume: 74 $cm^3$

**Vacuum generation with single-stage Venturi pump**
- Short evacuation times
- No moving parts
- Dust resistant
- No maintenance required

**Onboard diagnostic tools**
- Cycle counters (vacuum and blow-off control, objects gripped, objects lost, etc.)
- Alarm counters
- Supply voltage monitoring

**Available configurations**
- Standalone module
- Bank from 1 to 8 modules with common pressure and collectable exhaust

**Inputs / Outputs Digital (SIO) / IO-Link**
- One M8 6-pin connector male A coded

**Simple and efficient HMI**

Control status LEDs:
- Green LED: vacuum control
- Orange LED: blow-off control

2 setting buttons

High-visibility display with clear messages and straightforward settings menu

Gripping status indicator light:
- Green: object gripped
- Yellow: ASC disabled due to vacuum leakage (object held in place)
- Red: object lost




Vacuum check valve

Air Saving Control (ASC), our smart vacuum control system: Averages 90% energy savings

IO-Link communications interface: allows for simple and efficient integration of MPXS micro vacuum pumps into the process

Open clog-free silencer or exhaust collector depending on the version

## 6.2. Dialog front panel

**High-visibility display**




Multilingual alert and/or setup messages

EN FR DE IT ES

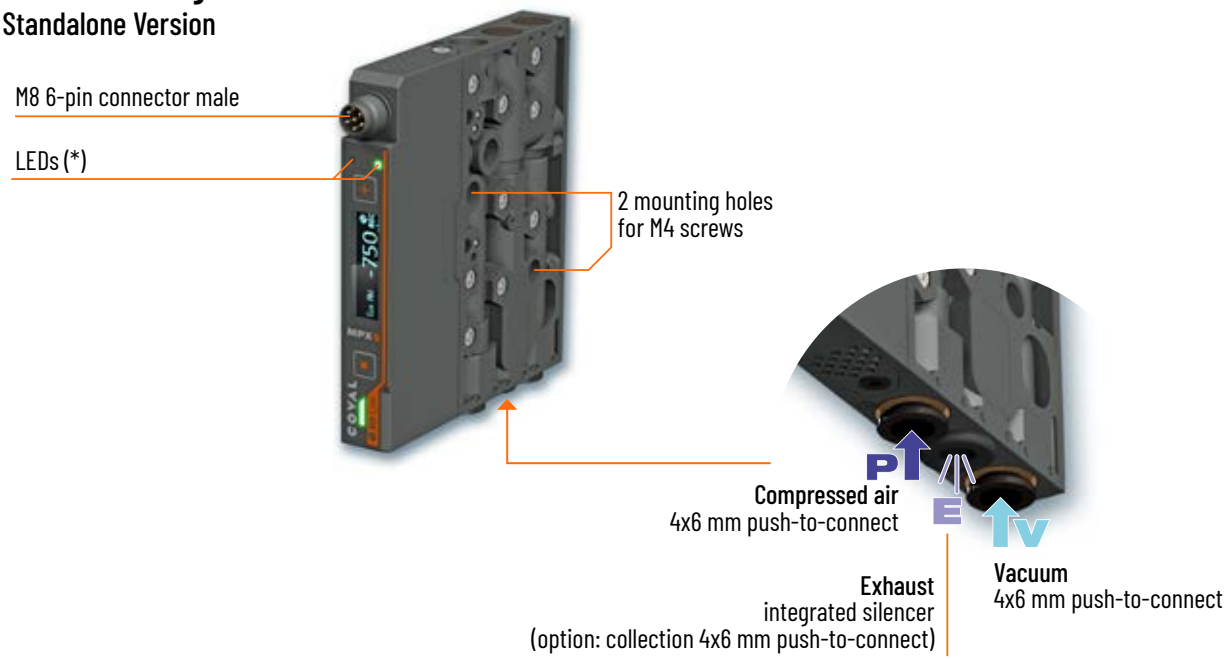
IO-Link active

ASC (Air Saving Control) Indicator:
ASC: active vacuum regulation
✳: ASC deactivated due to a vacuum leak (vacuum generation is permanent in this case).

Instantaneous vacuum level (in kPa, % of vacuum, mbar, or inHg)

## 6.3. Available configurations

### 6.3.1. Standalone Version




*** Green and orange LEDs on the front**
On the MPXS mini vacuum pumps, the LEDs correspond to the solenoid valve controls.

- Model **MPXS_S**: Vacuum pump with normally closed (NC) vacuum control and normally closed (NC) blow-off.
  - Green LED: vacuum control
  - Orange LED: blow-off control
- Model **MPXS_V**: Vacuum pump with normally open (NO) vacuum control and normally closed (NC) blow-off.
  - No LEDs: vacuum control (NO)
  - Both LEDs on: blow-off control.

**MPXS_F3**

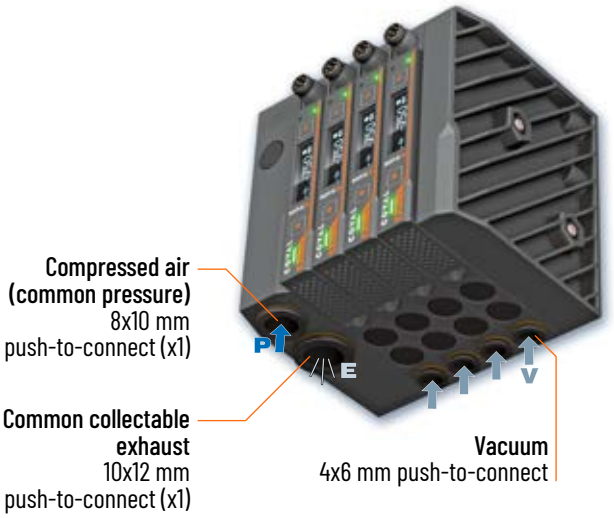
The MPXS micro pumps in the adjustable powerful blow-off version (**F3**) feature an adjustment screw with a locking nut to adjust the power as needed (blow-off flow rate adjustable from 16 to 55 Nl/min at 3.7 bar).



### 6.3.2. Bankable Version

**BANK EQUIPPED WITH SINGLE END SET - LEFT (MPXS___B_LX)**

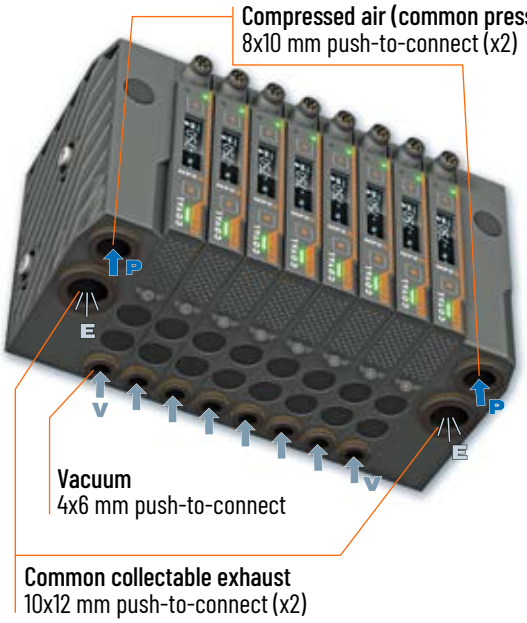
- Nozzle Dia. 0.7 mm: 1 to 8 modules per bank
- Nozzle Dia. 1.0 mm: 1 to 4 modules per bank
- 1 x Common Pressure
- 1 x Unrestricted and collectable exhaust






## BANK EQUIPPED WITH **DOUBLE** END SET (MPXS___B_DX)

- 1 to 8 modules per bank
- 2 x Common Pressure
- 2 x Unrestricted and collectable exhaust







*** Green and orange LEDs on the front**

On the MPXS mini vacuum pumps, the LEDs correspond to the solenoid valve controls.

- Model **MPXS_S**: Vacuum pump with normally closed (NC) vacuum control and normally closed (NC) blow-off.
  - Green LED: vacuum control
  - Orange LED: blow-off control
- Model **MPXS_V**: Vacuum pump with normally open (NO) vacuum control and normally closed (NC) blow-off.
  - No LEDs: vacuum control (NO)
  - Both LEDs on: blow-off control.

**MPXS_F3**

The MPXS micro pumps in the adjustable powerful blow-off version (**F3**) feature an adjustment screw with a locking nut to adjust the power as needed (blow-off flow rate adjustable from 16 to 55 Nl/min at 3.7 bar).

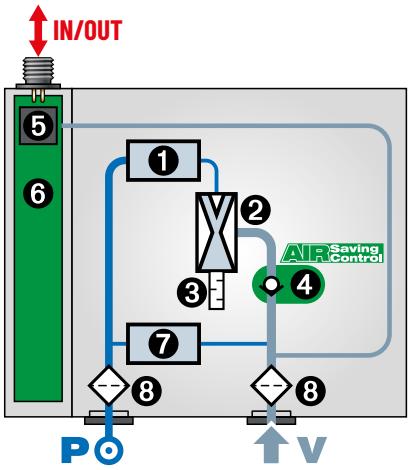


# 7. TECHNICAL DATA

## 7.1. Integrated Functions

The **MPXS Series** micro vacuum pumps integrate all the necessary functions into a compact footprint for a simple, efficient solution adapted to each application:

❶ Vacuum solenoid valve
❷ Single-stage Venturi pump
❸ Open silencer or exhaust collector
❹ Vacuum check valve
❺ Electronic vacuum switch
❻ Integrated electronics
❼ Blow-off solenoid valve
❽ 200 µm filter screen



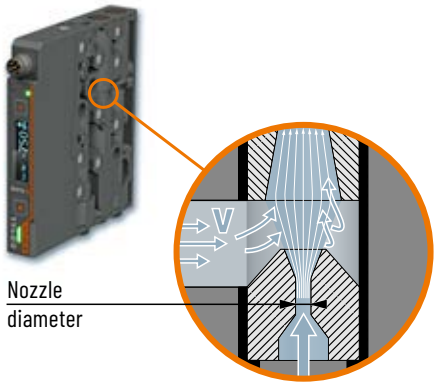

+ AIR Saving Control
**90%** energy savings *(on average)*

The combined action of the non-return valve ❹ and of the integrated electronics ❻ automatically ensures ASC management.
➔ **Once the vacuum has been established, the pump does not consume any more air to hold the object.**

## 7.2. Characteristics

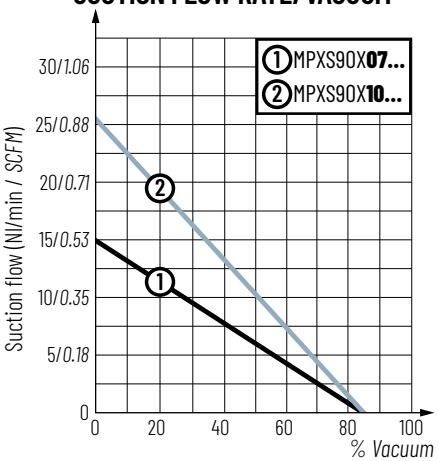
The table specifies the performance levels and evacuation times generated for each nozzle diameter available.
When handling air tight objects, the ASC vacuum control system can help to considerably reduce the consumption of compressed air.

| Vacuum reached / Nozzle dia. (mm) | Evacuation time[1] (s) of a volume of 5 cl[2] 50% | 60% | 70% | 80% | Max. vacuum (%) | Air drawn in (Nl/min/*SCFM*) | Air consumed (Nl/min/*SCFM*) | Air pressure level (bar) |
|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.15 | 0.25 | 0.42 | 0.70 | 85 | 15 / *0.53* | 22 / *0.78* | 3.7 |
| 1.0 | 0.09 | 0.14 | 0.24 | 0.37 | 85 | 26 / *0.92* | 44 / *1.55* | 3.7 |

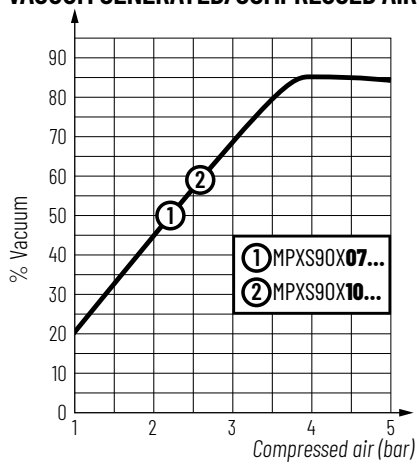



*(1) Out of valve response time. (2) Example of a 5 cl volume: 4 suction cups 1.5 bellows Ø 25 (VSA25) + 4 airlines 4x6 mm lg 600 mm + 1 airline 4x6 mm lg 500 mm.*

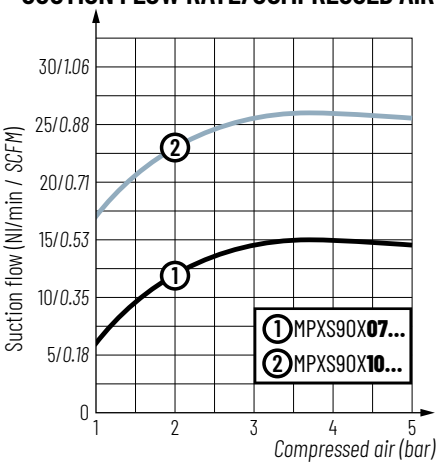
**SUCTION FLOW RATE/VACUUM**




**VACUUM GENERATED/COMPRESSED AIR**

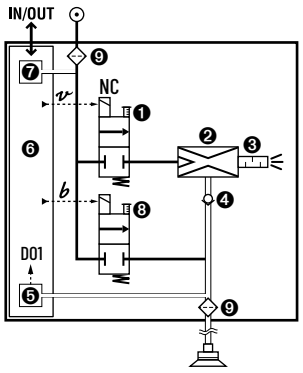


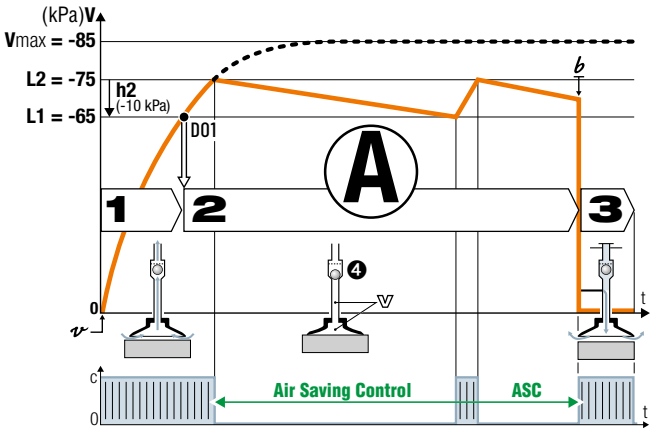

**SUCTION FLOW RATE/COMPRESSED AIR**



## 7.3. ASC Operating Procedure

The MPXS micro vacuum pumps operate with "ASC": **Air Saving Control**. Once vacuum is established, no more air consumption to hold the product. The resulting energy saving is a key progress ➔ **90%** energy savings on average. Here is how it is obtained.




**A- The "Air Saving Control" automatic cycle**
The **A** diagram presents the 3 steps of the cycle.

**1- Product gripping**
Vacuum signal *v* starts the cycle by piloting valve ❶ that feeds venturi ❷. The generated vacuum grips the product.
When the vacuum reaches the threshold L1 (-65 kPa), vacuum sensor ❺ generates the "product gripped" **DO1** signal that authorizes next step.

**2- Operations on vacuum gripped product**
The operations on the product (transfer, machining, etc.) will start.
When vacuum reaches threshold L2 (-75 kPa), the pressure supply to the venturi is automatically stopped by solenoid valve ❶ ➔ no more consumption. The product remains gripped by vacuum V that is preserved, due to the closing of poppet ❹. Micro-leaks may lead to the decrease in vacuum level. Each time it goes below L2-h2 (-65 kPa), the vacuum level is regenerated to L2 (-75 kPa) thanks to a brief pressure supply to the venturi.

**3- Product release**
At the end of operations, release is ordered. "Blow-off" solenoid valve ❸, piloted by blow-off signal *b* generates an air jet that blows off the product for a fast release.

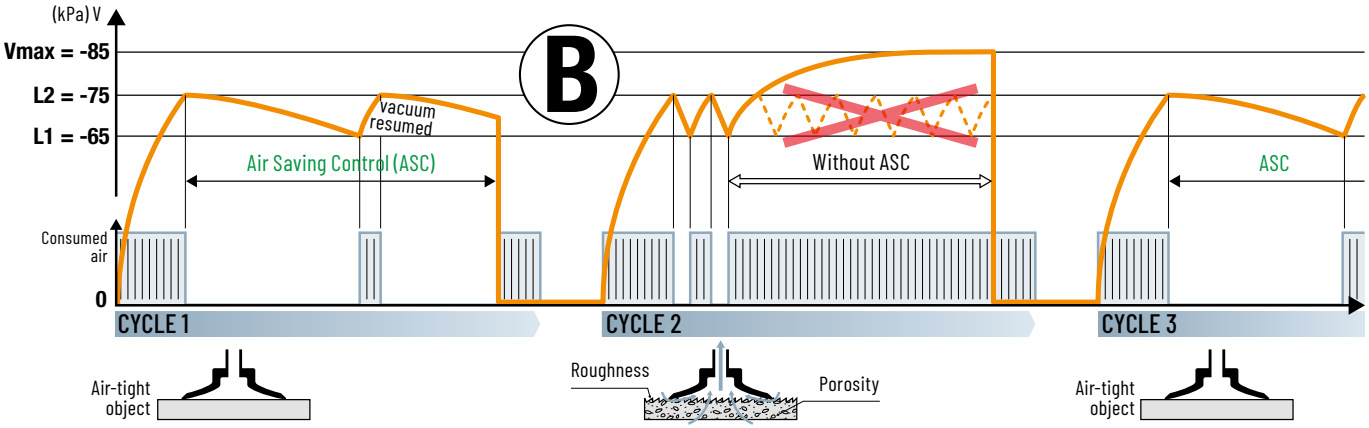
**B- "Air Saving Control" cycle self-adaptation**
The B diagram shows how the module adapts the cycle to fit to the production realities: leaks due to products, to vacuum pads...

Here, **cycle 1** deals with an air tight product under the influence of "ASC", resulting in optimum energy savings.

At **cycle 2** however, the porous product generates leaks that provoke repeated intermittent vacuum regeneration. The anomaly is automatically detected, and the cycle goes on but without "ASC". A ✱ symbol replaces ASC on the display, and production continues.

**Cycle 3** illustrates the automatic return to the "ASC" cycle as soon as leaks are eliminated: air tight products, vacuum circuit maintenance...

The MPXS module thus provides the maximum energy saving, without any limitations to the performance and functioning of the overall production system.



## 7.4. General characteristics

**General characteristics**
- Supply: non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:3].
- Operating pressure: from 3.5 to 7 bar.
- Optimal dynamic pressure per module: 3.7 bar *(bank supply pressure must be adjusted according to the number of modules to ensure 3.7 bar dynamic pressure / module).*
- Standard blow-off (MPXS__**F1**): network pressure (blow-off flow rate of 7 Nl/min/*0.24 SCFM* at 3.7 bar).
- Adjustable powerful blow-off (MPXS__**F3**): network pressure with valve (flow rate adjustable from 16 to 55 Nl/min, *0.56 to 1.94 SCFM*, at 3.7 bar).
- Pressure connection:
  - Standalone vacuum pumps: 4x6 mm push-to-connect with 200 µm filter screen.
  - Bank: 8x10 mm push-to-connect with 200 µm filter screen.
- Vacuum connection: 4x6 mm push-to-connect with 200 µm filter screen.
- Common collectable exhaust:
  - Standalone vacuum pumps: 4x6 mm push-to-connect.
  - Bank: 10x12 mm push-to-connect.
- Noise level:
  - Standalone vacuum pumps: max 66 dBA "without ASC". 0 dBA with ASC.
  - Bank of 1 to 4 vacuum pumps: max 74 dBA "without ASC". 0 dBA with ASC.
  - Bank of 5 to 8 vacuum pumps: max 82 dBA "without ASC". 0 dBA with ASC.
- Protection rating: IP40.
- Max. operating frequency: 4 Hz.
- Endurance: 30 million cycles.
- Weight:
  - Standalone vacuum pumps: MPXS___**F1**: 90 g, MPXS___**F3**: 94 g.
  - Bank: • MPXS_B_**L**X: 87 g (F1) or 91 g (F3) X number of stand-alone modules + 145 g for ends set.
    • MPXS_B_**D**X: 87 g (F1) or 91 g (F3) X number of stand-alone modules + 185 g for ends set.
- Operating temperature: from 0 to 50°C (*32 to 122°F*).
- Storage temperature: from -10°C to 60°C (*14°F to 140°F*)
- Materials: PA 6.6 GF, aluminum, stainless steel, brass, steel, NBR, PC+ABS, FKM, POM, PU. Housing materials comply with the requirements of UL standard 94 class HB.

**Electrical controls**
- Control voltage: 24V DC (regulated ± 10 %), PNP.
- Max. consumption: 60 mA (1.4 W) per vacuum and blow-off solenoid valve.
- Valve response time: - opening: 20 ms.
  - closure: 24 ms.

**Integrated electronics**
- 24 V DC power supply (regulated ± 10 %), protected against reversed polarity.
- Typical current consumption: < 35 mA / max. 50 mA.
- Measuring range: 0 to 99 % vacuum.
- Measurement accuracy: ± 2% of the range, compensated for temperature.
- Protected against reversed wiring and polarity.
- Protection against short circuits.
- Inputs switching type: PNP.
- LEDs for visualization of the controls:
  - Model **MPXS_S**, Vacuum pump with NC vacuum control and NC blow-off: • Green LED: vacuum control.
    • Orange LED: blow-off control.
  - Model **MPXS_V**, Vacuum pump with NO vacuum control and NC blow-off: • No LEDs: vacuum control.
    • Both LEDs on: blow-off control.

**Electrical connections**
- One M8 connector 6-pin, Male, A-Coded.
- IO-Link or SIO (Standard Inputs Outputs) operation.

**Analysis of ASC vacuum control system** (Air Saving Control)
- Permanent monitoring of leakage level: abort or automatically return to ASC operation.

**DO1 configurable output signal "Object Gripped"**
- PNP or NPN.
- NO or NC.
- Breaking capacity: 100 mA.
- Factory setting: PNP NO.
- Factory Set Value: 65% vacuum.

**Diagnostics**
- Instantaneous vacuum level (unit transmitted over IO-Link: mbar).
- Available information: Object gripped, object lost, regulation in progress, regulation fault.
- Cycle counters (vacuum, blow-off, object gripped, object lost, ASC, etc.).
- Alarm Counters (ASC Errors, Object Lost, Low/High Voltage, Simultaneous Commands, Overheating, Output Overcurrent).
- Supply voltage monitoring.
- Product item number and serial number.
- Error code log and operational status indicators.
- Software version.

**Information displayed**
- Gripping status indicator light: Green: object gripped, Yellow: ASC disabled due to vacuum leakage (object held in place), Red: object lost.
- High-visibility display:
  - Live vacuum level (in kPa, % vacuum, mbar, or inHg).
  - Warns when service life has been exceeded (> 30 million cycles).
  - Explicit fault messages.
  - Configurable display orientation: 0 – 180°.

**Parameter settings**
- Performed with 2-key keyboard.
- Choice of language: EN, FR, DE, IT, or ES.
- Choice of blow-off type:
  - Controlled.
  - Automatic timed, adjustable from 50 to 9950 ms.
- Choice of vacuum measurement unit (kPa, %, mbar, inHg).
- Monostable electrical manual controls.
- Object gripped (L1) and L2 control thresholds.
- Whenever required by the application, specific threshold and hysteresis settings that are different from the initial factory settings can be defined:
  L1 = -65 kPa, h1 = -10 kPa, L2 = -75 kPa, h2 = -10 kPa.
- Activation/deactivation of the ASC control system.
- Activation/deactivation of the leakage level monitoring system (DIAG ECO) + adjustment of monitoring parameters.

**Communication: IO-Link**
- Revision: 1.1.4
- Transmission rate: COM1,2,3 up to 230.4 kbit/s.
- Min. cycle time: 1 ms.
- SIO mode: Yes.
- Process Data Input (PDI): 4 bytes.
- Process Data Output (PDO): 1 byte.
- IO device description file (IODD) available for download.

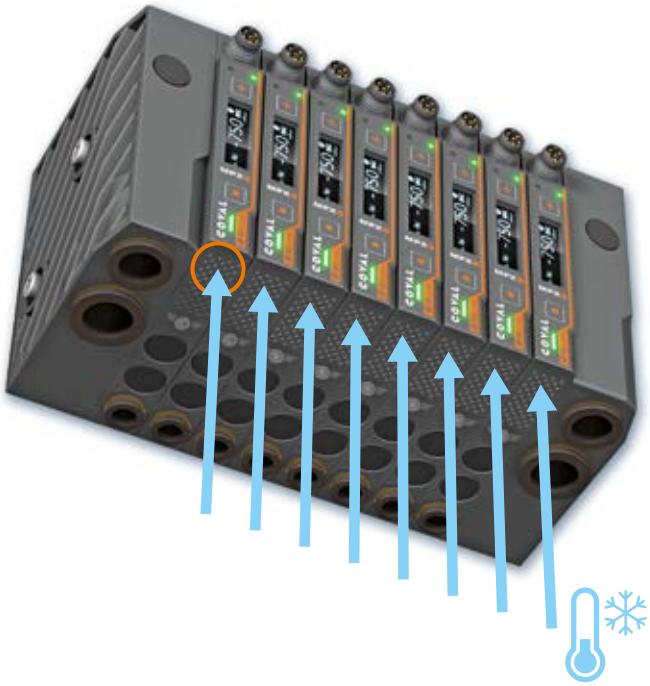
## 7.5. Integration and Thermal Constraints

Recommended horizontal installation with respect to the designated openings for optimal cooling through natural convection.
In the case of enclosure or other types of installations, ensure the integration of the equipment to comply with the allowed ambient temperature range and, if necessary, provide suitable cooling.

**Operating temperature: from 0 to 50°C (32 to 122°F).**

It is crucial to ensure the equipment is properly cooled and operated within the specified temperature range to prevent potential hazards, damage, or reduced product lifespan. Always follow the manufacturer's guidelines and safety instructions to maintain the reliability and safe operation of the equipment.

In case of overheating, the product generates an alert message on its screen as well as an IO-Link event.





**BURN HAZARD**

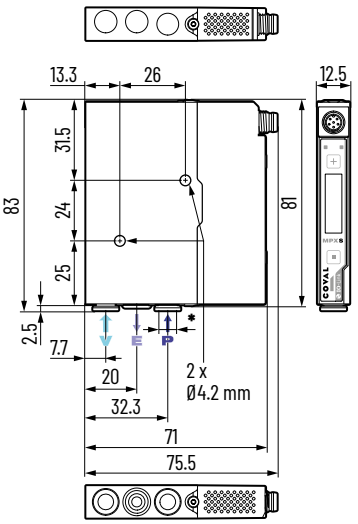
**WARNING**
In the event of a compressed air supply failure while keeping the controls activated and in the absence of adequate cooling, the equipment's temperature may exceed the burning threshold of 51°C (123.8°F) according to the NF EN ISO 13732-1 standard.

## 7.6. Dimensions and Installation

### Standalone Module

**LATERAL INSTALLATION**
2 x 4.2 mm dia.
(for two Ø 4 mm through screws or bolts with large washers).

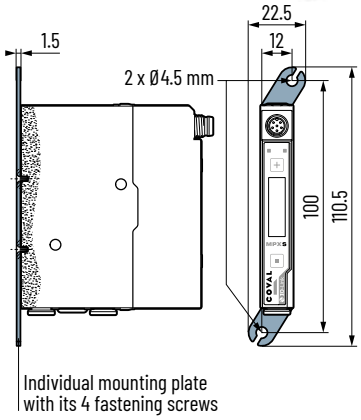





***** Push-to-connect:
-**V** (vacuum / suction cup): 4x6 mm
-**E** (exhaust collection, E option): 4x6 mm
-**P** (pressure / compressed air): 4x6 mm

**MOUNTING FROM FRONT**
2 x 4.5 mm dia.
(for M4 screws)





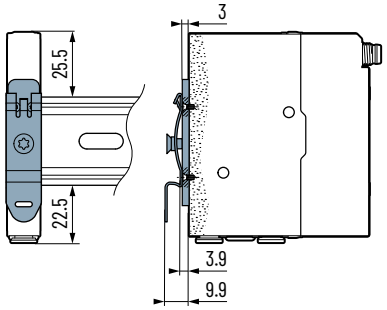

Individual mounting plate with its 4 fastening screws

For front panel installation, order the following installation kit:

Part No.: **MPXFIXA**
(1 plate + 4 fastening screws)

**INSTALLATION ON DIN RAIL**
For a static installation (e.g., in a cabinet), an MPXS micro vacuum pump can be mounted on a DIN rail.



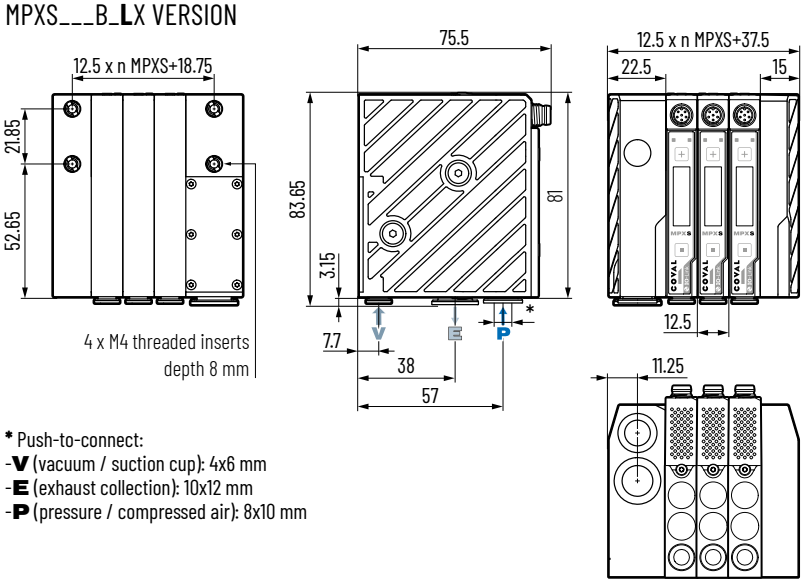



In this case, it must be equipped with an installation clip that is to be ordered separately:

Part No.: **MPXFIXB**
(1 bracket + 1 clip + 5 fastening screws)

### Bank

MPXS___B_**L**X VERSION




***** Push-to-connect:
-**V** (vacuum / suction cup): 4x6 mm
-**E** (exhaust collection): 10x12 mm
-**P** (pressure / compressed air): 8x10 mm

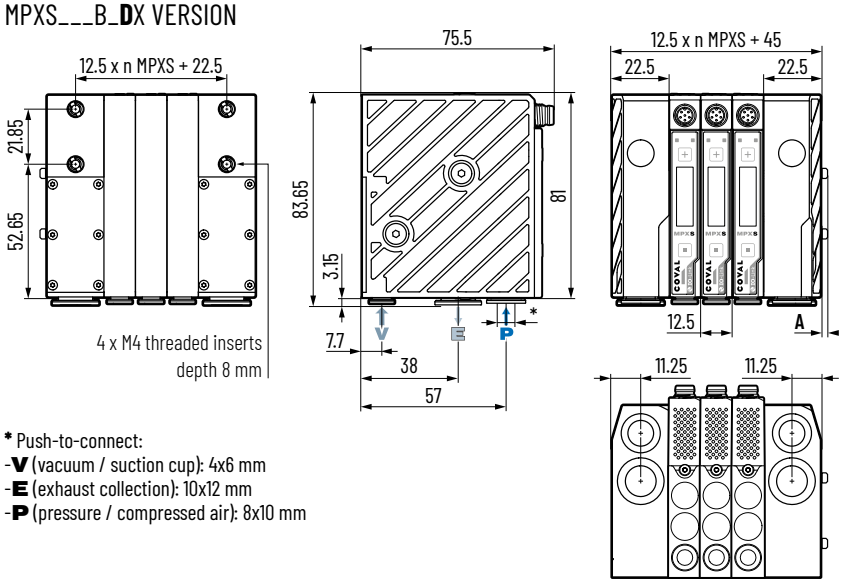
**Dimensions of the MPXS_F3 Option (Adjustable Powerful Blow-off)**

The MPXS micro vacuum pumps in the F3 version feature an adjustment screw with a locking nut to adjust the blow-off power.




*Note: All dimensions are in mm.*

MPXS___B_**D**X VERSION



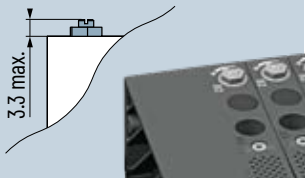

Dimensions

| Part No. | A |
|---|---|
| MPXS___**B1D**X | 0 |
| MPXS___**B2D**X | 3 |
| MPXS___**B3D**X | 0 |
| MPXS___**B4D**X | 3 |
| MPXS___**B5D**X | 0 |
| MPXS___**B6D**X | 3 |
| MPXS___**B7D**X | 0 |
| MPXS___**B8D**X | 0 |

***** Push-to-connect:
-**V** (vacuum / suction cup): 4x6 mm
-**E** (exhaust collection): 10x12 mm
-**P** (pressure / compressed air): 8x10 mm

**Dimensions of the MPXS_F3 Option (Adjustable Powerful Blow-off)**

The MPXS micro vacuum pumps in the F3 version feature an adjustment screw with a locking nut to adjust the blow-off power.



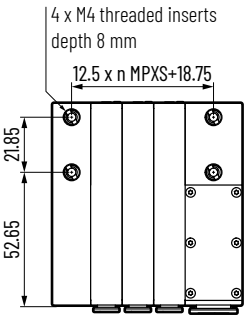

*Note: All dimensions are in mm.*

## MOUNTING FROM REAR

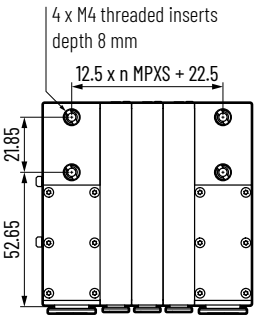
4 x M4 threaded inserts
depth 8 mm



MPXS_B_**L**X VERSION




MPXS_B_**D**X VERSION



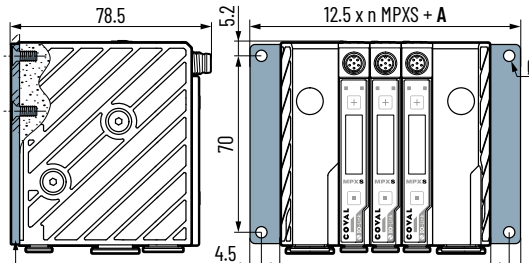

## MOUNTING FROM FRONT

4 x 4.5 mm dia.
(for M4 screws)

For front panel installation, order the following installation kit:

Part No.: **MPXFIXD**
(2 plates + 4 fastening screws






Dimensions

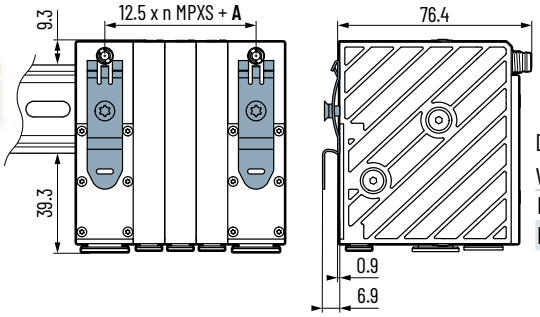
| Version | A | B |
|---|---|---|
| MPXS___B_LX | 66.3 | 16.25 |
| MPXS___B_DX | 70 | 12.5 |

## INSTALLATION ON DIN RAIL

The bank can be mounted on a DIN rail for a static installation (e.g. in a cabinet).
In this case, it must be equipped with an installation clip that is ordered separately:

Part No.: **MPXFIXC**
(2 clips + 2 fastening screws)






Dimensions

| Version | A |
|---|---|
| MPXS___B_LX | 18.75 |
| MPXS___B_DX | 22.5 |

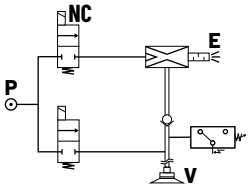
# 8. FINDING YOUR MODULE

In order to meet all your needs, the **MPXS** range includes bankable micro vacuum pumps, each one with NC or NO solenoid valve vacuum control. To efficiently implement your vacuum pump using the present operating instructions, you need to find your module in the range based on its reference number.

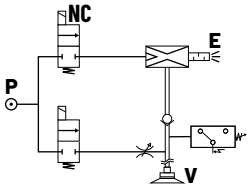
**Model MPXS_S**:
Vacuum pump with **NC** vacuum control and **NC** blow-off.

In the event of power failure, vacuum is no longer generated. In the event of compressed air failure, the vacuum is no longer maintained.
- NC blow-off and vacuum control: solenoid valves
- Choice of blow-off settings:
  - Controlled by external signal
  - Automatic timer from 50 to 9950 ms (advantage: saves one controller output).

**NC** vacuum control
Standard blow-off (**F1**)




**NC** vacuum control
Adjustable powerful blow-off (**F3**)

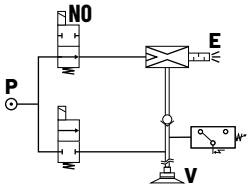



**P**: *Pressure / Compressed Air* **V**: *Vacuum / Suction Cup* **E**: *Exhaust*

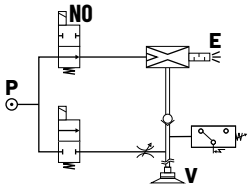
**Model MPXS_V**:
Vacuum pump with **NO** vacuum control and **NC** blow-off.

In the event of power failure, vacuum is still generated: object is held in place ➔ fail-safe.
In the event of compressed air failure, the vacuum is no longer maintained.
- NO vacuum control solenoid valve.
- NC blow-off control solenoid valve.

**NO** vacuum control
Standard blow-off (**F1**)




**NO** vacuum control
Adjustable powerful blow-off (**F3**)




**P**: *Pressure / Compressed Air* **V**: *Vacuum / Suction Cup* **E**: *Exhaust*

# 9. CONNECTIONS

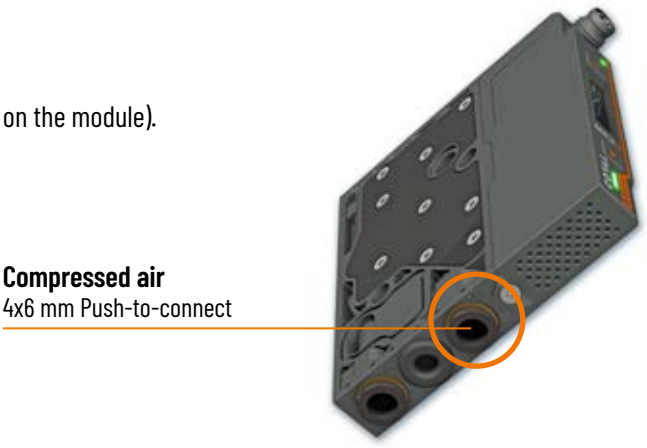
**COMPRESSED AIR OR VACUUM NETWORKS:**
- Wear safety goggles
- Make sure all fittings and tubes are tightened securely
- Tube ends must be fastened to avoid any risk of being pulled off in the event of accidental breakage

## 9.1. Pressure supply connection

- Non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:3].
- Operating pressure: from 3.5 to 7 bar.
- Optimal dynamic pressure per module: 3.7 bar *(bank supply pressure must be adjusted according to the number of modules to ensure 3.7 bar dynamic pressure / module).*
- 200 µm filter screen integrated in the vacuum connection to protect the pump against particles.

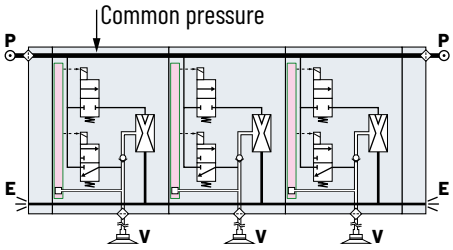
### 9.1.1. Standalone Modules

Compressed air connection through a 4x6 mm push-to-connect (mark **B** on the module).



### 9.1.2. Banks

The banks group the MPXS vacuum pump modules with a common internal pressure.



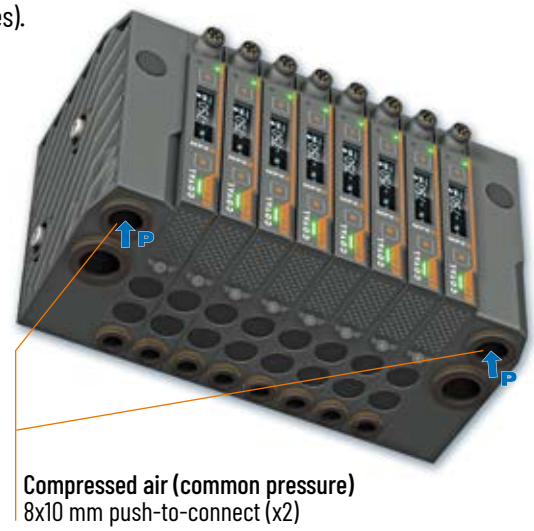

**BANK EQUIPPED WITH SINGLE END SET - LEFT (MPXS___B_LX)**

Compressed air (common pressure):
1 x 8x10 mm push-to-connect (mark **E** on the head plate).




**BANK EQUIPPED WITH DOUBLE END SET (MPXS___B_DX)**

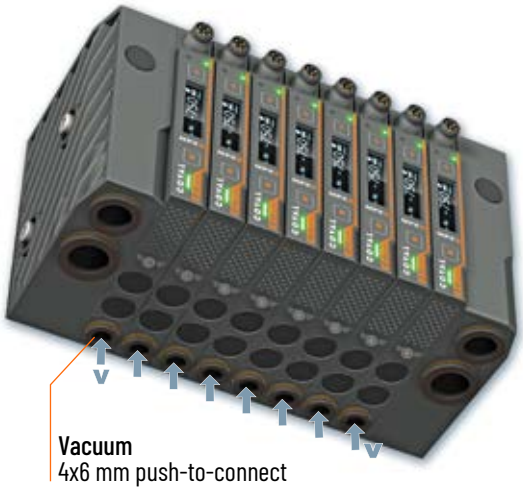
Compressed air (common pressure):
2 x 8x10 mm push-to-connect (mark **E** on the head and tail plates).




## 9.2. Vacuum circuit connection

4x6 mm push-to-connect with 200 µm filter screen on each module (mark **A** on module).

For optimal vacuum regulation, the vacuum circuit must be airtight at all times.




**NOTE: MODULE PROTECTION**

- 200 µm filter screen integrated in the vacuum connection to protect the pump against particles.
- Possible additional filter on vacuum circuit: In the rare cases of fine dust in a wet environment, the use of an appropriate filter will prevent any internal clogging: → See COVAL catalog: "Filters for vacuum circuits".

For short response times and minimum consumption, try reducing the volume to evacuate. To this end, as the module is installed as close as possible to the suction cups, ensure the length of the tube connecting the suction cups to the module is as short as possible.

## 9.3. Collectable exhaust connection

### 9.3.1. Exhaust collection on standalone vacuum micro pump (MPXS_E)

1 x 4x6 mm push-to-connect (mark **C** on the module).



**Exhaust**
4x6 mm push-to-connect

### 9.3.2. Common exhaust collection on bank

**BANK EQUIPPED WITH SINGLE END SET - LEFT (MPXS___B_LX)**

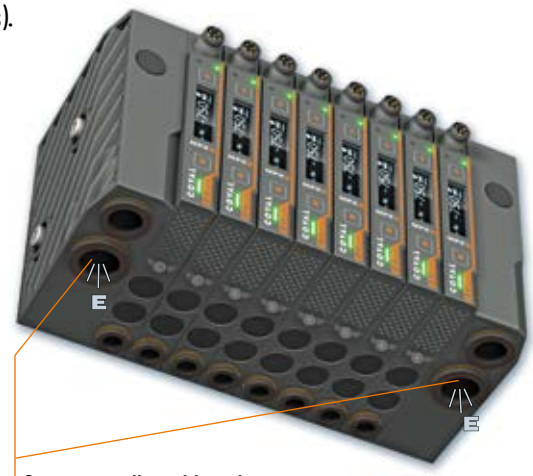
Common collectable exhaust:
1 x 10x12 mm push-to-connect (mark **F** on the head plate).




**Common collectable exhaust**
10x12 mm
push-to-connect (X1)

**BANK EQUIPPED WITH DOUBLE END SET (MPXS___B_DX)**

Common collectable exhaust:
2 x 10x12 mm push-to-connect (mark **F** on the head and tail plates).




**Common collectable exhaust**
10x12 mm push-to-connect (X2)

## 9.4. Internal diameter and tube length

| Device | Compressed air inlet | | | Suction inlet | Exhaust collector | | |
|---|---|---|---|---|---|---|---|
| | Standalone modules | Banks L | Banks D | Standalone modules and banks | Standalone modules | Banks L | Banks D |
| **MPXS90X07** | 4 mm dia. max. length 20 m. | 8 mm dia. max. length 20 m. | 2 X 8 mm dia. max. length 40 m. | 4 mm dia. max. length 4 m. | 4 mm dia. max. length 1 m. | 10 mm dia. max. length 1 m. | 2 X 10 mm dia. max. length 2 m. |
| **MPXS90X10** | 4 mm dia. max. length 15 m. | 8 mm dia. max. length 20 m. | 2 X Ø mm dia. max. length 40 m. | 4 mm dia. max. length 2 m. | 4 mm dia. max. length 0,5 m. | 10 mm dia. max. length 0.5 m. | 2 X 10 mm dia. max. length 1 m. |

*The values of the compressed air network are given for a maximum tolerated ΔP of 0.5 bar.*
*The values of the vacuum network are given for a maximum tolerated residual vacuum of 10% on an open network.*
*The values of the exhaust network are given for a maximum tolerated vacuum pressure drop of 5% at zero suction flow.*

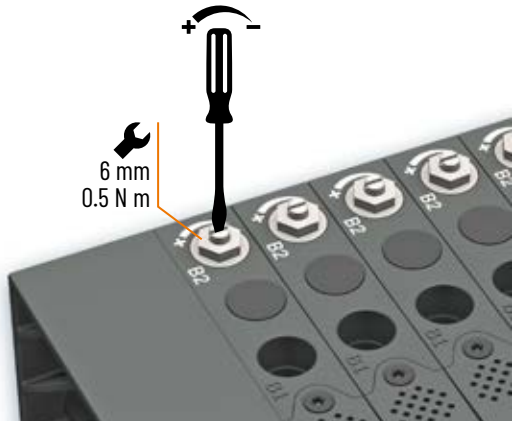
➔ Flexible tubes must be as short as possible in order to minimize response times.
➔ Make sure there is no pollution in the device connections and tubes.
➔ Flexible tubes must be connected without bends and without crushing them.

**IF THESE CONDITIONS ARE NOT OBSERVED, YOU RISK THE FOLLOWING ISSUES:**
■ If the chosen internal diameter on the compressed air inlet is too small, the compressed air supply will be insufficient to achieve optimal performance. The generator will be unable to achieve the specified maximum vacuum rate.
■ If the chosen internal diameter on the vacuum inlet is too small, the airflow is slowed down due to this restriction, which has a negative effect on suction power and on suction or exhaust time.

## 10. ADJUSTMENT OF POWERFUL BLOW-OFF (F3)

**Blow-off flow rate adjustable from 16 to 55 Nl/min at 3.7 bar.**

1- Unscrew the locking nut
2- Adjust the blow-off flow rate
3- Screw the locking nut



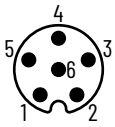

## 11. ELECTRICAL CONNECTIONS

**MPXS** vacuum pumps must be used with power supply units that provide a Protective Extra Low Voltage (PELV) and with an isolation of the supply voltage according to EN 60204.



One M8 6-pin connector male, A-Coded

**IN / OUT**




**IN / OUT**

| | |
|---|---|
| **1** | 24 V DC |
| **2** | 24V DC PNP suction command (1) |
| **3** | 0 V - GND |
| **4** | 24 V DC object gripped D01 - C/Q |
| **5** | 24 V DC PNP blow-off command |
| **6** | / |

*: Connections for* **IO**-Link

*(1) 24 V DC suction command, depending on version:*
*- **S**: 24 V DC vacuum control*
*- **V**: 24 V DC vacuum off command*

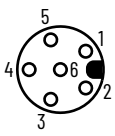


## 12. CONNECTION CABLES

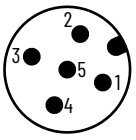
**Part No.: CCM8F6PCM12M5PL05**

M8 6-pin female snap-in elbow / M12 5-pin male straight connectors, AWG24, PUR, length 0.5 m.

**P1**




**P2**



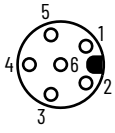

| | P1 | P2 |
|---|---|---|
| | **1** | **1** |
| | **2** | **2** |
| | **3** | **3** |
| | **4** | **4** |
| | **5** | **5** |
| | **6** | **/** |

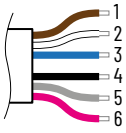


**Part No.: CCM86PCL2**

M8 6-pin female snap-in elbow, AWG24, PUR, length 2 m.

**P1**




| | P1 | Color |
|---|---|---|
| | **1** | Brown |
| | **2** | White |
| | **3** | Blue |
| | **4** | Black |
| | **5** | Grey |
| | **6** | Pink |

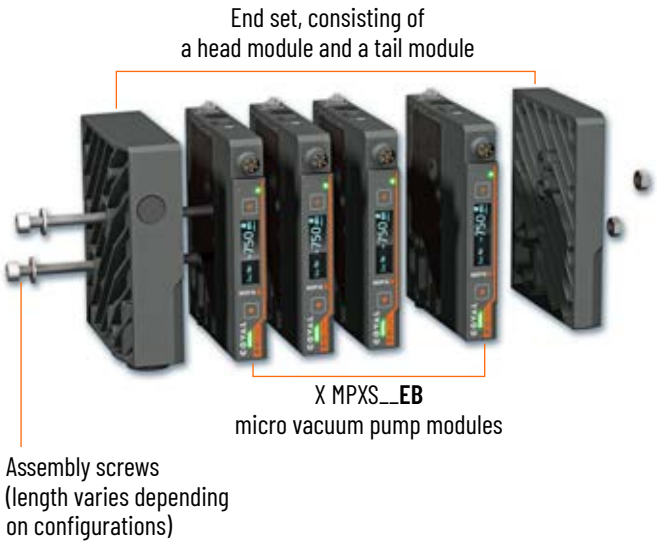


## 13. COMPOSITION OF A BANK

Standard banks are composed of 1 to 8 identical **MPXS** vacuum modules in the MPXS_**EB** version, an end set consisting of a head module and a tail module, and assembly screws corresponding to the number of modules in the bank.

The end sets are available in two versions:

- **Single** version – left: 1 x Common Pressure and 1 x Unrestricted and collectable exhaust
- **Double** version: 2 x Common Pressure and 2 x Unrestricted and collectable exhaust




## 14. PROCEDURE FOR ADDING A MICRO VACUUM PUMP TO AN EXISTING BANK

It is possible to add an MPXS micro vacuum pump to an existing bank by ordering the desired MPXS micro vacuum pump module in the EB version, along with the assembly screw kit corresponding to the new number of modules in the bank.

### Select the Micro Vacuum Pump Modules for Bank

| MPXS90X | 10 | S | C16 | P | R2 | F1 | EB |
|---|---|---|---|---|---|---|---|

| NOZZLE DIA. | | GENERATOR CONTROL | | BLOW-OFF | |
|---|---|---|---|---|---|
| 0.7 mm dia. | **07** | **S** | Vacuum **NC** and blow-off **NC** | **F1** | Standard blow-off |
| 1.0 mm dia. | **10** | **V** | Vacuum **NO** and blow-off **NC** | **F3** | Adjustable powerful blow-off |



### Select the Assembly Screw Kit

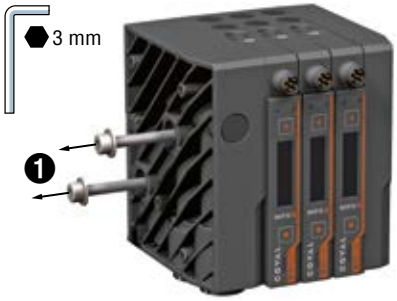
| Assembly Screw Kit for a **Single Left** Bank Version | |
|---|---|
| **MPXSETVB1L** | For a bank of **1 MPXS module** |
| **MPXSETVB2L** | For a bank of **2 MPXS modules** |
| **MPXSETVB3L** | For a bank of **3 MPXS modules** |
| **MPXSETVB4L** | For a bank of **4 MPXS modules** |
| **MPXSETVB5L** | For a bank of **5 MPXS modules** |
| **MPXSETVB6L** | For a bank of **6 MPXS modules** |
| **MPXSETVB7L** | For a bank of **7 MPXS modules** |
| **MPXSETVB8L** | For a bank of **8 MPXS modules** |

| Assembly Screw Kit for a **Double** Bank Version | |
|---|---|
| **MPXSETVB1D** | For a bank of **1 MPXS module** |
| **MPXSETVB2D** | For a bank of **2 MPXS modules** |
| **MPXSETVB3D** | For a bank of **3 MPXS modules** |
| **MPXSETVB4D** | For a bank of **4 MPXS modules** |
| **MPXSETVB5D** | For a bank of **5 MPXS modules** |
| **MPXSETVB6D** | For a bank of **6 MPXS modules** |
| **MPXSETVB7D** | For a bank of **7 MPXS modules** |
| **MPXSETVB8D** | For a bank of **8 MPXS modules** |



## 14.1. Procedure for adding a module to a bank

- ❶ Unscrew and remove the 2 M4 hex socket head screws from the head module using a 3 mm hex bit.




- ❷ Detach the end module from the island.
  ⚠ Be careful with the sealing gaskets and nuts.




- ❸ Position the new module, ensuring the correct placement of the 2 sealing gaskets.




- ❹ Reposition the end module, ensuring the correct placement of the 2 sealing gaskets.
- ❺ Reposition the 2 nuts of the end module in their housing.




- ⚠ ***The assembly screws must be replaced with the assembly screw kit corresponding to the new number of modules in the island (see chap. 14).***

- ❻ Position the 2 new assembly screws and screw them into the nuts of the end module using a 3 mm hex bit (tightening torque 1.3 N m).



# 15. HMI DETAILS AND FEATURES

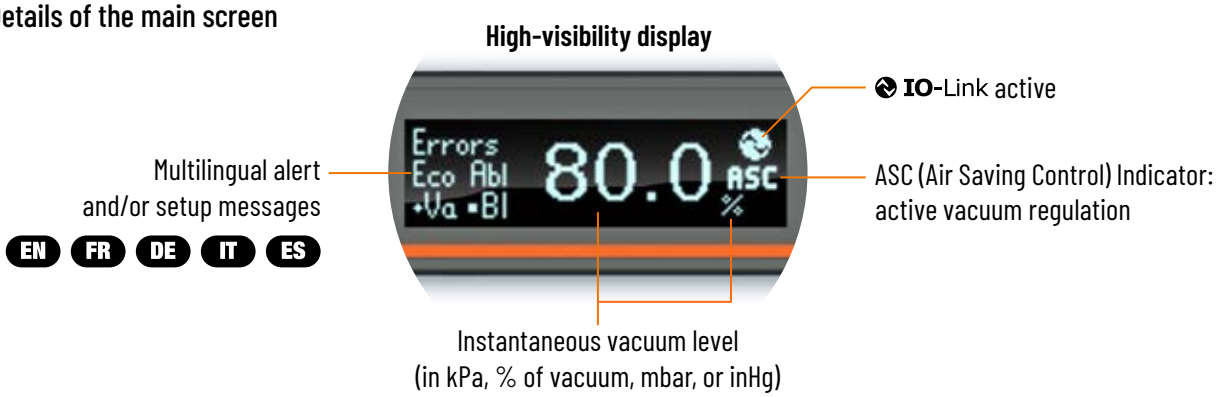
## 15.1. Main screen

### 15.1.1. Powering on

The following occurs when the device is powered on:
1- COVAL logo is displayed (for about 5 seconds).
2- Display "XXX" custom product name if provided and Firmware Version (approximately 5 seconds).
3- Main screen is displayed showing the vacuum level.
4- The keypad is locked by default.

**Note: During the startup phase (1), the product is immediately operational in terms of inputs/outputs (suction/blow-off commands, contact output). Only the "HMI" part is being initialized during this phase.**

### 15.1.2. Details of the main screen




**Note: See detailed description of screens and menus in sections 18 to 22.**

### 15.1.3. Keypad functions

The keypad consists of 2 keys used to navigate to the various menus/screens and to change the parameters, etc.

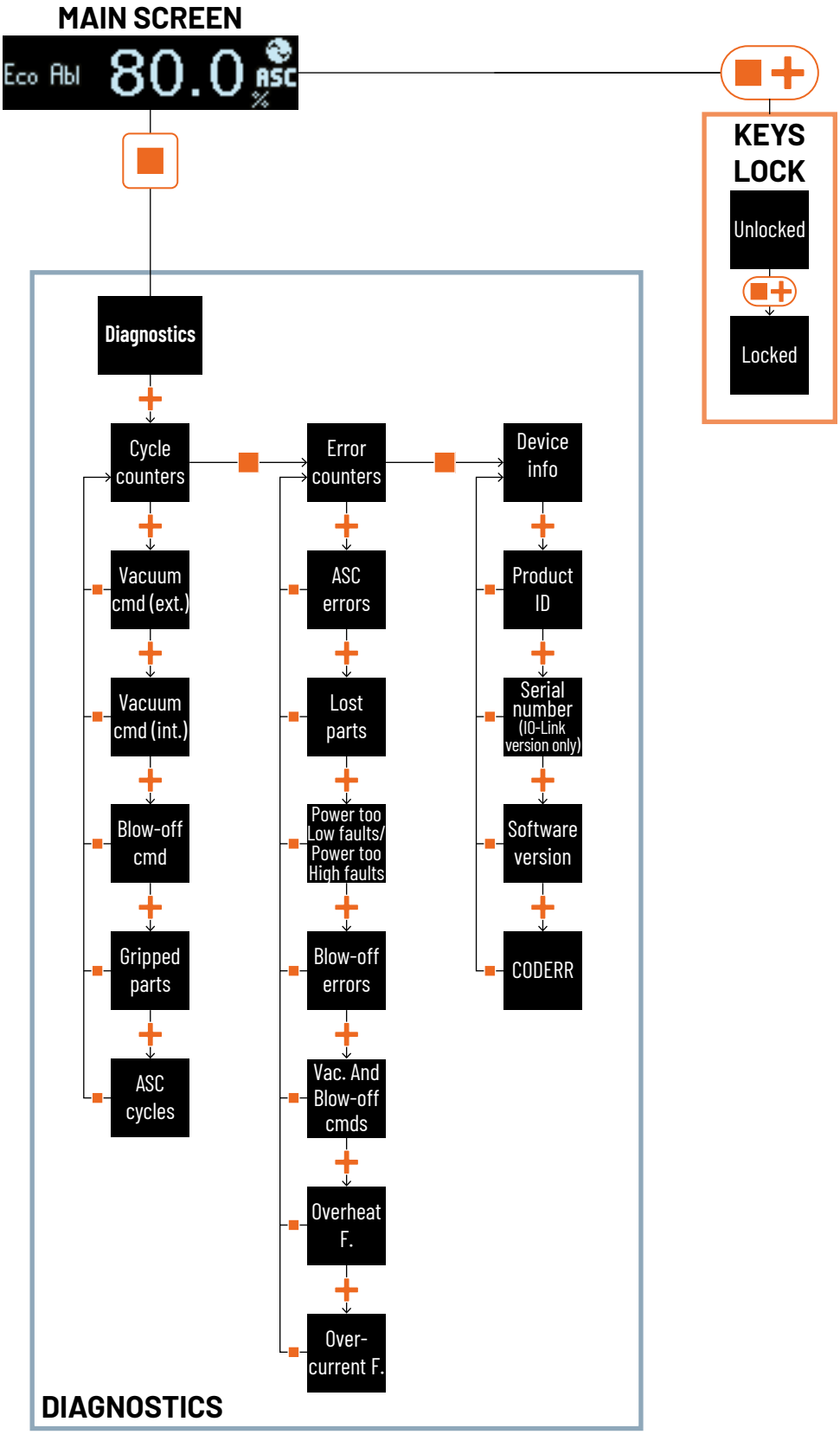



From the main screen, the ■ button allows access to diagnostic functions.

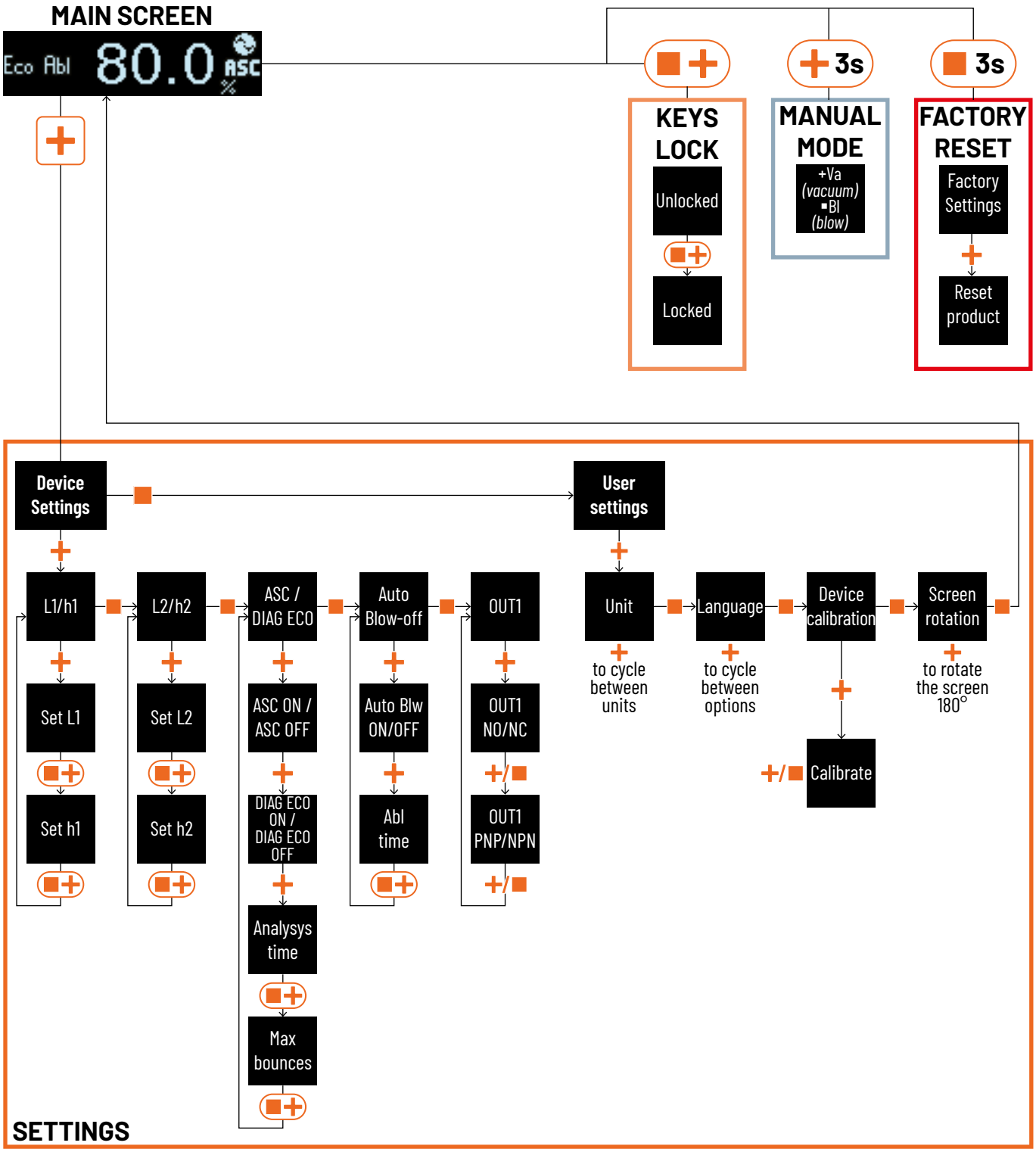
From the main screen, the + button allows access to the settings functions.

# 16. SUMMARY OF FUNCTIONS

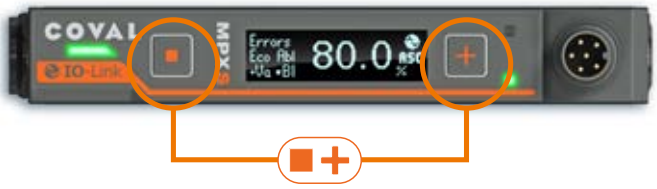
## 16.1. Accessing live diagnostic data



## 16.2. Access to the settings menu



## 17. LOCKING/UNLOCKING THE KEYPAD




1- Simultaneously pressing the ■ and + keys unlocks the keypad.
2- Pressing them again locks it.
3- The display automatically returns to the vacuum level after 10 s.

## 18. MANUAL MODE

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| MAIN SCREEN | Manual mode | Permanent | |

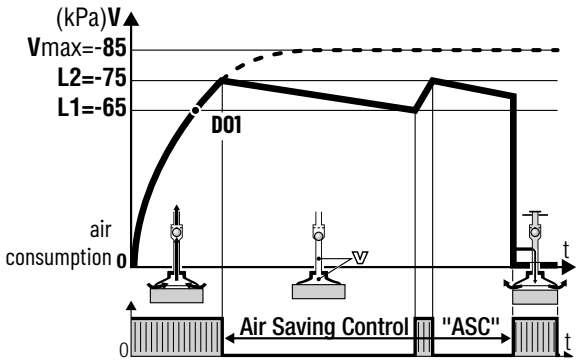
The MPXS vacuum pump is equipped with an electronic manual control for the vacuum and blow-off solenoid valves.
From the main screen with the keyboard unlocked, pressing + for 3 seconds activates the manual control mode.

- Holding + down once activates the vacuum solenoid valve (green LED lights up on the product's front).
- Holding ■ down once activates the blow-off solenoid valve (orange LED lights up on the product's front).

A 10-second wait without button action or simultaneous pressing of both buttons exits the mode.

## 19. DEVICE SETTINGS

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DEVICE SETTINGS | L1/h1 | Permanent | L1 = -65 kPa<br>h1 = -10 kPa |
| DEVICE SETTINGS | L2/h2 | ASC ACTIF | L1 = -75 kPa<br>h1 = -10 kPa |




### 19.1. Setting the thresholds 1 and 2

**Reminder of the "factory" setting**
This initial factory setting is suitable for most applications.

**Threshold L1:**
- L1= -65 kPa, vacuum threshold that generates the D01 "object gripped" signal.
- h1= -10 kPa, L1 hysteresis, drop in vacuum that will make the D01 signal "object gripped" disappear.

**Threshold L2: (only available when the ASC mode is enabled (ON))**
- L2= -75 kPa, vacuum threshold that triggers the vacuum generation cut-off.
- h2= -10 kPa, L2 hysteresis, drop in vacuum that will make vacuum generation resume.

The figure shows a reminder of how this "factory" setting works.

**Recommendations**
The L1 threshold (object gripped) must be lower than the L2 threshold (ASC vacuum control).
Recommended value: Hysteresis from -1 to -20 kPa.

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DEVICE SETTINGS | ASC | Permanent | ON |
| DEVICE SETTINGS | DIAG Eco | ASC actif | ON<br>2 battements<br>1 seconde |

## 19.2. ASC (Air Saving Control) and Diag-Eco mode

### 19.2.1. Disabling the Air Saving Control (ASC)

In some cases, as when porous objects are gripped, the smart vacuum control system ASC can be disabled to allow for permanent suction, an operating mode offering no energy savings.

- ON confirms that the ASC mode is enabled (factory setting).
- OFF confirms that the ASC mode is disabled.

**Note:** When the ASC mode is disabled (OFF), the following settings are no longer accessible:

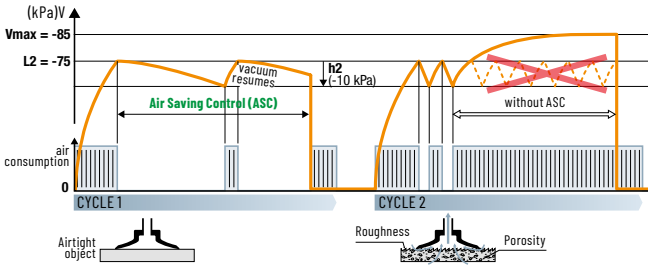
- Threshold L2
- Diag Eco "anti-pulsation" mode
- Control cycle counter (ASC)
- Control fault counter

Refer to sect. 7.3 for details on ASC works.

## 19.3. DIAG Eco "anti-pulsation" mode

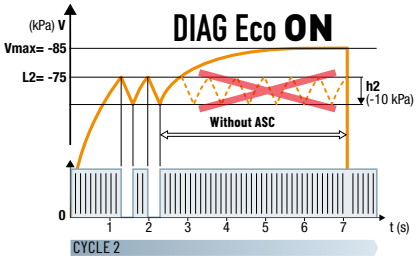
**reminder:** The Air Saving Control (ASC) mode controls the vacuum to reduce compressed air consumption and includes a self-adapting function (DIAG Eco) that analyzes the leakage level in the vacuum network.

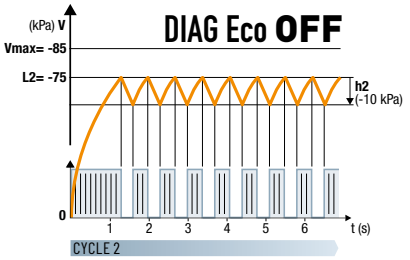
The figure opposite shows how the MPXS module adapts the cycle according to the actual production conditions: leaks due to objects, suction cups, etc.
- In this case, cycle 1 handles an airtight object and operates with ASC, leading to optimal energy savings.
- However, a porous object is introduced in cycle 2, which leads to leaks requiring vacuum generation to be resumed in successive bursts.
The unwanted condition is detected automatically and operation carries on, though without ASC vacuum control.
✱ replaces ASC on the display, the indicator light on the MPXS turns yellow, but production carries on.




The DIAG Eco "anti-pulsation" function can be disabled for certain specific applications:

- ON confirms that DIAG Eco "anti-pulsation" is enabled (factory setting).
- OFF: DIAG Eco "anti-pulsation" is disabled.




The maximum number of bounces allowed within the allotted time is set in the "Analysis time" submenu.
Factory setting: 2 bounces max./second (can be set from 1 to 10 bounces).
Analysis time: 1 second (can be set from 1 to 6 seconds).

**Note:** The DIAG Eco "anti-pulsation" function is part of ASC operation (refer to sect. 7.3 for details on how ASC works).

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DEVICE SETTINGS | Auto Blow-Off | MPXS version S | OFF |

### 19.4. Auto Blow-Off

Timed automatic blow-off eliminates the need for a Controller output and controls the blow-off as soon as vacuum control is stopped and for a configurable amount of time.
The initial "factory" setting for blow-off is the "blow-off controlled by external signal" option.

This setup is only available for MPXS_**S**
(Refer to section 11, Electrical connections).

**OFF:** Auto blow-off disabled = blow-off controlled by external signal.
**ON:** Auto blow-off enabled.
If enabled, the duration of the automatic blow-off can be adjusted from 50 to 9950 ms (factory setting 250 ms).

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DEVICE SETTINGS | OUT 1 | PNP/NPN : Permanent<br>Sortie-1 : Permanent | PNP<br>Sortie TOR 1 : NO |

### 19.5. Output 1 Switching Mode

#### 19.5.1. PNP or NPN

Select PNP or NPN to choose the switching mode for output 1 (OUT 1).

#### 19.5.2. NO or NC

The contact output (OUT 1) can be configured to operate as NO (Normally Open) or NC (Normally Closed).

Factory setting:
- Output OUT1 "Gripped product": NO.

## 20. USER SETTINGS

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| USER SETTINGS | Units | Permanent | Vacuum: kPa |

### 20.1. Units

The unit of measure to display the vacuum level can be selected from among the following:
- kPa
- %
- mbar
- inHg

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| USER SETTINGS | Language | Permanent | English |

### 20.2. Language

To make the MPXS easier to use and configure, all information, messages and menus are available in the following 5 languages:
- EN: English
- FR: French
- DE: German
- IT: Italian
- ES: Spanish

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| USER SETTINGS | Screen | Permanent | Rotation : 0° |

## 20.3. Screen

**Rotation:**

To make it easier to read the information displayed on the MPXS's screen, the display on the screen can be rotated according to how the vacuum pump is placed in the facility.
The display rotation can be configured as follows: 0 / 180°

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| USER SETTINGS | Calibration | Permanent | |

## 20.4. Calibration

**Vacuum sensor calibration**

The calibration procedure may only be performed when the vacuum network is at atmospheric pressure.

**Note:** Zero point correction is only possible within a +/-5% range around atmospheric pressure.

# 21. DIAGNOSTIC

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DIAGNOSTIC | Cycle counters | Permanent | |

## 21.1. Cycle counters

- **Vacuum commands (ext.)**: Number of times external vacuum activated (controller command).
- **Vacuum commands (int.)**: Total number of times vacuum solenoid valve activated (external/customer command + automatic commands related to ASC).
- **Blow-off commands**: Number of times blow-off solenoid valve activated (external command and automatic blow-off).
- **Gripped parts**: Number of parts handled by the vacuum pump.
- **ASC cycles**: Number of times air saving mode enabled (ASC control).

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DIAGNOSTIC | Error counters | Permanent | |

## 21.2. Error counters

- **ASC faults**: Number of control cycles interrupted following leakage on vacuum network (switch to permanent suction) if Diag Eco "anti- pulsation" is enabled.
- **Lost parts**: Number of parts lost during handling stage.
- **Power too Low faults**: Number of vacuum or blow-off commands that have occurred while the supply voltage was lower than 21.6 V.
- **Power too High faults**: Number of vacuum or blow-off commands that have occurred while the supply voltage was greater than 26.4 V.
- **Blow-off faults**: Number of unloading cycles during which blow-off did not work properly (residual vacuum rate after blow-off).
- **Vac. and blow-off cmds**: Number of times the vacuum and blow-off commands have been activated simultaneously. To ensure efficient blow-off, vacuum generation must be stopped to set down the object.
- **Overheat Faults**: number of high temperature detections on the electronic board.
- **Overcurrent Faults**: number of overload current detections on Output 1.

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| DIAGNOSTIC | Device Info | Permanent | |

### 21.3. Device info

- **Product ID**

The complete reference of the MPXS consists of 2 parts
- Part 1/2: e.g., MPXS90X10
- Part 2/2: e.g., SC16PR2F1X

Example of complete reference: MPXS90X10SC16PR2F1X

- **Serial number**: "XXX" product serial number.

- **Software version**: firmware version.

- **CODERR**: error code register.
See index 85 in "Diagnostic" IODD.

## 22. FACTORY RESET

| Main menu | Secondary menu | Display conditions | Factory settings |
|---|---|---|---|
| FACTORY SETTINGS | Reset product | Permanent | |

### Reset

On the MPXS vacuum pumps, it is possible to reset all parameters and return to the "factory reset."

## 23. EVENTS MESSAGES

During operation, if necessary, messages appear on the main screen or the status indicator changes state to warn of an alert:

EVENTS

| Message | Condition for raising | Condition for clearing | Action |
|---|---|---|---|
| Grip status indicator: Red | Part loss: Suction command active and vacuum level below L1-h1. | Stop vacuum command and/or activate blow-off. | Check the settings of the different parameters, the supply pressure of the vacuum pump, as well as the quality of the vacuum network and the sizing of the suction cups relative to the load to be handled. |
| Grip status indicator: Yellow | Leak in the vacuum network:<br>The "ASC" mode has detected vacuum leaks causing successive intermittent vacuum regeneration.<br>The anomaly is automatically detected, and operation continues, but without "ASC" vacuum regulation. | Stop vacuum command and/or activate blow-off. | Check the vacuum network's airtightness.<br>Check the wear of the suction cups.<br>Ensure that the suction cups are properly positioned on the part (not on holes that would cause leaks).<br>Do not handle rough or porous parts, or disable the ASC mode (see chapter 19.2). |
| Power too high faults | Supply voltage exceeding 26.4 V at the pilots. | Adjust the supply voltage within the recommended voltage range (24 V DC +/- 10% | Use a regulated 24 V DC power supply +/- 10% |
| Power too low faults | Supply voltage below 21.6 V at the pilots. | Adjust the supply voltage within the recommended voltage range (24 V DC +/- 10%). | Use a regulated 24 V DC power supply +/- 10% |
| Overheat Faults | Temperature on the electronic board > 70° C | When the temperature on the electronic board is < 70° C | |
| Overcurrent Faults | Overload current on output 1 > 100 mA | Eliminate the external short circuit to the product. | |

# 24. IO-LINK PARAMETER SETTINGS

MPXS vacuum pumps feature an IO-Link communications interface based on the IEC 61131-9 standard. This protocol is used to establish a point-to-point link between a sensor/actuator and an IO-Link input/output module called "IO-Link master", which is connected to the programmable logic controller.

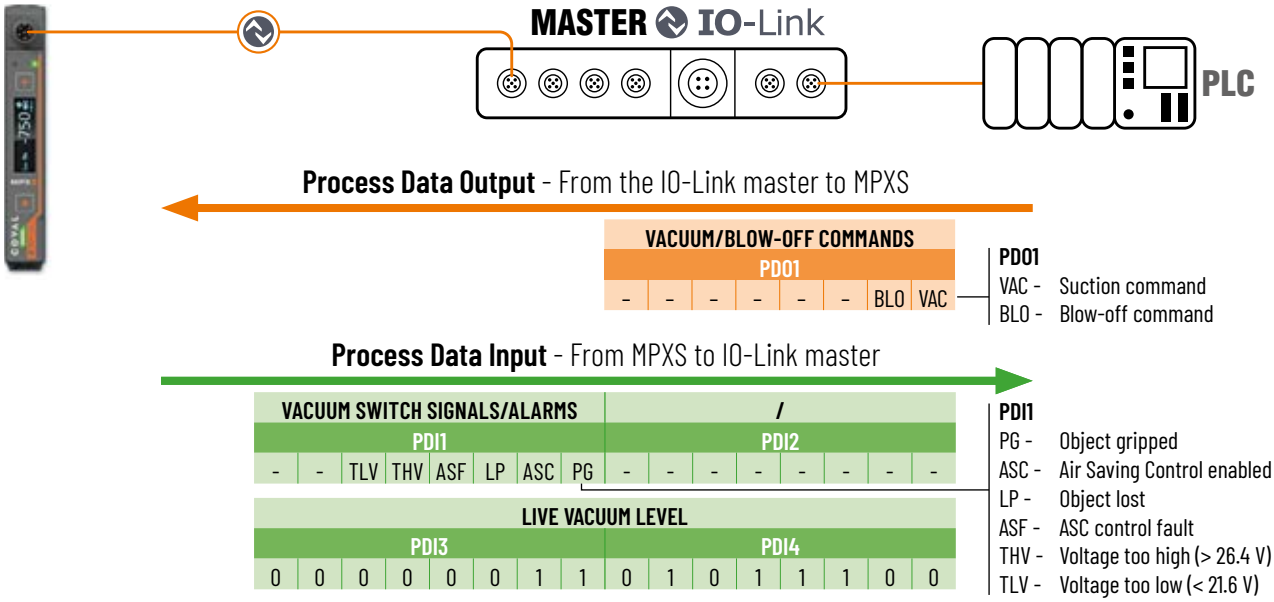
## 24.1. IO-Link Communications

| | |
|---|---|
| IO-Link revision | 1.1.4 |
| Transmission rate | COM1, 2, 3 up to 230.4 kbit/s |
| Min. cycle time | 1 ms |

| | |
|---|---|
| SIO mode | Yes |
| Process data input (PDI) | 4 bytes |
| Process data output (PDO) | 1 byte |

Update of IO Device Description (IODD) file: available for download.

## 24.2. Cyclical datD (PDI/PDO)




| Process Data | Parameter | Bit | Length (byte) | R/W | Unit | Comment |
|---|---|---|---|---|---|---|
| PDI1 | PG - Part gripped (L1) | 0 | BOOL | RO | | Vacuum level greater than L1 then between L1 and L1-h1 |
| | ASC - Air Saving Control (L2) | 1 | BOOL | RO | | Vacuum level greater than L2 then between L2 and L2-h2 |
| | LP - Lost Part | 2 | BOOL | RO | | Vacuum level lower than L1-h1 during part handling |
| | ASF - Air Saving Failure | 3 | BOOL | RO | | Vacuum leakages leading to a permanent vacuum state of the ejector |
| | THV - Too High Voltage | 4 | BOOL | RO | | Power supply voltage greater than 26.4 V |
| | TLV - Too Low Voltage | 5 | BOOL | RO | | Power supply voltage lower than 21.6 V (dynamic) |
| | - | 6 | BOOL | RO | | Not used |
| | - | 7 | BOOL | RO | | Not used |
| PDI2 | - | 0-7 | 8xBOOL | RO | | Not used |
| PDI3 / PDI4 | Instant vacuum level | 0-15 | 2 | RO | mbar | Instantaneous vacuum level (0 to -1013 mbar) |
| PDO1 | VAC - Vacuum command | 0 | BOOL | RW | | 0: vacuum OFF (NC vacuum control) vacuum ON (NO vacuum control) |
| | | | | | | 1: vacuum ON (NC vacuum control) VACUUM OFF (NO vacuum control) |
| | BLO - Blow-off command | 1 | BOOL | RW | | 0: Blow-off OFF |
| | | | | | | 1: Blow-off ON |
| | - | 2-7 | 6xBOOL | RW | | Not used |

## 24.3. Acyclical Data

### IDENTIFICATION

| Index (dec) | Parameter | Length (byte) | R/W | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | min | Typ. | max | |
| 7 | Vendor ID | 2 | RO | - | | 0x04 | | 0x0421 = COVAL SAS |
| 8 | | | | | | 0x21 | | |
| 9 | Device ID | 3 | RO | - | | 0x00 | | 0x5101 = MPXS Series |
| 10 | | | | | | 0x51 | | |
| 11 | | | | | | 0x01 | | |
| 16 | Vendor name | 9 | RO | | COVAL SAS | | | |
| 17 | Vendor text | 15 | RO | | Vacuum managers | | | |
| 18 | Product name | 32 | RO | | MPXS90X10SC16PR2F1EBSP | | | Full reference |
| 19 | Product ID | 10 | RO | | MPXS | | | Simplified reference |
| 20 | Product text | 38 | RO | | MPXS CONTROLLED MINI VACUUM PUMP | | | |
| 21 | Serial number | 8 | RO | | 204131097140001 | | | |
| 22 | Hardware revision | 3 | RO | | 1.0 | | | |
| 23 | Firmware revision | 22 | RO | | 01.02 | | | |

### BASIC SETTINGS

| Index (dec) | Parameter | Length (byte) | R/W | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | min | Typ. | max | |
| 64 | Gripped product threshold L1 | 2 | RW | mbar | 10 | 650 | 999 | Recommendations :<br>h1 & h2 ≥ 10<br>L2-h2 ≥ L1<br>L1 > h1 & L2 > h2 |
| 65 | Gripping threshold hysteresis h1 | 2 | RW | mbar | 0 | 100 | 999 | |
| 66 | Regulation threshold L2 (Air saving) | 2 | RW | mbar | 10 | 750 | 999 | |
| 67 | threshold hysteresis h2 (Air saving) | 2 | RW | mbar | 0 | 100 | 999 | |
| 68 | ASC (Air Saving Control) | 1 | RW | | 0 | 1 | 1 | 0: OFF / 1: ON |
| 69 | DIAG Eco | 1 | RW | | 0 | 1 | 1 | 0: OFF / 1: ON (refer to related indexes 80/81) |
| 70 | Automatic blow-off | 1 | RW | - | 0 | 0 | 1 | 0: OFF / 1: ON<br>Automatic blowing for a period of 50 to 9940 ms as soon as vacuum control is disabled. |
| 71 | Automatic blow-off duration | 2 | RW | msec | 50 | 250 | 9950 | |

### ADVANCED SETTINGS

| Index (dec) | Parameter | Length (byte) | R/W | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | min | Typ. | max | |
| 80 | DIAG Eco Max. bounces number | 1 | RW | - | 1 | 2 | 10 | The ejector automatically switches to permanent suction once the vacuum valve bounces more than "Maximum bounces No." during a period of "DIAG Eco analysis time". |
| 81 | Diag Eco analysis time | 1 | RW | sec | 1 | 1 | 60 | |

### DEVICE SETTINGS

| Index (dec) | Parameter | Length (byte) | R/W | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | min | Typ. | max | |
| 90 | I/O switching type | 1 | RW | - | 0 | 0 | 1 | 0: PNP / 1: NPN |
| 91 | Switching output-1 (DO1) | 1 | RW | - | 0 | 0 | 1 | 0: NO / 1: NC |

## DIAGNOSTIC

| Index (dec) | Parameter | Length (byte) | R/W | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | min | Typ. | max | |
| 84 | Custom device name | 20 | RW | - | | MPXS | | Free field, 20 characters max.<br>if replaced and not MPXS nor empty, displays at startup. |
| 85 | Errors and warnings of control unit | 2 | RO | - | 0 | 0 | | **CODERR register**<br>Byte 0 / bit 0-7 : internal errors<br>Byte 0 / bit 0-7 : internal errors<br>bit0 and bit1: sensor not working properly<br>bit2 and bit 3: internal power supply not working properly<br>bit 4: internal temperature >90°C<br>bit 5: non volatile memory (EEPROM) not working properly<br>bit 6: display not operating properly<br>bit 7 : invalid product reference<br>**Byte 1 / bits 8-15 : warnings**<br>bit 8 : overload current on TOR1 > 100mA<br>bit 9: internal temperature >70°C<br>bit 10 : external power supply voltage lower than 18V<br>bit 11 : configuration L1/h1/L2/h2 not valid<br>bit12 : main power supply voltage < 15V<br>bit 13: pilot supply voltage > 26.4V<br>bit 14 : pilot supply voltage < 21.6V<br>bit 15 : / |
| 32 | IO-Link error count | 2 | RO | | | | | Number of IO-Link errors since last power-up |
| 36 | IO-Link Device Status | 1 | RO | | | | | Status codes according to IO-Link specification V1.1:<br>0 = device is operating properly<br>1 = maintenance required<br>2 = out of specification<br>3 = functional check<br>4 = failure |
| 37 | Extended Device Status = Event Category | 4 | RO | | | | | Four Events maximum active at the same time |

**▼ Events ▼**
(according to table D.1 of the IO-Link 1.1.4 specification)

| EventCode | Definition and recommended maintenance action | Device Status Value | Condition |
|---|---|---|---|
| 0x0000 | No malfunction | 0 | CODERR = 0, no error nor warning |
| 0x1000 | General malfunction - unknown error | 4 | CODERR / error of control unit any bit 0 to 7 |
| 0x4000 | Temperature fault - Overload | 4 | CODERR bit 4 : overheating >90°C |
| 0x4210 | Device temperature overrun - Clear source of heat | 2 | CODERR bit 9 : overheating >70°C |
| 0x5000 | Device hardware fault - Device exchange | 4 | CODERR / error of control unit any bit 0 to 7 |
| 0x5100 | Power supply failure - Check availability | 4 | CODERR bit 12 : power supply voltage < 15V |
| 0x5110 | Primary supply voltage overrun - Check tolerance | 2 | CODERR bit 13 : power supply voltage > 26.4V |
| 0x5111 | Primary supply voltage underrun - Check tolerance | 2 | CODERR bit 14 : power supply voltage < 21.6V |
| 0x6320 | Parameter error - Check data sheet and values | 4 | CODERR bit 7 : invalid product number |
| 0x7710 | Short circuit - Check installation | 4 | CODERR bit 8 : overcurrent fault on OUT1 |
| 0x8C10 | Process variable range underrun - Process Data uncertain | 2 | CODERR bit 11 : invalid L1/h1/L2/h2 configuration |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ▼ Cycles counters ▼ | | | | | | | |
| 110 | External vacuum commands counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 111 | Internal vacuum commands counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 112 | Blow-off commands counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 113 | Grip counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 114 | Grip faults counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 115 | ASC counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 116 | ASC faults counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 117 | Power supply too high faults counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 118 | Power supply too low faults counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 119 | Overheating fault counter | 4 | RO | - | 0 | 0 | 1E+08 |
| 120 | Counter for simultaneous suction/blowing controls | 4 | RO | - | 0 | 0 | 1E+08 |

## SYSTEM COMMANDS

| | | | | | | |
|---|---|---|---|---|---|---|
| ▼ Sensor calibration ▼ | | | | | | |
| 2 | Calibration of vacuum sensor | 1 | WO | - | 160 / 0xA0 | |
| ▼ Factory settings ▼ | | | | | | |
| 2 | Reset settings | 1 | WO | - | 129 and 131 | ApplicationReset (129 / 0x81)<br>Reset all settings to factory values.<br><br>BackToBox (131 / 0x83)<br>Reset of all factory settings and application tags.<br>Requires power off / power on following this command. |

# 25. MAINTENANCE

## 25.1. Troubleshooting

| Failure | Possible cause | Remedy |
|---|---|---|
| The vacuum pump does not work. | No supply voltage or power supply defective. | Check the electrical connection and the pin assignment on the M8 connector. |
| | No compressed air supply | Check the compressed air supply. |
| The vacuum level is not correct. | A filter is clogged in the facility. | If the facility includes an additional vacuum filter, clean or replace the filter cartridge. |
| | Leakage in the vacuum network | Check the fittings and tubes. |
| The vacuum build-up is too slow. | Suction cup leakage | Check the suction cup. |
| The vacuum pump is quickly switching on and off. | Pressure too low | Increase the pressure (refer to technical data). |
| | Inner diameter of tubes too small | See recommendations for tube diameters. |
| Cannot hold the payload in place. | Vacuum level too low | Check the values of thresholds L1 and L2. |
| | Suction cup too small or insufficient number of suction cups | Choose a larger suction cup and/or increase the number of suction cups. |
| The Venturi pump is running permanently (no vacuum control). | L2 threshold set to a higher value than what the vacuum pump is able to reach | Reduce the value of the L2 vacuum control threshold or revert to factory settings. |
| The vacuum decreases in the network, but Venturi pump does not switch back on. | The h2 hysteresis value is too high | Check the values of the L2 threshold and reduce the h2 hysteresis if necessary. |
| Screen is off | Power supply and/or electrical connection not correct | Check the electrical connection and the pin assignment on the M8 connector |
| The screen shows a event message | | See section 23 |

# 26. SPARE PARTS FOR BANK

## 1 Select the Bank End Set

| | |
|---|---|
| **MPXSETAL** | **Single Left Bank End Set:**<br>▪ Head module on the left with 8x10 mm pressure connection and 10x12 mm exhaust collector.<br>▪ Tail module on the right (simple).<br>→ For a bank of 1 to 4 MPXS micro vacuum pump modules with a 1.0 mm nozzle, and up to 8 modules with a 0.7 mm nozzle. |
| **MPXSETAD** | **Double Bank End Set:**<br>▪ Head and tail modules with 8x10 mm pressure connection and 10x12 mm exhaust collector.<br>→ For a bank of 1 to 8 MPXS micro vacuum pump modules. |

## 2 Select the Micro Vacuum Pump Modules for Bank



| MPXS90X | 10 | S | C16 | P | R2 | F1 | EB |
|---|---|---|---|---|---|---|---|

| NOZZLE DIA. | | GENERATOR CONTROL | | BLOW-OFF | |
|---|---|---|---|---|---|
| 0.7 mm dia. | **07** | **S** | Vacuum **NC** and blow-off **NC** | **F1** | Standard blow-off |
| 1.0 mm dia. | **10** | **V** | Vacuum **NO** and blow-off **NC** | **F3** | Adjustable powerful blow-off |

## 3 Select the Assembly Screw Kit



| Assembly Screw Kit for a **Single Left** Bank Version | |
|---|---|
| **MPXSETVB1L** | For a bank of **1 MPXS module** |
| **MPXSETVB2L** | For a bank of **2 MPXS modules** |
| **MPXSETVB3L** | For a bank of **3 MPXS modules** |
| **MPXSETVB4L** | For a bank of **4 MPXS modules** |
| **MPXSETVB5L** | For a bank of **5 MPXS modules** |
| **MPXSETVB6L** | For a bank of **6 MPXS modules** |
| **MPXSETVB7L** | For a bank of **7 MPXS modules** |
| **MPXSETVB8L** | For a bank of **8 MPXS modules** |

| Assembly Screw Kit for a **Double** Bank Version | |
|---|---|
| **MPXSETVB1D** | For a bank of **1 MPXS module** |
| **MPXSETVB2D** | For a bank of **2 MPXS modules** |
| **MPXSETVB3D** | For a bank of **3 MPXS modules** |
| **MPXSETVB4D** | For a bank of **4 MPXS modules** |
| **MPXSETVB5D** | For a bank of **5 MPXS modules** |
| **MPXSETVB6D** | For a bank of **6 MPXS modules** |
| **MPXSETVB7D** | For a bank of **7 MPXS modules** |
| **MPXSETVB8D** | For a bank of **8 MPXS modules** |

## 27. GLOSSARY

- **IHM**: Human-machine interface
- **I/O**: Input / Output
- **SIO**: Standard input/output
- **DO**: Digital Output
- **SDCI**: Single-drop digital communication interface, commonly known as IO-Link
- **C/Q**: Connection for communication or switching signal
- **IODD**: IO device description, a file that provides all the properties required to establish the communication and the parameters to establish the desired function of a sensor or actuator
- **Acyclical data**: Data transmitted from the controller only following a request (e.g. settings data, diagnostic data)
- **Cyclical data**: Data automatically transmitted by the controller at regular intervals (processing data, changes to values)
- **COMx**: IO-Link communication transmission rate (COM1: 4.8 kbit/s, COM2: 38.4 kbit/s, COM3: 230.4 kbit/s)

## 28. WARRANTY

We provide a warranty for this product and for any COVAL spare parts in accordance with our general terms of sale (GTS).
The exclusive use of COVAL spare parts is a condition required to ensure the product's flawless operation and we will not be held liable for any damage resulting from the use of spare parts or accessories that are not made by COVAL.
Wearing parts are excluded from the warranty.

## 29. RECYCLING



Waste from electrical and electronic equipment (WEEE) is a category of waste consisting of equipment at the end of its life cycle that uses electricity or electromagnetic fields to operate and designed to be used at a voltage that does not exceed 1000 volts for alternating current and 1500 volts for direct current.

MPXS Micro Vacuum Pumps are products that fall under this category of waste.

Waste from electrical and electronic equipment (WEEE) requires separately collection and recycling according to the European directive 2012/19/EU and to French legislation: decree no. 2014-928 from 19 August 2014.

For France: COVAL is a member of ECOSYSTEM for the collection, decontamination and recycling of professional WEEE. If you own any COVAL WEEE products, contact ECOSYSTEM who will collect and treat the products. (Collection only applies to France).
https://www.ecosystem.eco/

# 30. DECLARATION OF CONFORMITY

## CE EC DECLARATION OF CONFORMITY

COVAL, the manufacturer, confirms that the product "MPXS vacuum pump" described in this manual meets the following applicable EC directives:

- **2014/30/UE**: Electromagnetic Compatibility (EMC) 26/02/2014.
- **2011/65/UE**: Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS 2), 08/06/2011.

The following harmonized standards have been applied:

- **NF EN IEC 61000-6-2:2019**: Electromagnetic compatibility (EMC) - Part 6-2 : generic standards - Immunity standard for industrial environments.
- **NF EN IEC 61000-6-4:2019**: Electromagnetic compatibility (EMC) - Part 6-4 : generic standards - Emission standard for industrial environments.
- **NF EN 61000-4-2:2009**: Electromagnetic compatibility (EMC) - Part 4-2 : testing and measurement techniques - Electrostatic discharge immunity test.
- **NF EN IEC 61000-4-3:2020**: Electromagnetic compatibility (EMC) - Part 4-3 : testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
- **NF EN 61000-4-4:2013**: Electromagnetic compatibility (EMC) - Part 4-4 : testing and measurement techniques - Electrical fast transient/ burst immunity test.

# 31. CERTIFICATES / TESTS

| | | | |
|---|---|---|---|
| EMC | CEI 61000-6-2 (2019) Electromagnetic compatibility (EMC). Generic standards. Immunity standard for industrial environments | NF EN 61000-4-2 (2009) Electrostatic discharges (ESD) | |
| | | NF EN 61000-4-3 (2020) Radiofrequency electromagnetic field amplitude modulated | |
| | | NF EN 61000-4-4 (2013) Fast transients (Burst) | |
| | | NF EN 61000-4-6 (2014) Radio-frequency common mode | |
| | | NF EN61000-4-8 (2010) Magnetic fields | |
| | CEI 61000-6-4 (2019) Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments | NF EN 55011 (2021) Conducted Emissions. | |
| | | NF EN 55011 (2021) Radiated Emissions | |
| | FCC 47 CFR part 15 B Emission standard for industrial environments | limits identical to the NF EN 55032 class B limits (2020) Conducted Emissions. | |
| | | FCC part 15B Radiated Emissions | |
| Degrees of protection | NF EN 60529 (2014) | | IP 40 |
| | NF EN 60 068-2-75 (2015) | | IK 06 |
| Temperature variations | IEC 60068-2-14 (2009) | | 0°C +50°C |
| Humidity | IEC 60068-2-30 (2006) | | 10% - 95% |
| Vibrations | NF EN 60068-2-6 (2008) | | 5 *g* |
| Shocks | NF EN 60068-2-27 (2009) | | 15 *g* |
| Storage | IEC 60068-2-1 & IEC 60068-2-2 (2007) | | -10°C to 60°C (without condensation or frost) |

COVAL
vacuum managers

vacuum
components




## A TECHNOLOGICAL PARTNER ON A GLOBAL SCALE

Located in the South of France, COVAL SAS designs, produces, and markets high-performance vacuum components and systems for industrial applications in all sectors worldwide.

An ISO 9001: V2015 certified company, COVAL innovates globally in vacuum handling. Our optimized components integrate intelligent and reliable functionalities, adapt to your industrial context, and safely improve your productivity.

With a strong spirit of innovation and technological advancements, the COVAL team is now recognized as an expert in developing reliable, economical, and productive custom solutions.

COVAL's references are found in major industrial sectors such as packaging, food processing, automotive, plastics, aerospace, and robotics, where vacuum handling is crucial for efficiency and productivity.

COVAL markets its products and services worldwide through its subsidiaries and authorized distributor network. Always attentive to its customers, COVAL supports the implementation of its solutions with a continuous and attentive relationship.

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