

# CVGC

Carbon Vacuum Grippers

CVGC\_M2\_ Version with Vacuum Generator



# COVAL

vacuum managers

## EN

### OPERATING INSTRUCTIONS

This manual is intended for users of **CVGC\_M2\_** series carbon vacuum grippers with integrated vacuum generator. It contains all the information you need to integrate the grippers, 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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**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/cvgc\\_m2/](https://doc.coval.com/cvgc_m2/)



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**NOTE:**

This document provides detailed operating instructions for the *standard models* referenced in chapter 5. For *custom models*, the information herein must be adapted to the specific features of the product. Custom versions are products that have been tailored to meet the constraints of a specific application. The following are examples of such custom models:

- Different product lengths
- Multi-zone
- Different suction cups
- Different accessories

## 1. IMPORTANT INFORMATION

This document contains important instructions and information regarding various stages in the life cycle of the product:

- Transportation, storage, commissioning, and decommissioning.
- Operation and service.

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 this document within reach of the product so operators 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 resulting from failure to follow instructions.

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## 2. SAFETY INSTRUCTIONS

Only qualified personnel should be authorized to use the components. These individuals must be trained in the following areas:

- Installing pneumatic and electric equipment.
- Applicable safety rules and requirements for using components and installing them in devices, machines, and production lines.
- Appropriate handling of components and their respective products.
- Proper use of the operating materials and supplies.
- The latest applicable EC directives, legislations, decrees, and standards, as well as the current state of the technology for its intended use.
- Any special measures necessary to meet these requirements, as well as the current state of the technology.
- Installation in a secure environment.
- The device must be used exclusively with robotic systems that comply with DIN IST/TS 15066, DIN EN ISO 10218-1, and DIN EN ISO 10218-2 standards. For use in a collaborative environment, the entire system must comply with the current legal requirements for collaborative robots. The responsibility for compliance with these requirements lies with the system integrator. Methods to ensure this compliance include:
  - The use of redundant vacuum/compressed air generation systems.
  - The integration of battery-powered audio-visual alert devices to monitor input pressure and vacuum values.
  - The implementation of safety-focused vacuum generation and monitoring systems with an appropriate performance level.

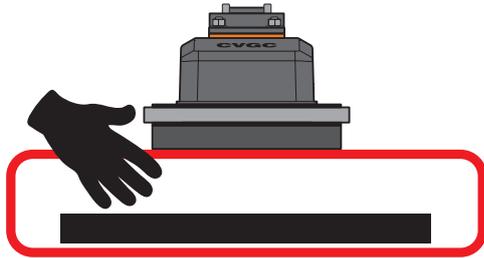
**The vacuum gripper is designed for use in collaborative robot applications.**

The improper use of components, use of operating materials and supplies other than those defined, improper voltages, and/or other environmental conditions may lead to failure, damage, and/or injury.

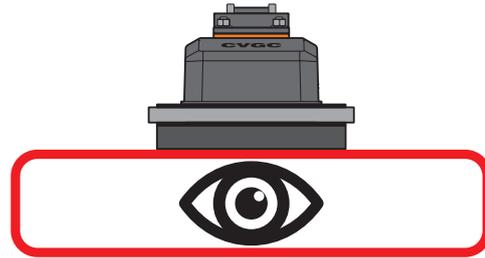
*This list must be considered as an overview and does not claim to be exhaustive. It can be further expanded by users according to their particular needs.*

## HAZARD AREAS

Area where there is a risk of crushing



Area where there is a risk of air ejection



### Notes for the manufacturer of the final machinery and for the end user

- Standing or walking in the operating area of the vacuum gripper is strictly prohibited. In the event of a power or pneumatic supply failure, the load handled by the gripper will be released.
- Never look inside and/or introduce hands into cavities, holes, or openings (e.g. air exhausts, openings/holes under the suction cups, etc.).
- The vacuum gripper described in this manual is designed for implementation in industrial systems. In other words, It must not be used under any conditions other than those specified.
- Once the vacuum gripper is installed, the manufacturer of the final machinery is responsible for the final assessment of safety systems applied prior to putting the facility into operation. It is the responsibility of the manufacturer of the final machinery to specify the PPE required for operators standing in the vicinity as well as for those who have access to the operating area. Furthermore, the said manufacturer must certify final commissioning in accordance with applicable local rules and regulations.

## 3. INSTRUCTIONS FOR USE

### 3.1. Basic Installation

In order to ensure flawless installation and operation, the following rules must also be observed:

- Vacuum grippers must be carefully removed from their packaging.
- Vacuum grippers must be protected against any and all damage.
- During installation and maintenance work, the vacuum generator must be de-energized (air and power) and secured against any unauthorized activation.
- Any attempt to alter the vacuum gripper is strictly prohibited.
- The area surrounding the vacuum gripper and the location where it is used must be kept clean (no outdoor use).
- Only the fittings/connectors provided may be used.
- During installation, only flexible tubes and tubes that are suitable for the specific operating material may be used (Improper tubing and/or electrical lines are 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 this document 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.

### 3.2. Commissioning and Decommissioning

**Commissioning:**

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

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

- Ensure the gripper is not holding any objects (load may drop).

### 3.3. Operating the Vacuum Gripper



#### Intended use

The vacuum gripper is designed for use in collaborative robot applications. Use cases depend on the gripping interfaces used → see chapter 13.



#### Unintended use

The vacuum gripper may not be used for the following:

- Manual applications.
- Uses other than those established by the manufacturer or specified in this manual.
- In direct contact with hazardous materials (molten masses, radioactive products), water, steam, or in environments where dripping or splashing water, oil, etc. may occur.
- In explosive, acidic, alkaline, or saline atmospheres.
- In environments subject to strong vibrations and/or shocks.

### 3.4. Transportation and Storage

When handling the vacuum gripper, only use equipment that is suitable for its dimensions and weight.

For proper storage of the system and its spare parts, we recommend the following:

- Do not store in outdoor areas or areas exposed to bad weather, excessive moisture, or direct sunlight
- In a reasonably clean environment, place the system in such a way that it rests on a stable support base, and ensure that the device cannot tip over.
- Store the gripper in a manner where the interface is uncompressed.

### 3.5. Maintenance

Maintenance must be performed in accordance with the instructions in this manual. Prior to performing any maintenance work, follow the instructions provided in section 3.2.

### 3.6. 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 RECYCLING).



- 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!

## 4. NAMEPLATE

The nameplate is affixed to the vacuum gripper in such a way that it is legible at all times.

It includes the following information:

- Part number
- Serial number
- Weight
- CE marking



*Sample nameplate*

Always provide the part and serial numbers of the product when you contact COVAL.

## 5. IDENTIFYING YOUR MODEL

 **CVGC 320x160 D VSA25JI X H X M2 S VA A50**



DIMENSIONS L x W	GENERATOR CONTROL	ISO 9409-1 ROBOT MOUNTING INTERFACE
240 x 120 mm <b>240x120</b>	NC vacuum control and NC blow-off <b>S</b>	ISO 9409-1-50-4-M6 <b>A50</b>
320 x 160 mm <b>320x160</b>	NO vacuum control and NC blow-off <b>V</b>	ISO 9409-1-63-4-M6 <b>A63</b>
350 x 250 mm <b>350x250</b>		ISO 9409-1-80-6-M8 <b>A80</b>

SUCTION CUP GRIPPING INTERFACES		
CUP PATTERN LAYOUT		INTERFACES
Straight 	<b>D VSA25JI</b>	"medium" type interface 1.5 bellows suction cups Ø 25 mm in natural rubber with flow control nozzles.
Straight 	<b>D VSA33JK</b>	"maxi" type interface 1.5 bellows suction cups Ø 33 mm in natural rubber with flow control nozzles.

FOAM GRIPPING INTERFACES		
HOLE PATTERN LAYOUT		INTERFACES
Staggered 	<b>Q F2S</b>	Foam "mini" type interface Holes Ø12 mm, EPDM (thickness 20 mm).
Straight 	<b>D F2L</b>	Foam "maxi" type interface Oblong holes 27x12 mm, EPDM (thickness 20 mm).

## 6. TECHNOLOGIES USED

### 6.1. Gripping Interface

The **CVGC** series offers an option between two gripping interface technologies for vacuum handling: foam or suction cups.

In order to optimize the performance of the **CVGC** series vacuum grippers for different applications, various spacings and diameters of the gripping points are available for each variant.

→ A wide range of options to meet your application needs.

#### "FOAM" Interface

- Handling of rigid products.
- Gripping textured or uneven surfaces.
- Flow control nozzles.
- 2 standard hole diameters (Ø12 mm and oblong 27x12 mm).



CVGC\_F2S\_



CVGC\_F2L\_

#### "SUCTION CUP" Interface

- Handling of flexible products.
- Wide range of cup options.
- Flow control nozzles in multiple diameters.
- 2 types of standard suction cups (Ø25 and Ø33 mm).



CVGC\_VSA25JI\_



CVGC\_VSA33JK\_

### Vacuum Gripping Force

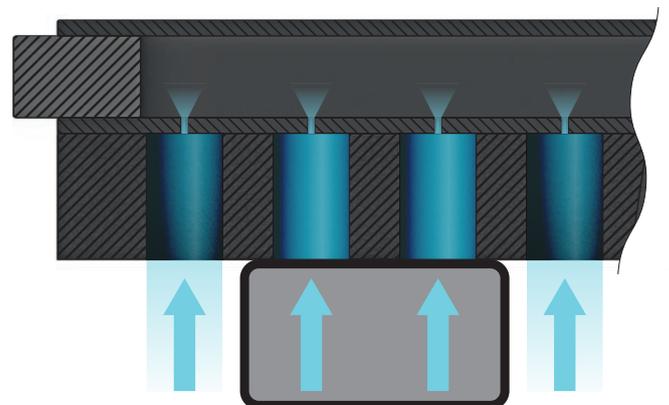
	Vacuum Level (%)	Gripping Force*	
		(N)	(lbf)
CVGC240X120_	45	110	24.73
	75	180	40.47
CVGC320X160_	45	200	44.96
	75	330	74.19
CVGC350X250_	45	340	76.44
	75	565	127.02

\* Indicative force for a gripper with gripping interface covered 100% by the load, including a safety factor of 2 for horizontal handling, on a rigid and airtight surface.

### 6.2. Flow Control Technologies

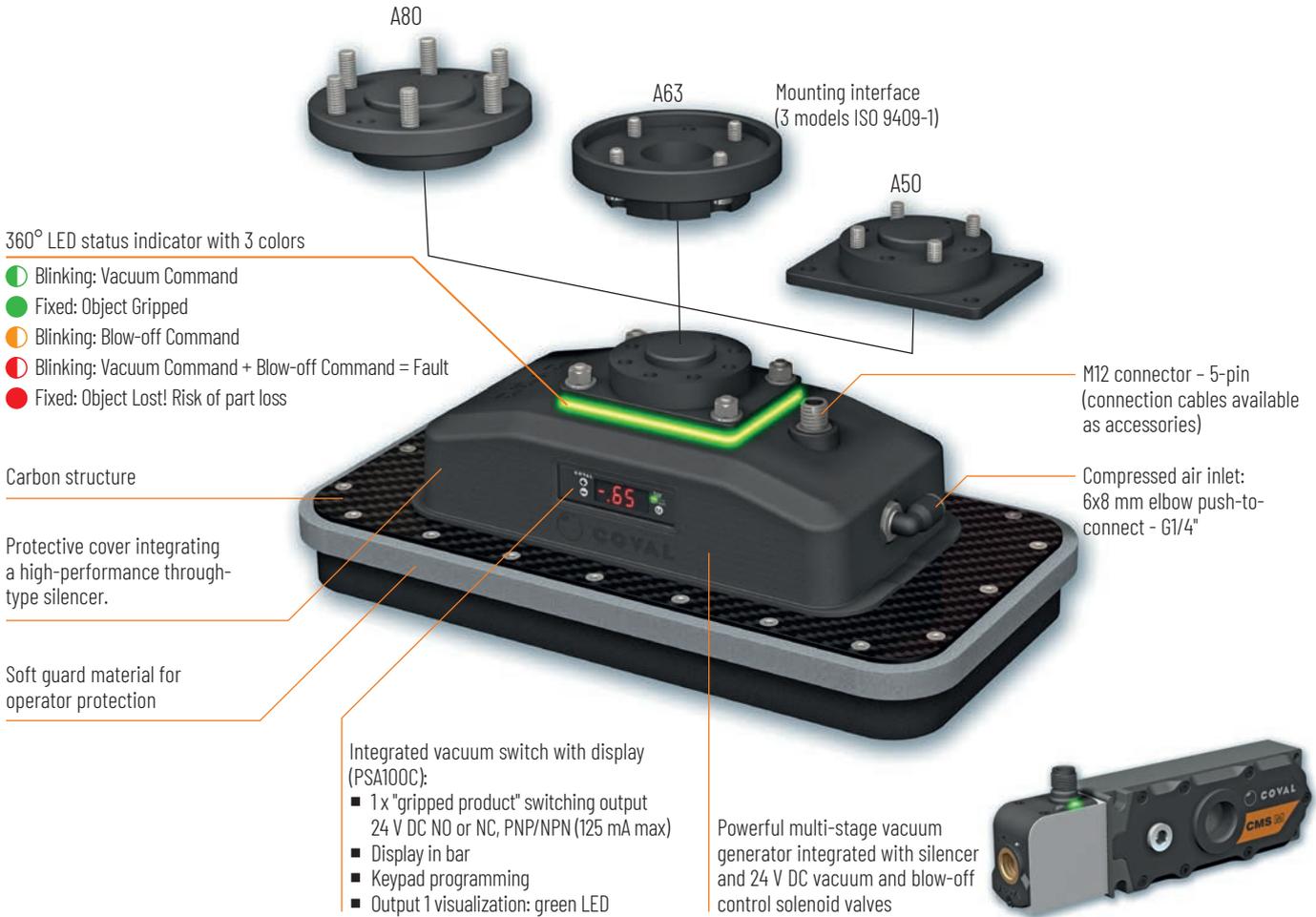
The **CVGC** carbon vacuum grippers use **flow control nozzles** to limit the leakage rate from uncovered areas. This technology yields several advantages:

- Economic solution.
- Customizable calibration.
- Horizontal and vertical handling.

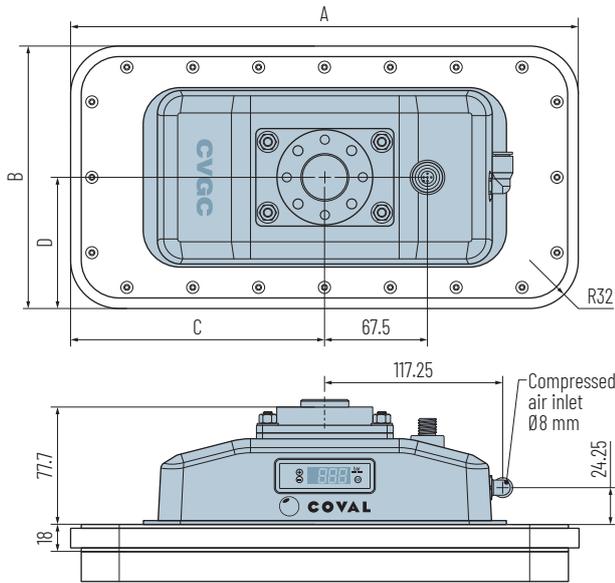


## 7. OVERVIEW AND DIMENSIONS

### 7.1. Overview of Vacuum Grippers with Integrated Vacuum Generator: CVGC\_M2\_



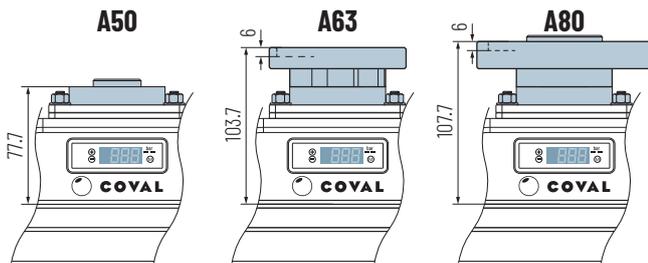
**7.2. Dimensions**



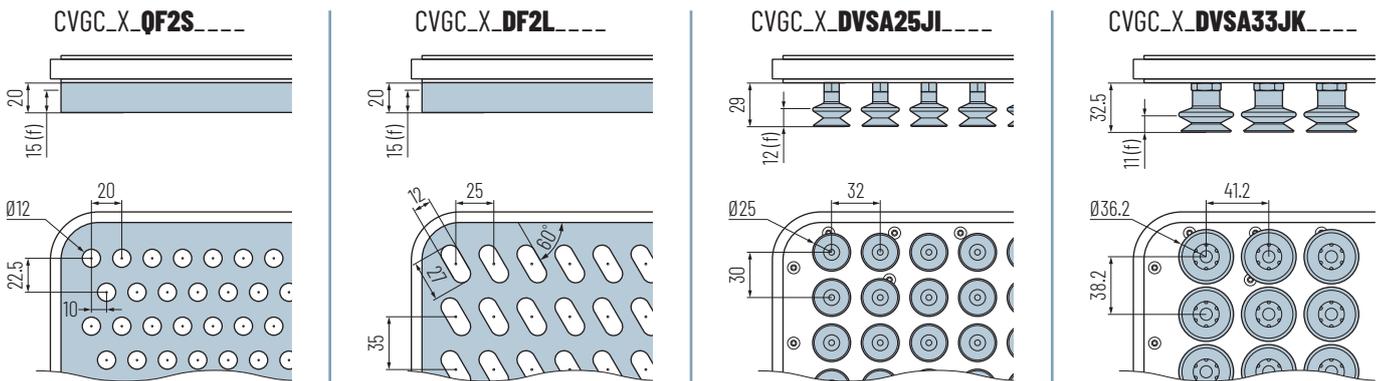
	A	B	C	D
CVGC240X120_	254	134	127	67
CVGC320X160_	334	174	167	87
CVGC350X250_	364	264	182	132

Note: all dimensions are in mm.

**ISO 9409-1 Robot Mounting Interface**



**Gripping Interfaces**

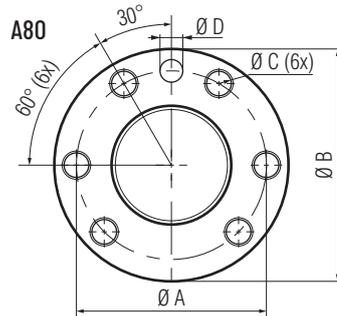
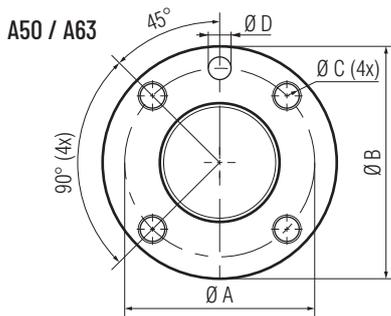


Number of holes/suction cups per interface type.

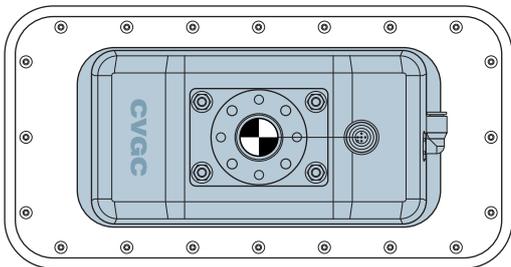
	F2S "mini" type interface	F2L "maxi" type interface	VSA25 "medium" type interface	VSA33 "maxi" type interface
CVGC240X120_	42	27	21	15
CVGC320X160_	87	48	45	28
CVGC350X250_	160	78	77	54

### 7.3. ISO 9409-1 Robot Mounting Interface

Version	Standard	Ø A (mm)	Ø B (mm)	Ø C (mm)	Ø D (mm)	
A50	ISO 9409-1-50-4-M6	50	63	M6 (x4)	6	 UR: UR3(e), UR5(e), UR10(e), UR16(e) OMRON/TECHMAN: TM5, TM12, TM14, TM16, TM20 DOOSAN: A0509, A0509S, A0912, A0912S, M0609, M0617, M1013, M1509, H2017, H2515 FANUC: CRX-5iA, CRX-10iA, CRX-10iA/L, CRX-20iA/L, CRX-25iA, CRX-30iA YASKAWA: HC10DTP, HC20DTP, HC30PL KASSOW ROBOTS: KR0810, KR1018, KR1205, KR1410, KR1805 JAKA: Zu 3, 3s, 5, 5s, 7, 7s, 12, 12s, 18, 18s, Ai 3, 5, 7, 12, 18, Pro 5, 12, 16
A63	ISO 9409-1-63-4-M6	63	80	M6 (x4)	6	YASKAWA: HC10, HC10DT
A80	ISO 9409-1-80-6-M8	80	100	M8 (x6)	8	YASKAWA: HC20DT UR: UR20, UR30



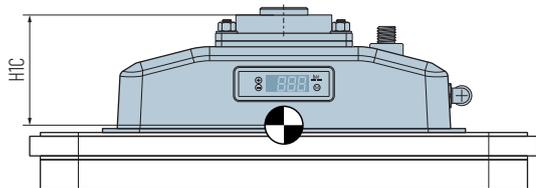
### 7.4. Centers of Gravity



#### HIC Value

##### CVGC240X120

Mounting Interface	Gripping Interfaces			
	F2L	F2S	VSA25	VSA33
CVGC_____M2__A50	58.35	58.57	61.37	64.5
CVGC_____M2__A63	72.48	72.71	75.55	78.76
CVGC_____M2__A80	74.05	74.29	77.15	80.38



##### CVGC320X160

Mounting Interface	Gripping Interfaces			
	F2L	F2S	VSA25	VSA33
CVGC_____M2__A50	63.05	63.28	68.2	71.55
CVGC_____M2__A63	77.69	77.92	83	86.48
CVGC_____M2__A80	79.45	79.69	84.83	88.36

##### CVGC350X250

Mounting Interface	Gripping Interfaces			
	F2L	F2S	VSA25	VSA33
CVGC_____M2__A50	67.99	68.17	74.19	79.21
CVGC_____M2__A63	83.31	83.5	89.77	95.06
CVGC_____M2__A80	85.34	85.54	91.91	97.3

Note: all dimensions are in mm.

## 8. CHARACTERISTICS

### General Characteristics

- Operating temperature: from 0°C to 50°C (32°F to 122°F)
- Materials:
  - Gripper: carbon, brass, stainless steel, high-density EPDM foam
  - Foam gripping interface: EPDM
  - Suction cup gripping interface: NR, aluminum, steel

### Characteristics of grippers with integrated vacuum generator, CVGC\_M2\_

- Supply: non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:4]
- Operating pressure: from 2 to 7 bar
- Optimal dynamic pressure: 5.5 bar
- Pressure Connection: 6x8 mm elbow push-to-connect - G1/4", with 200 µm filter screen
- Multi-stage Mini Vacuum Pump CMSM90X30\_: Equipped with a removable 200 µm vacuum filter screen
- Max Vacuum: 80%
- Air Suction Flow Rate: 550 NI/min (19.42 SCFM)
- Air Consumption: 280 NI/min (9.89 SCFM)
- Noise Level: 72 dB (at 50% vacuum, at optimal pressure)
- Protection Rating: IP40
- Max Operating Frequency: 2 Hz
- M12-5 pin connector

#### Materials:

- Cover: Brass, stainless steel, felt, aluminum, PMMA, PETP, PA
- Vacuum generator CMS-M for CVGC\_M2\_:
  - Base Body: PA GF, brass, NBR, PU
  - Valve Body: PA 6 glass fiber reinforced
  - Vacuum Connection Flange: PETP
  - Internal Pump Parts: Brass, aluminum
  - Internal Valve Block Parts: Brass, aluminum, steel, NBR, PU, FKM
  - Screws: Zinc-plated steel
  - Seals and Membrane: NBR, PU

#### Integrated Electronics:

- Power Supply: 24 V DC (regulated ± 10%)
- Inputs and Outputs: Protected against polarity reversal and overcurrent
- Vacuum Control: 24 V DC PNP/NPN
- Blow-off Control: 24 V DC PNP/NPN
- Idle consumption / without command: 35 mA
- Consumption during part gripping (no load): 150 mA
- Maximum peak consumption: 500 mA
- Input/Output Switching Type: Configurable as PNP or NPN

#### Integrated Vacuum Switch:

- Compatible Fluids: All non-corrosive, filtered, non-lubricated gases
- Power Supply: 24 V DC ± 10%
- Current Consumption: <60 mA
- 1 x Switching Output "gripped product": 24 V DC NO or NC, PNP/NPN (125 mA max)
- Output 1 Visualization: Green LED
- Keypad Programming
- Display in bar
- EMC Industrial Standard: Class B
- Display Resolution: 1%
- Setting Resolution: 1%
- Setting Range: 0.10 ~ -1.00 bar
- Measuring Range: 0.00 ~ -1.00 bar
- Allowable Overpressure: 3 bar

#### Indicator: 360° LED status visualization:

- Blinking green LED: Vacuum Command
- Fixed green LED: Object Gripped (threshold factory set at -0.65 bar)
- Blinking orange LED: Blow-off Command
- Blinking red LED: Vacuum Command + Blow-off Command = Fault
- Fixed red LED: Object Lost ! Risk of part Lost!

#### Plugins available for download on our website:

[https://doc.coval.com/cvgc\\_m2/](https://doc.coval.com/cvgc_m2/)

*Values are representative of the average characteristics of our products.*

## 9. INSTALLING THE VACUUM GRIPPER



### COMPRESSED AIR OR VACUUM NETWORKS:

- Wear safety goggles
- Make sure all fittings and tubes are tightened securely
- Air line ends must be fastened to avoid any risk of being pulled off in the event of accidental breakage

### 9.1. Pneumatic Supply

#### Pneumatic supply characteristics

- Non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:4].
- Operating pressure: from 2 to 7 bar.
- Optimal dynamic pressure: 5.5 bar
- Pressure Connection: 6x8 mm elbow push-to-connect - G1/4", with 200 µm filter screen.

#### Technical data of the integrated CMS M series vacuum generators

Vacuum generator	Consumption (NI/min) / (SCFM)	Flow rate (NI/min) / (SCFM)	Max. vacuum (%)	Sound level (dBA)
CMSM90X30_	280 / 9.89	550 / 19.42	80	72

### 9.2. Pneumatic Connection

#### 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"

#### Compressed air supply line requirements

Vacuum generator	Min. internal line dia.
<b>CMSM90X30</b>	6 mm - max. length 3 m 8 mm - max. length 10 m

- Air supply lines must be as short as possible in order to minimize response times.
- Make sure there is no contamination or debris in the device connections and lines.
- Air supply lines 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.

Connect the compressed air to the G1/4" connection on the vacuum gripper.

Permissible tightening torque:

- G1/4" pressure connection: 2 N m



Compressed air inlet:  
6x8 mm elbow push-to-connect - G1/4"

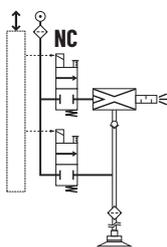
### 9.3. Electrical Connections

The CVGC carbon vacuum grippers, CVGC\_M2 versions, integrating a controlled multi-stage vacuum pump, offer 2 choices for vacuum control.

**Model CVGC\_M2S\_:** vacuum pump with **NC** vacuum control and **NC** blow-off control.

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.

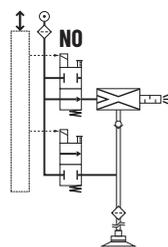


**Model CVGC\_M2V\_:** vacuum pump with **NO** vacuum control and **NC** blow-off control.

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.

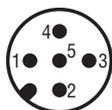
- NO vacuum control solenoid valve.
- NC blow-off control solenoid valve.



The CVGC carbon vacuum gripper M2 version with integrated vacuum generator must be used with power supply units that provide Protective Extra Low Voltage (PELV) and supply voltage isolation according to EN 60204.



One M12 5-pin male connector  
(connection cables available as accessories)



- |   |   |
|---|---|
| 1 | +24 V DC permanent  |
| 2 | 24 V DC suction command <sup>(1)</sup>                      |
| 3 | 0 V - GND   |
| 4 | "Gripped product" switching output 24 V DC PNP/NPN NO or NC |
| 5 | 24 V DC blow-off command                                    |

<sup>(1)</sup> 24 V DC suction command, depending on version:

- S: 24 V DC vacuum control

- V: 24 V DC vacuum off command

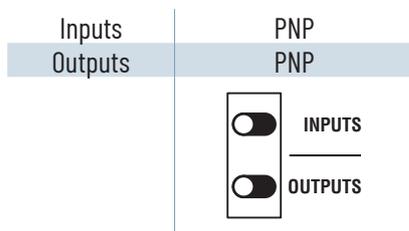
### 9.4. Inputs/Outputs Switching Mode

The CVGC's input/output signals can be configured in PNP (switching to positive potential charge) or NPN (switching to negative potential charge) to adapt to characteristics of the robot/controller used.



The mode change must be performed while the power is off.

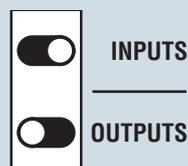
By default, inputs and outputs are configured as PNP.



#### Example of specific configuration

Inputs/Outputs setting for connecting CVGC C1 version to the tool connector of the Universal Robots UR3/UR5/UR10/CB3 Series with a CCM12F5PM8F8PLO15C1 connection cable:

- Inputs: NPN
- Outputs: PNP



## 9.5. Accessories: Connection Cables

### CCM12F5PM8F8PL015C1

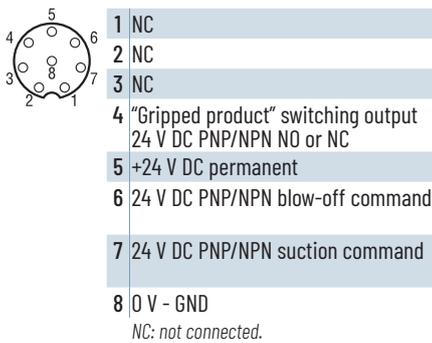
- M12 – 5-pin female elbow
- M8 – 8-pin female elbow
- Cable length 150 mm (PUR)



 Universal Robots: CB3 UR3, UR5, UR10 + e-Series UR3e, UR5e, UR10e, UR16e, UR20, UR30<sup>(1)</sup>

FANUC: CRX-5iA, CRX-10iA, CRX-10iA/L, CRX-20iA/L, CRX-25iA, CRX-30iA  
Yaskawa: HC10DT, HC10DTP, HC10DTP IP67, HC10SDTP, HC20DT, HC20DTP, HC30PL  
Kassow Robots: GEN1 & 2 KR0810, KR1018, KR1205, KR1410, KR1805

(!) UR's M8 connector will change in 09/2024 for new cobots and requires a UR tool cable adapter to ensure compatibility between the cobot I/O and the gripper.

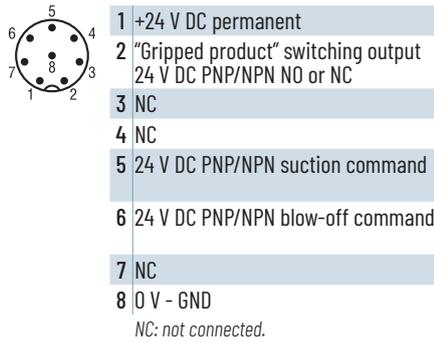


### CCM12F5PM8M8PL015C2

- M12 – 5-pin female elbow
- M8 – 8-pin male elbow
- Cable length 150 mm (PUR)



 Omron/Techman: TM5, TM12, TM14, TM16, TM20



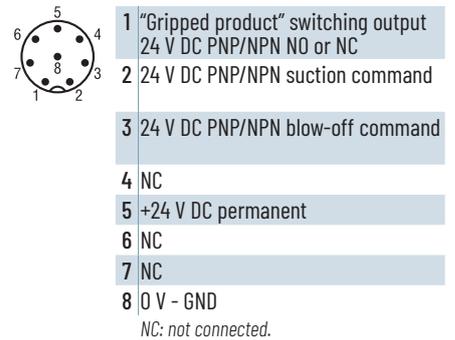
### CCM12F5PM8M8PL015C3

- M12 – 5-pin female elbow
- M8 – 8-pin male elbow
- Cable length 150 mm (PUR)



 Doosan Robotics: A0509\*, A0509S\*, A0912\*, A0912S\*, M0609, M0617, M1013, M1509, H2017, H2515

\* Robots manufactured since 1/21/2021

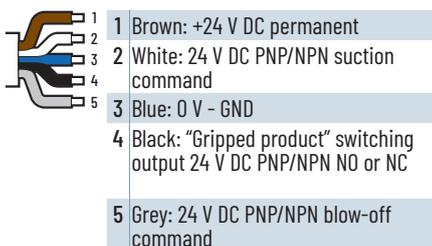


### CCM125PL2 / CCM125PL5

- M12 – 5-pin female elbow
- 5-wire output
- Length 2 m (CCM125PL2) (PUR)
- Length 5 m (CCM125PL5) (PUR)



 FANUC: CR-4, CR-7, CR-7 A/L, CR-14 A/L  
Yaskawa: HC10  
+ any application requiring cables to be routed outside the robot arm.  
+ any robot whose housing connection does not match with connection cables.

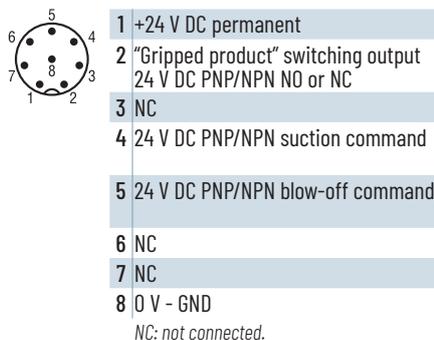


### CCM12F5PM8M8PL015C6

- M12 – 5-pin female elbow
- M8 – 8-pin male elbow
- Cable length 150 mm (PUR)



 JAKA: Zu 3, 3s, 5, 5s, 7, 7s, 12, 12s, 18, 18s  
Ai 3, 5, 7, 12, 18  
Pro 5, 12, 16



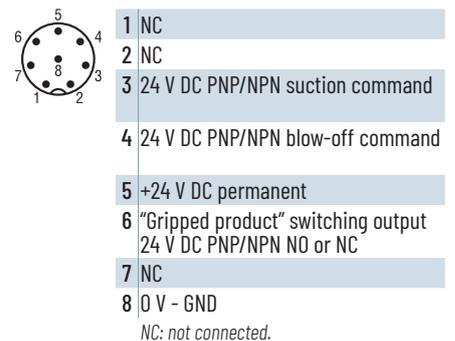
### CCM12F5PM8M8PL015C7

- M12 – 5-pin female elbow
- M8 – 8-pin male elbow
- Cable length 150 mm (PUR)



 Universal Robots: e-Series UR3e, UR5e, UR10e, UR16e, UR20, UR30

(!) UR's M8 connector will change in 09/2024 for new cobots; this cable ensures compatibility between the cobot I/O and the gripper.



### 9.6. Grounding connection & ESD

It is strongly recommended that the assembly consisting of the robot arm and the gripper be properly connected to the protective equipotential bonding (PE) to ensure controlled dissipation of electrostatic discharges (ESD). Grounding must be performed using the dedicated PE terminals recommended by the robot manufacturer.

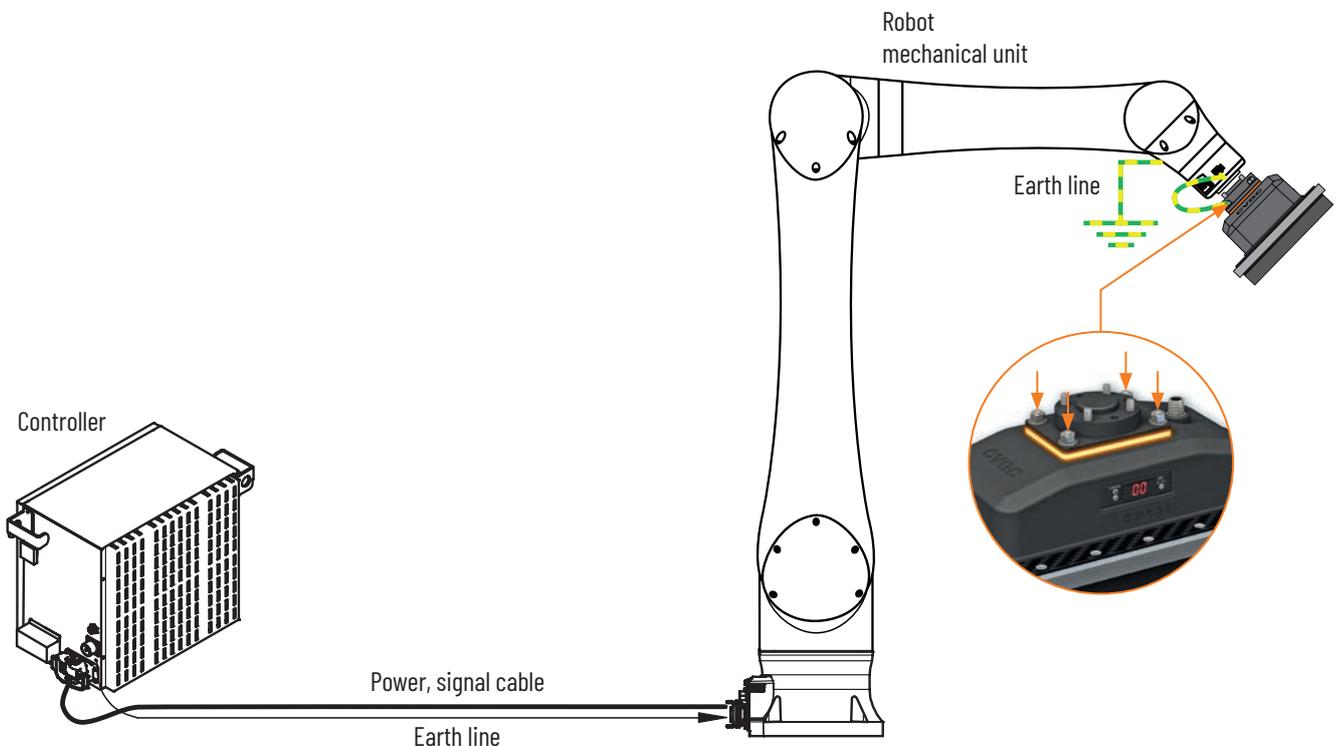


**On some robot models, the effector connector is not designed to handle ESD currents.**

The CVGC must be grounded using one of the screws on the robot-CVGC mechanical interface, with a suitable connection. Note that this connection should be as short as possible.

#### Installation example

Connect a grounding braid or a low-inductance green/yellow cable with a minimum cross-section of 1.5 mm<sup>2</sup> / AWG16 to one of the screws on the robot-CVGC mechanical interface (including its washer and nut).



This recommendation does not exempt the user from implementing a comprehensive approach to manage ESD in their application. It is particularly important when handling materials that generate a lot of static electricity (e.g., dry cardboard, plastics, etc.).

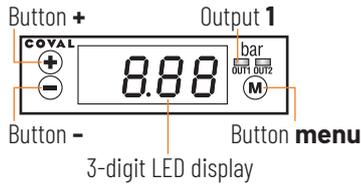


**In the absence of a dedicated grounding path, malfunctions related to ESD may occur.**

## 10. INTEGRATED VACUUM SWITCH WITH DISPLAY (PSA100C)

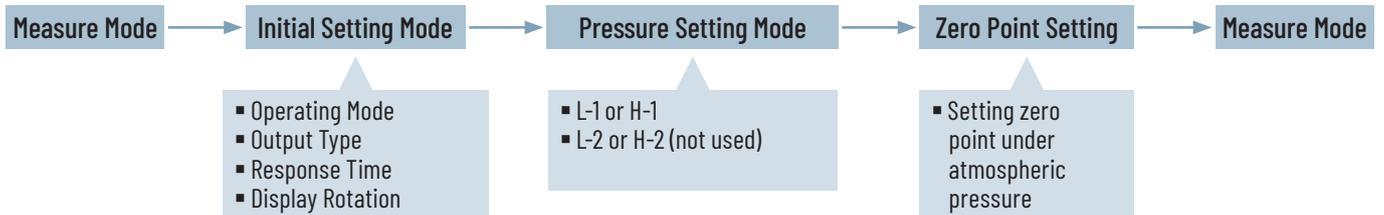
Integrated vacuum switch with display (PSA100C):

- 1 x "gripped product" switching output 24 V DC NO or NC, PNP/NPN (125 mA max)
- Display in bar
- Keypad programming
- Output 1 visualization: green LED

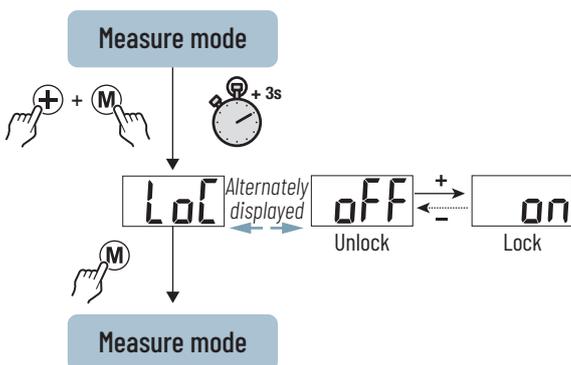


- Compatible Fluids: All non-corrosive, filtered, non-lubricated gases
- Power Supply: 24 V DC  $\pm$  10%
- Current Consumption: <60 mA
- 1 x Switching Output "gripped product": 24 V DC NO or NC, PNP/NPN (125 mA max)
- Output 1 Visualization: Green LED
- Keypad Programming
- Display in bar
- EMC Industrial Standard: Class B
- Display Resolution: 1%
- Setting Resolution: 1%
- Setting Range: 0.10 ~ -1.00 bar
- Measuring Range: 0.00 ~ -1.00 bar
- Allowable Overpressure: 3 bar

### 10.1. Setting Steps



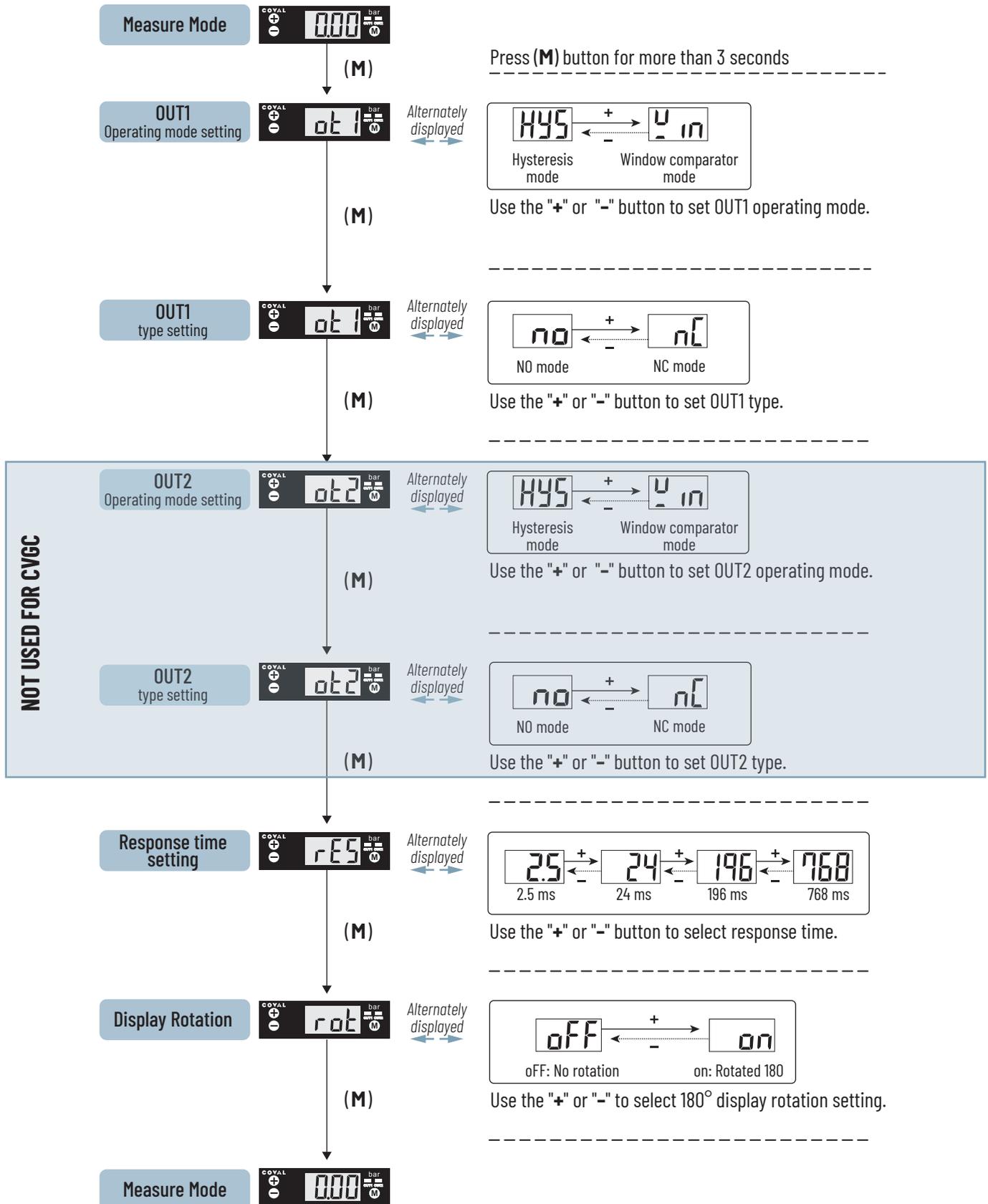
### 10.2. Key Lock/Unlock Mode



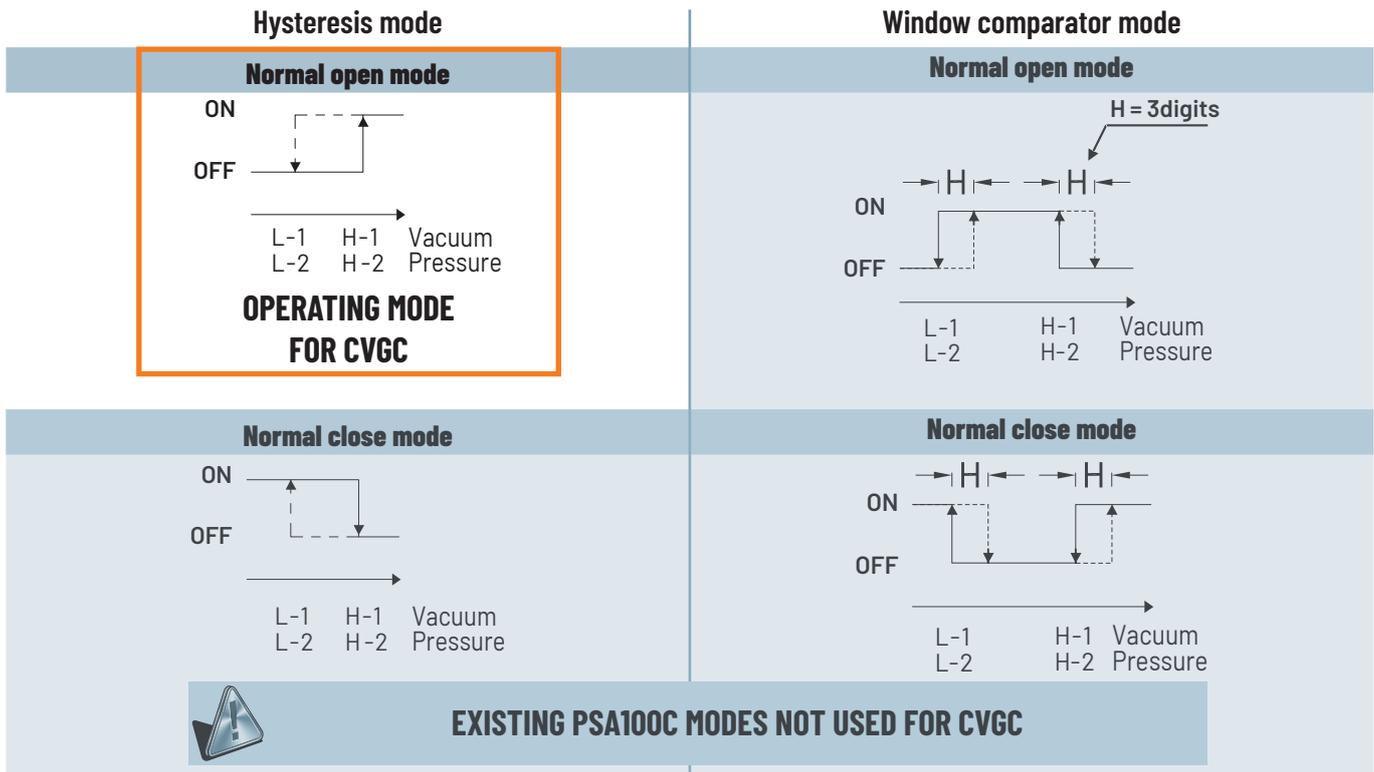
Key lock mode, it displays as picture when pressing any key. After some time, it would be returned to measure mode.



### 10.3. Initial Setting Mode



### 10.4. Output Type



Note: When hysteresis mode setting is within 2 digits, if the input and pre-set pressure is quite near, pressure sensor output might cause chattering.

Note: Hysteresis is fixed in 3 digits.  
Pressure value level setting : At least 6

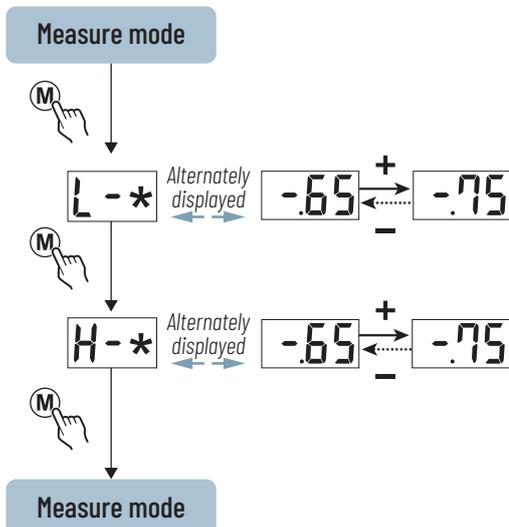
### 10.5. Zero Point Setting

Use the + and - button at the same time until the "00" is shown, Release the button to end zero setting.



### 10.6. Pressure Setting Mode

Hysteresis mode / Window comparator mode:

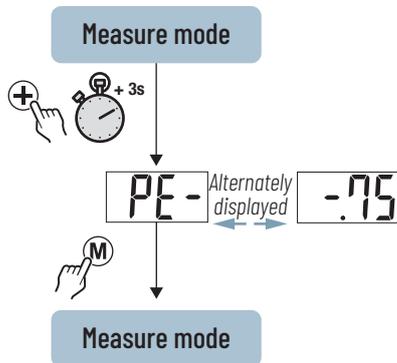


Use the + or - buttons to set the value.

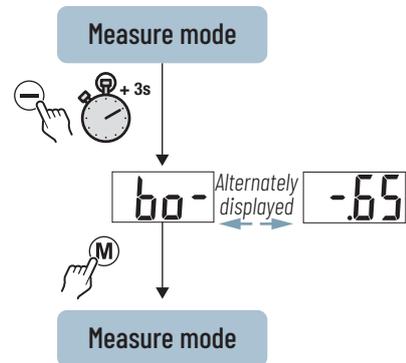
\* When out 1,"\*" displays 1  
When out 2,"\*"displays 2

### 10.7. The MAX. & MIN. Display Mode

The Max. value display mode:



The Min. value display mode:



Note: In operation, these two modes allow displaying the maximum or minimum vacuum value instead of the instantaneous vacuum value.

### 10.8. Error Code Instruction

Error name		Error code	Error instruction	Troubleshooting
Excess load current error	OUT1	<i>Er 1</i>	Excess load current of 125 mA	Turn power off and check the cause of overload current or lower the current load under 125 mA, then restart.
	OUT2	<i>Er 2</i>		
Residual pressure error		<i>Er 3</i>	During zero reset, ambient pressure is over $\pm 3\%$ F.S.	Change input pressure to ambient pressure and perform zero reset again.
Applied pressure error		<i>HHH</i>	The applied pressure is excess the upper limit of pressure setting.	Adjust the pressure within applied pressure range.
		<i>LLL</i>	The applied pressure is excess the lower limit of pressure setting.	
System error		<i>Er 4</i>	Internal data error	Turn power off, and then restart. If error condition remains, please return to factory for inspection.
		<i>Er 6</i>	Internal system error	
		<i>Er 7</i>	Internal data error	
		<i>Er 8</i>	Internal system error	

### 11. INDICATOR: 360° LED STATUS DISPLAY

360° LED status indicator with 3 colors

- Blinking: Vacuum Command
- Fixed: Object Gripped
- Blinking: Blow-off Command
- Blinking: Vacuum Command + Blow-off Command = Fault
- Fixed: Object Lost! Risk of part loss

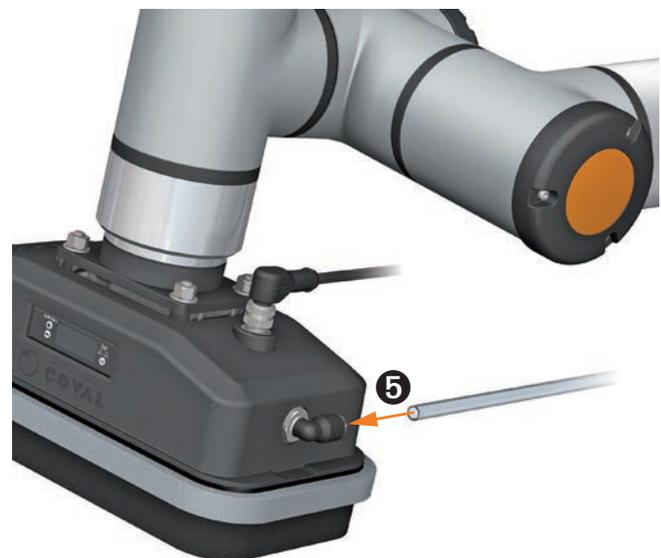
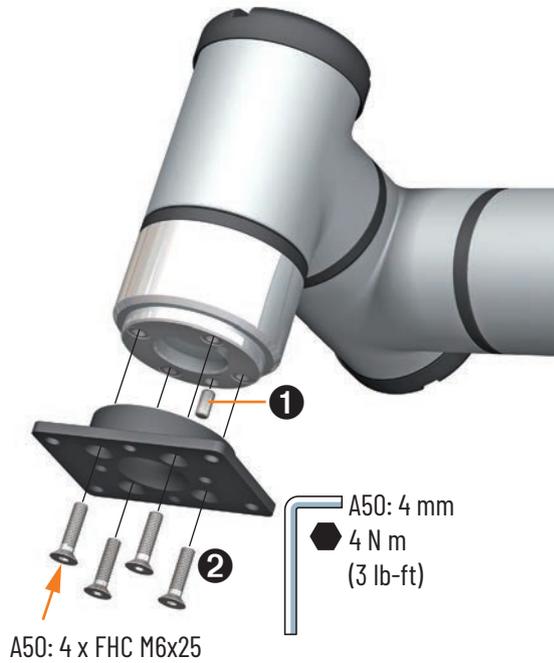


## 12. ASSEMBLY INSTRUCTIONS

### 12.1. Assembly Instructions for CVGC A50

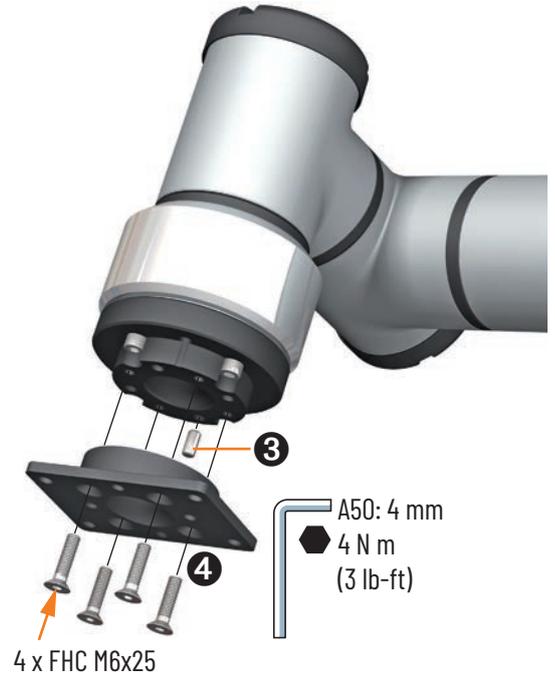
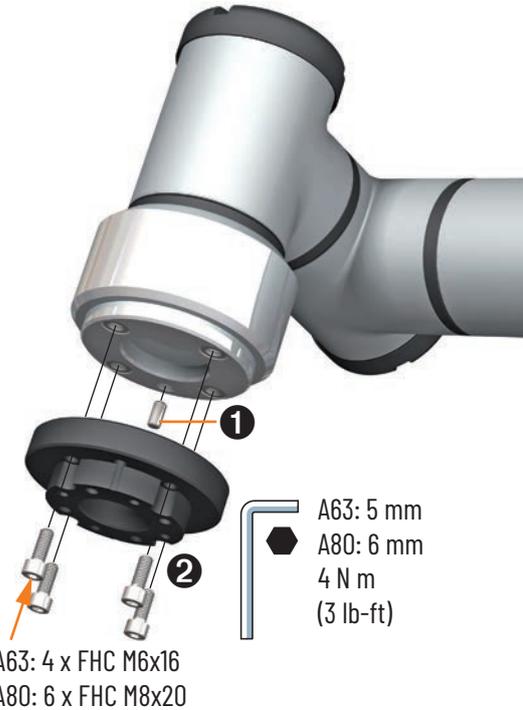
**NOTE:**

- $\varnothing$  6 mm indexing pin (1) supplied for A50 version.



**12.2. Assembly instructions for CVGC A63 and A80**

**NOTE :** ■  $\varnothing$  6 mm indexing pin (1) supplied for A63 version.  
 ■  $\varnothing$  8 mm indexing pin (1) supplied for A80 version.



For use with CVGC series Carbon Vacuum Grippers, plug-ins with installation and programming instructions are available for download from the COVAL website: <https://doc.coval.com/CVGC>

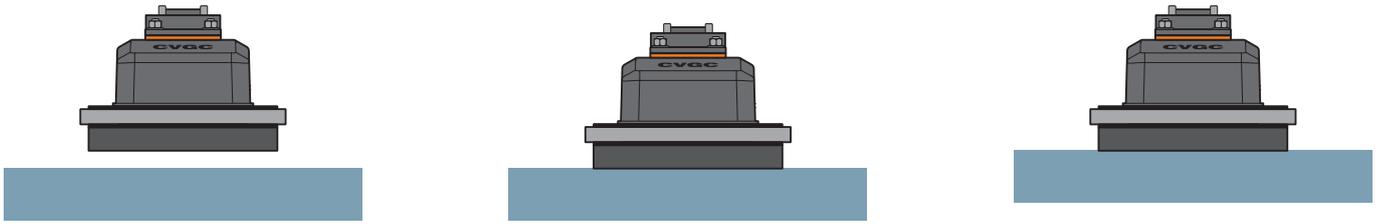
## 13. OPERATING THE VACUUM GRIPPER

### 13.1. Version with Foam Gripping Interface (F2S and F2L)

**Recommendation:**

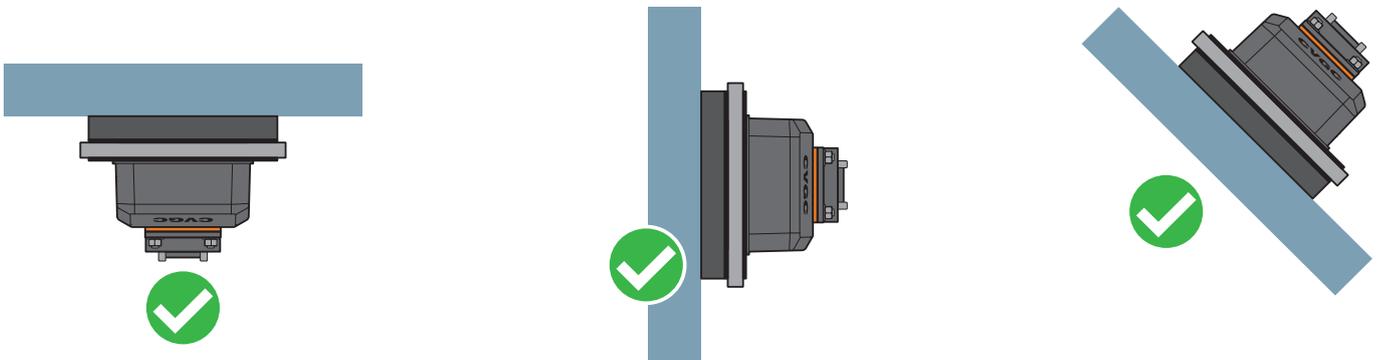
- Operating temperature: from -40 to 120 °C (from -40 to 248 °F)
- Avoid protruding shapes
- Pay attention to the angle of approach and stroke of robot
- Cover 50% of the surface of the foam gripping interface
- Gripper position:
  - Always place the gripper in the center of the load to be handled
  - CVGC vacuum grippers are designed to handle loads in a horizontal position
- We advise against using the CVGC for vertical gripping as the foam could deteriorate quickly:
  - In rare cases of vertical use, tests should be performed prior to commercial use
  - COVAL will not be held liable for any premature foam degradation

A working cycle of a CVGC vacuum gripper includes the following steps:



1. Place the vacuum gripper above the object to be handled with the foam grip interface parallel to the object's surface.
2. Bring the vacuum gripper into contact with the object and slightly compress the foam.
3. Activate the vacuum.
4. Handle the object.
5. Deposit the object by stopping the vacuum and blowing it off, if necessary.

**Note:** In this case, the vacuum can be activated either before or after contact with the object.



- Standing or walking in the working area of the empty gripper is strictly prohibited. In the event of a power or pneumatic supply failure, the load handled by the gripper will be released.
- With the flow control nozzle, the vacuum level measured by the vacuum switch in the gripper is the actual vacuum present at the object's surface. In this case, the vacuum switch can be used to check the grip on the object.
- Caution: Please note that the vacuum level is influenced by the degree of coverage of the vacuum gripper on the object, as well as the porosity of the object handled.

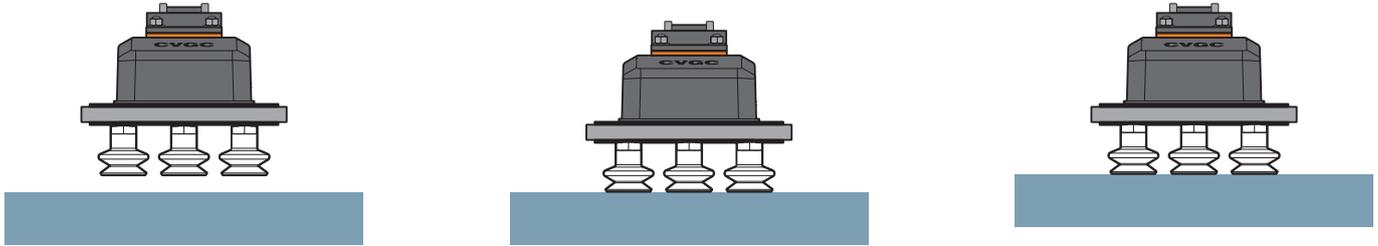
**Note:** Handling with the vacuum gripper in an upright position may subject the gripping foam to shearing stress. Depending on the load's weight and/or center of gravity, the foam may deteriorate quickly. We recommend always performing preliminary tests on actual samples of the objects to be handled.

**Contact the COVAL team to perform validation tests if necessary.**

### 13.2. Version with Suction Cup Gripping Interface (VSA25JI, VSA33JK)

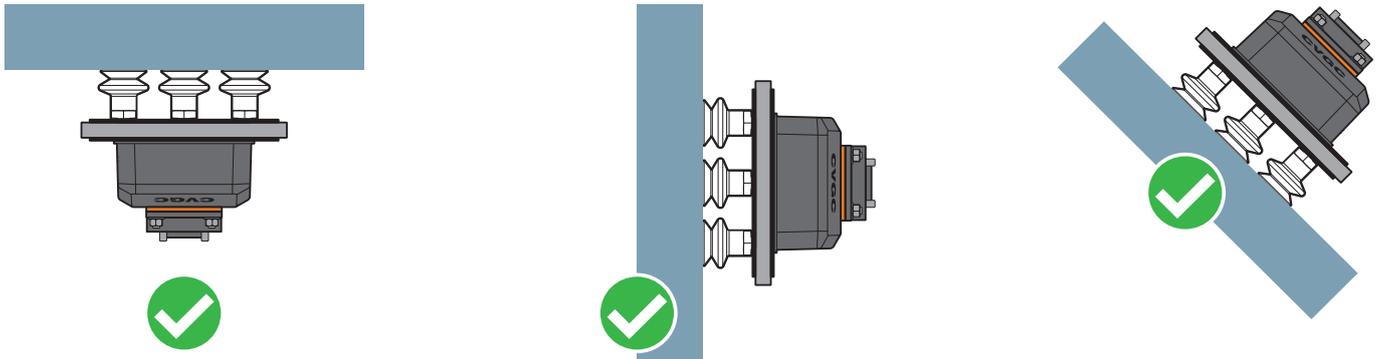
- Operating temperature: Dependent on the material of the suction cups used.
- Food compatibility: Dependent on the material of the suction cups used.
- Avoid protruding shapes.
- Pay attention to the approach angle and stroke of the robot.

A working cycle of a CVGC vacuum gripper includes the following steps:



1. Place the vacuum gripper above the object to be handled with the suction cups gripping interface parallel to the object's surface.
2. Bring the vacuum gripper into contact with the object.
3. Activate the vacuum.
4. Handle the object.
5. Deposit the object by stopping the vacuum and blowing it off, if necessary.

**Note:** In this case, the vacuum can be activated either before or after contact with the object.



- Standing or walking in the working area of the empty gripper is strictly prohibited. In the event of a power or pneumatic supply failure, the load handled by the gripper will be released.
- With the flow control nozzle, the vacuum level measured by the vacuum switch in the vacuum gripper is the actual vacuum present at the object's surface. In this case, the vacuum switch can be used to check the grip on the object.
- Caution: Please note that the vacuum level is influenced by the degree of coverage of the vacuum gripper on the object, as well as the porosity of the object to be handled

**Note:** We recommend always performing preliminary tests on actual samples of the objects to be handled.

**Contact the COVAL team to perform validation tests if necessary.**

## 14. MAINTENANCE

### 14.1. Frequency

Determination of the maintenance frequency according to the rates, environment, and type of load:

→ **To be defined by the user according to gripping efficiency and visible wear of gripping interface.**

#### Maintenance plan

	Daily	Weekly	Monthly	Every 6 months	Every year
Check the maximum vacuum level		×			
Check the tightness of parts				×	
Check the suction cups/foams	×				
Check the electrical connections			×		
Check the vacuum supply		×			
Check the general condition					×
Clean the outside of the gripper				×	

#### Troubleshooting

Failure	Possible cause	Remedy
Vacuum level too low or vacuum not reached fast enough	Gasket damaged	Check and replace as required
	Leakage in lines	Check tubes
	The foam or suction cups may be damaged	Replace any damaged suction cup or foam
Object not gripped	Low vacuum level	See above
	Insufficient suction flow rate	Increase the vacuum generator's suction flow rate
	Lifting speed is too fast	Reduce lifting speed, avoid acceleration peaks
	Suction cup inserts are clogged	Clean inserts
Suction cups wear out very quickly	Objects are not suitable for lifting with this system	Replace the gripping solution
	The vacuum gripper is not correctly placed on the object to be handled	The vacuum gripper must be parallel with the surface of the object
The vacuum pump does not work.	No supply voltage or power supply defective.	Check the electrical connection and the pin assignment on the M12 connector(s)
	No compressed air supply	Check the compressed air supply
The vacuum level is not correct.	A filter is clogged in the facility or network.	Clean or replace the filter screen of the vacuum connection.
	Suction cup leakage	Check the suction cup.
The vacuum build-up is too slow.	Pressure too low	Increase the pressure (refer to technical data).
	Inner diameter of tubes too small	See recommendations for air line diameters.
Cannot hold the payload in place.	Vacuum level too low	Check the L1 threshold
	Suction cup too small or insufficient number of suction cups	Choose a larger suction cup and/or increase the number of suction cups.

## 14.2. Replacing the Gripping Foam

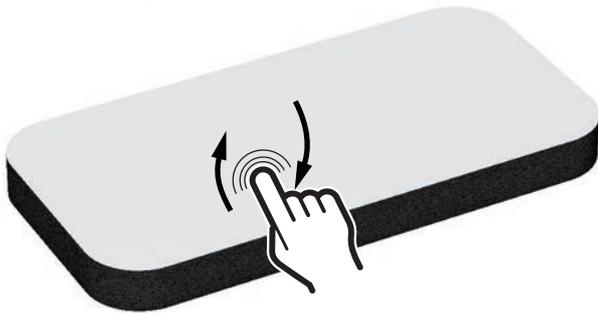
1. Manually remove the used foam interface.



2. Clean the plate with a chemical degreaser (e.g. acetone) to remove unwanted compounds (adhesive residue, grease, etc.).



3. On the replacement foam, rub the protective film on the adhesive side for a few seconds to activate the cells and promote bonding.



4. Remove the protective film.



5. Adhere foam to plate by aligning the holes.



6. Turn the gripper over and place it on a flat, smooth and clean surface. Press lightly on the gripper for 30 seconds so that the foam is uniformly adhered to the plate.



### 14.3. Replacing Suction Cups

The suction cups are mounted on barbed fittings. Simply pull the suction cup to remove it.

**Tip for mounting the suction cups:**

Soak the suction cup neck in lukewarm water to facilitate the mounting on the fitting.



### 14.4. Replacement of the PSA100C Vacuum Switch or Disassembly of the Multi-stage Mini Vacuum Pump CMSM90X30\_

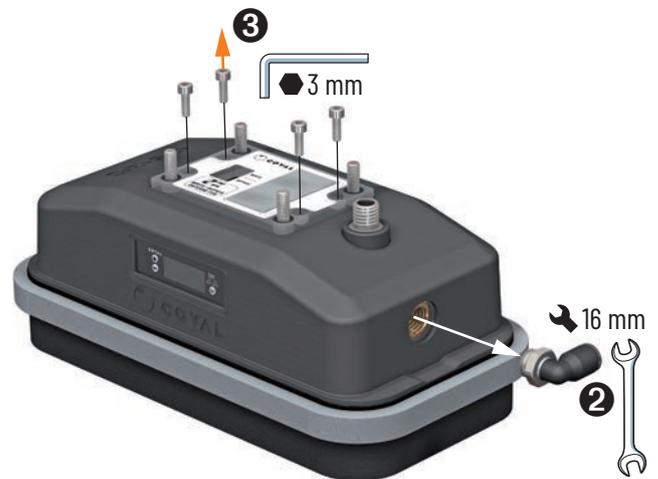


Prior to working on the pump, make sure the compressed air network is depressurized and that the connector(s) has (have) been removed.

- **1** Unscrew the 4 M6 locknuts using a 10 mm hex wrench to detach the CVGC gripper from the robot.



- **2** Unscrew the elbow quick connector for the compressed air supply using a 16 mm wrench.
- **3** Unscrew the 4 CHC M4X12 screws, using a 3 mm hexagon bit socket.

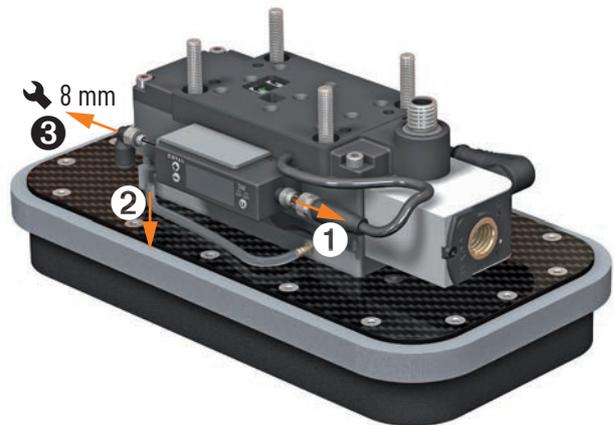


- **4** Remove the LED diffuser.
- **5** Remove the protective cover.

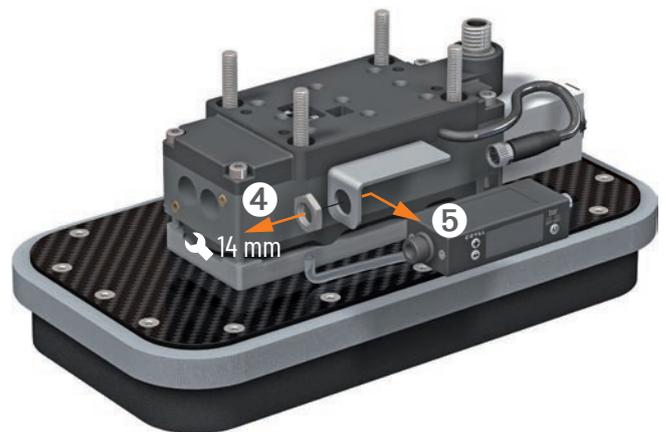


#### 14.4.1. Replacement of the electronic vacuum switch, ref. PSA100C

- **1** Unscrew and disconnect the M8 connector from the vacuum switch.
- **2** Disconnect the vacuum hose.
- **3** Unscrew and remove the elbow push-in fitting using an 8 mm hex wrench.

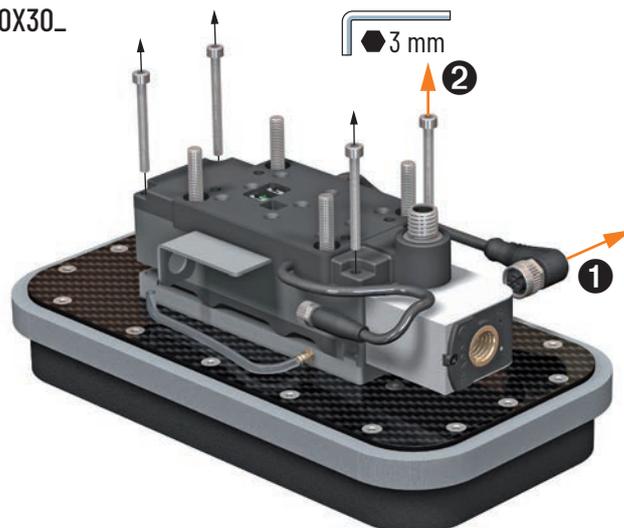


- **4** Unscrew the nut using a 14 mm hex wrench.
- **5** Remove the PSA100C vacuum switch.
- **6** Place the new PSA100C vacuum switch.
- **7** Screw in the nut using a 14 mm hex wrench (torque of 1 N m, 0.74 lb-ft).
- **8** Screw in the push-in fitting and connect the vacuum hose.
- **9** Connect and screw in the M8 connector.

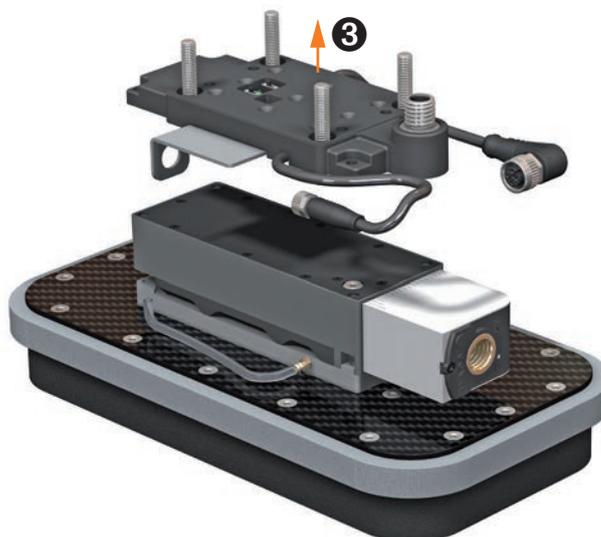


#### 14.4.2. Disassembly of the multi-stage mini vacuum pump CMSM90X30\_

- **1** Unscrew the M12 connector located on the control valve block.
- **2** Unscrew the 4 M4x40 socket head cap screws using a 3 mm hex bit.



- **3** Remove the "electronic board support" plate.  
⚠ Do not touch the electronic board.



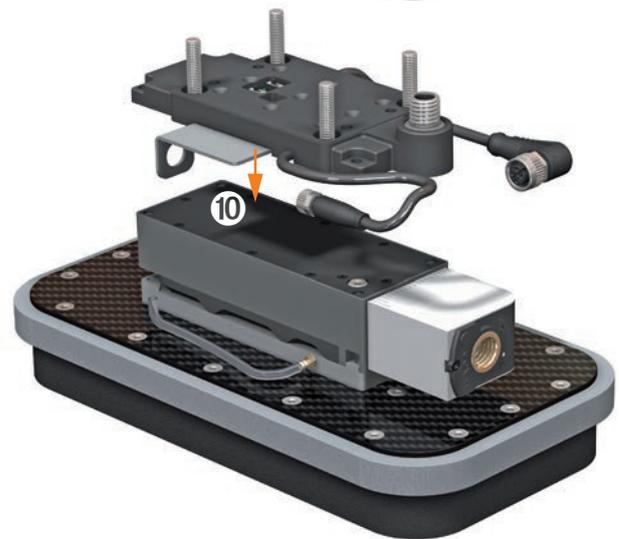
- **4** Remove the multi-stage mini vacuum pump CMSM90X30.  
⚠ The seals may be stuck to the flange. Ensure they are positioned in their housing.



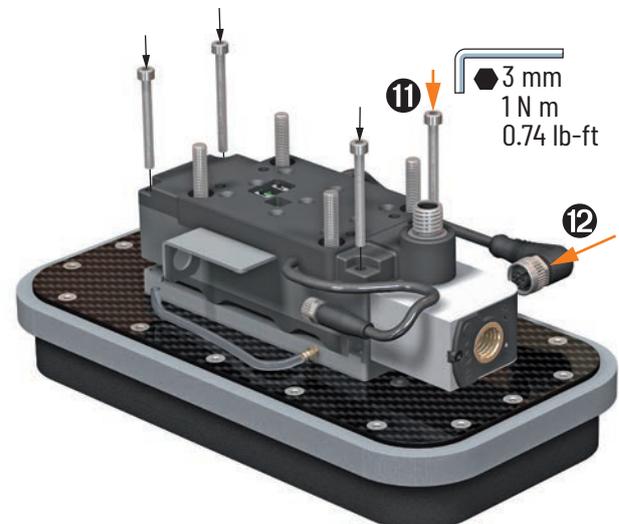
- **5** Replace the multi-stage mini vacuum pump CMSM90X30\_ or perform maintenance on the mini pump.  
To do this, please download the CMS M pump manual.  
→ Find all documents in different languages on the COVAL website: <https://doc.coval.com/CMSM>
- **6** Assembly of the multi-stage mini vacuum pump CMS90X30.  
⚠ Remove the G1/8" plug located on the front flange of the CMS M pump.
- **7** Ensure that the 2 seals are properly positioned in their housing.
- **8** Add a drop of threadlocker to the 4 M4 threaded holes (Loctite 242).
- **9** Position the multi-stage mini vacuum pump CMSM90X30.



- **10** Position the "electronic board support" plate.  
⚠ Do not touch the electronic board.



- **11** Screw in the 4 M4x40 socket head cap screws using a 3 mm hex bit (torque 1 N m, 0.74 lb-ft).
- **12** Connect and screw in the M12 connector onto the valve block of the multi-stage mini vacuum pump CMSM90X30.



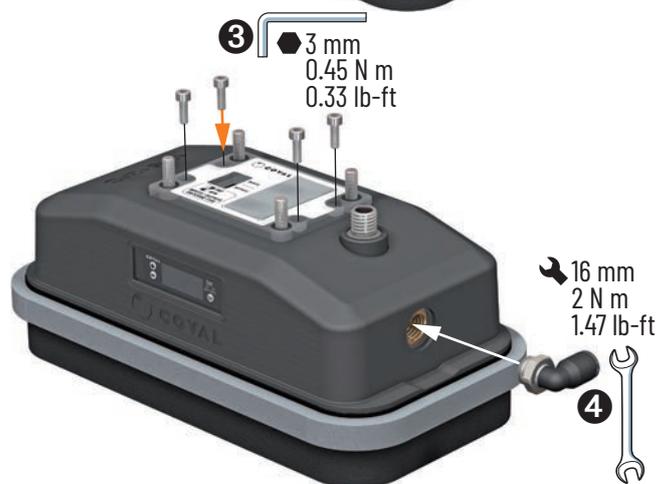
### 14.4.3. Assembly of the protective cover

- **1** Position the cover on the gripper.  
⚠ Do not pinch the cable or the vacuum hose of the vacuum switch.

- **2** Position the LED diffuser.



- **3** Screw in the 4 M4x12 socket head cap screws using a 3 mm hex bit (torque 0.45 N m, 0.33 lb-ft).
- **4** Screw in the elbow quick connector for the compressed air supply using a 16 mm wrench (torque 2 N m, 1.47 lb-ft).



## 15. SPARE PARTS

### 15.1. Foam Gripping Interface

#### 15.1.1. Spare foam bases

##### Foam bases for CVGC "mini" type foam (CVGC...QF2S \_)

Part number	For model	Description
80009114	CVGC240X120QF2SX	Foam mini type, holes $\varnothing$ 12 mm, thk 20 mm for CVGC 240x120 mm
80009116	CVGC320X160QF2SX	Foam mini type, holes $\varnothing$ 12 mm, thk 20 mm for CVGC 320x160 mm
80009120	CVGC350X250QF2SX	Foam mini type, holes $\varnothing$ 12 mm, thk 20 mm for CVGC 350x250 mm



##### Foam bases for CVGC "maxi" type foam (CVGC...DF2L \_)

Part number	For model	Description
80005297	CVGC240X120DF2LX	Foam maxi type, oblong holes 27x12 mm, thk 20 mm for CVGC 240x120 mm
80005298	CVGC320X160DF2LX	Foam maxi type, oblong holes 27x12 mm, thk 20 mm for CVGC 320x160 mm
80009119	CVGC350X250DF2LX	Foam maxi type, oblong holes 27x12 mm, thk 20 mm for CVGC 350x250 mm



### 15.2. Suction Cup Gripping Interfaces

#### 15.2.1. Spare suction cups

Part number	$\varnothing$ (mm)	Material	Description
VSA25NR	$\varnothing$ 25	Natural rubber	Natural rubber, 1.5 bellows suction cup $\varnothing$ 25 mm
VSA33NR	$\varnothing$ 33	Natural rubber	Natural rubber, 1.5 bellows suction cup $\varnothing$ 33 mm



### 15.3. Mounting Interface

Part number	Description
80009124	A50-ISO 9409-1-50-4-M6 mounting interface for CVGC, 4 screws, 4 nuts, 4 washers and 1 indexing pin
80009125*	A63-ISO 9409-1-63-4-M6 mounting interface kit for CVGC-A50, 4 screws and 1 indexing pin
80009144*	A80-ISO 9409-1-80-6-M8 mounting interface kit for CVGC-A50, 6 screws and 1 indexing pin

\* A63 or A80 section only (excluding A50)



### 15.4. CVGC Protective Cover

Part number	Description
80009145	CVGC Protective cover

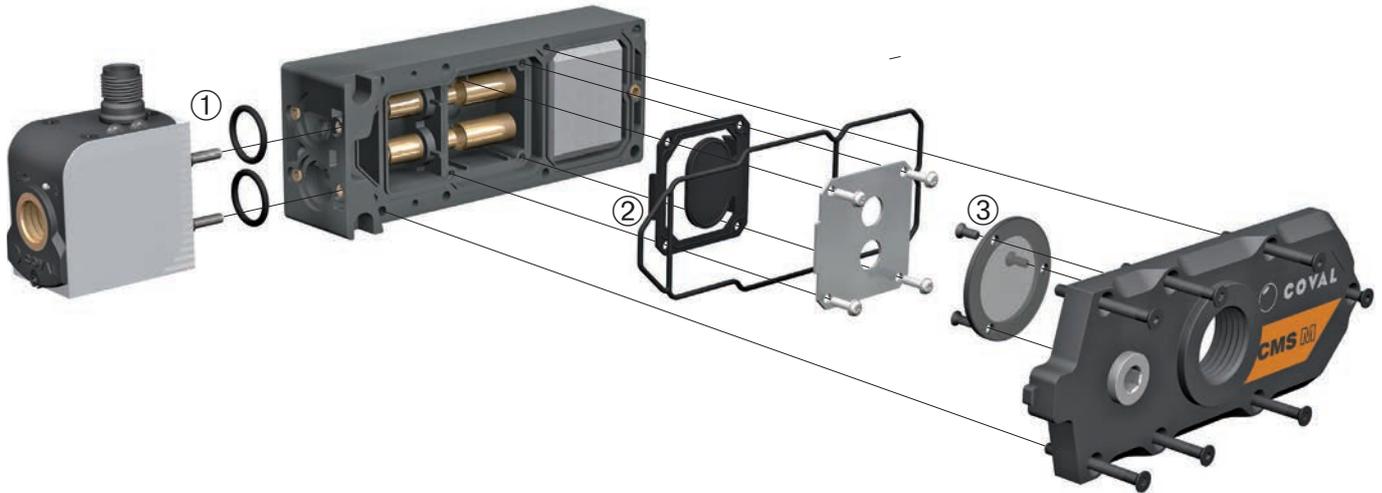


### 15.5. CMS M Multi-stage Mini Vacuum Pumps for CVGC \_ M2

Part number	Description
CMSM90X30SVOC14PG2X	CMSM NC/NC controlled multistage mini vacuum pump for CVGC...M2S_
CMSM90X30VVOC14PG2X	CMSM NO/NC controlled multistage mini vacuum pump for CVGC...M2V_



### 15.6. Spare Parts for CMS M Multi-stage Mini Vacuum Pumps



#### ① Valve block for CMS M controlled (CMSM\_\_SVO/NVO)

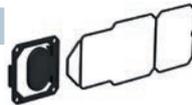
For model	Description	Part number
CMSM90X__SVO_	<ul style="list-style-type: none"> <li>Valve block</li> <li>O-ring 14X2 NBR x 2</li> <li>Zinc-plated CHC screw M3X40 ZN x4</li> </ul>	<b>80009451</b>
CMSM90X__VVO_	<ul style="list-style-type: none"> <li>Valve block</li> <li>O-ring 14X2 NBR x 2</li> <li>Zinc-plated CHC screw M3X40 ZN x4</li> </ul>	<b>80009452</b>



#### MAINTENANCE KITS

#### ② VACUUM CHECK VALVE KIT CMS M

Description	Part number
<ul style="list-style-type: none"> <li>molded gasket x 1</li> <li>vacuum check valve x 1</li> </ul>	<b>80009444</b>



#### ③ VACUUM FILTER KIT CMS M

Description	Part number
<ul style="list-style-type: none"> <li>Vacuum filter 350 µm x 1</li> <li>Filter washer x 1</li> <li>Screw for plastic TFX 2.5X6 ZN (45°) black nickel x 3.</li> </ul>	<b>80009445</b>



### 15.7. Vacuum switch

Description	Part number
Vacuum switch for CVGC__M2_VA_	<b>PSA100C</b>



## 16. 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.

## 17. 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.

CVGC vacuum grippers with solenoid pilots and vacuum switch 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.

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/>

## 18. EC DECLARATION

COVAL, the manufacturer, confirms that the product "CVGC Series vacuum grippers" described in this manual meets the following applicable EC directives:

- **2006/42/EC**, Machinery Directive, 17/05/2006.
- **2011/65/EC**, Restriction of the use of hazardous substances in electrical and electronic equipment (ROHS 2), 08/06/2011.
- **2014/30/EC**, Electromagnetic Compatibility (EMC)

The following harmonized standards have been applied:

- **NF EN 12100:2010**, Safety of machinery - General principles for design - Risk assessment and risk reduction, 12/2010.
- **NF EN 60204-1:2018**, Safety of machinery - Electrical equipment of machines - Part 1: General requirements.

## 19. 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 EN 61000-4-8 (2010) Magnetic fields
	CEI 61000-6-4 (2019) Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments	NF EN 55032 (2020) Conducted Emissions.
FCC 47 CFR part 15 B Emission standard for industrial environments	NF EN 55011 (2021) Radiated Emissions	
	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 62262 (2004) NF EN 60068-2-75 (2015)	IK 06
Temperature variations	IEC 60068-2-14 (2023)	0°C +50°C
Humidity	IEC 60068-2-30 (2006)	10% - 95%
Vibrations	NF EN 60068-2-6 (2008)	5 g
Shocks	NF EN 60068-2-6 (2008)	15 g



**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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