CVGC

Carbon Vacuum Grippers
CVGC_M2_ Version with Vacuum Generator

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.

For any additional information, please contact COVAL:

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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

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

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

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

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

SUMMARY

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.**

For any additional information, please contact COVAL:

International:
- E-mail: coval@coval.com
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2. SAFETY INSTRUCTIONS

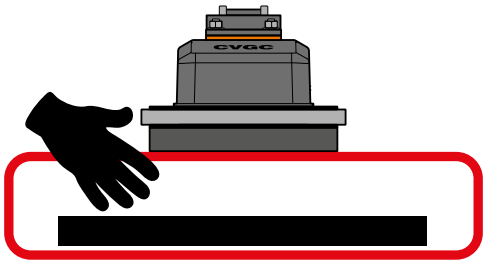
Only qualified personnel should be authorized to use the components. These individuals must be trained in the following areas:
- Installing pneumatic and electric equipment.
- Applicable safety rules and requirements for using components and installing them in devices, machines, and production lines.
- 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.

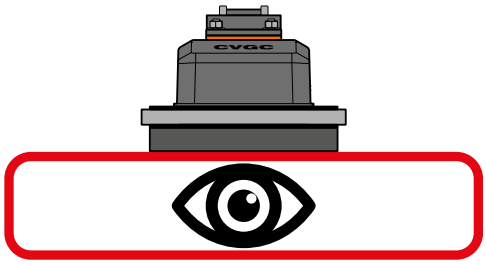
The improper use of components, use of operating materials and supplies other than those defined, improper voltages, and/or other environmental conditions may lead to failure, damage, and/or injury.
This list must be considered as an overview and does not claim to be exhaustive. It can be further expanded 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	
240 x 120 mm	**240x120**
320 x 160 mm	**320x160**
350 x 250 mm	**350x250**

GENERATOR CONTROL	
NC vacuum control and **NC** blow-off	**S**
NO vacuum control and **NC** blow-off	**V**

ISO 9409-1 ROBOT MOUNTING INTERFACE	
ISO 9409-1-50-4-M6	**A50**
ISO 9409-1-63-4-M6	**A63**
ISO 9409-1-80-6-M8	**A80**

SUCTION CUP GRIPPING INTERFACES

CUP PATTERN LAYOUT			INTERFACES
Straight	**D**	**VSA25JI**	**"medium" type interface** 1.5 bellows suction cups Ø 25 mm in natural rubber with flow control nozzles.
Straight	**D**	**VSA33JK**	**"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	**Q**	**F2S**	**Foam "mini" type interface** Holes Ø12 mm, EPDM (thickness 20 mm).
Straight	**D**	**F2L**	**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

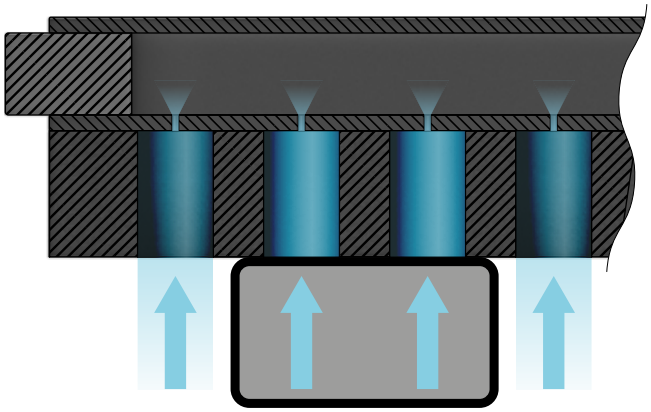
	Vacuum Level (%)	Gripping Force* (N)	(lbf)
CVGC240X120_	45	110	24.73
	75	180	40.47
CVGC320X160_	45	200	44.96
	75	330	74.19
CVGC350X250_	45	340	76.44
	75	565	127.02

** 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

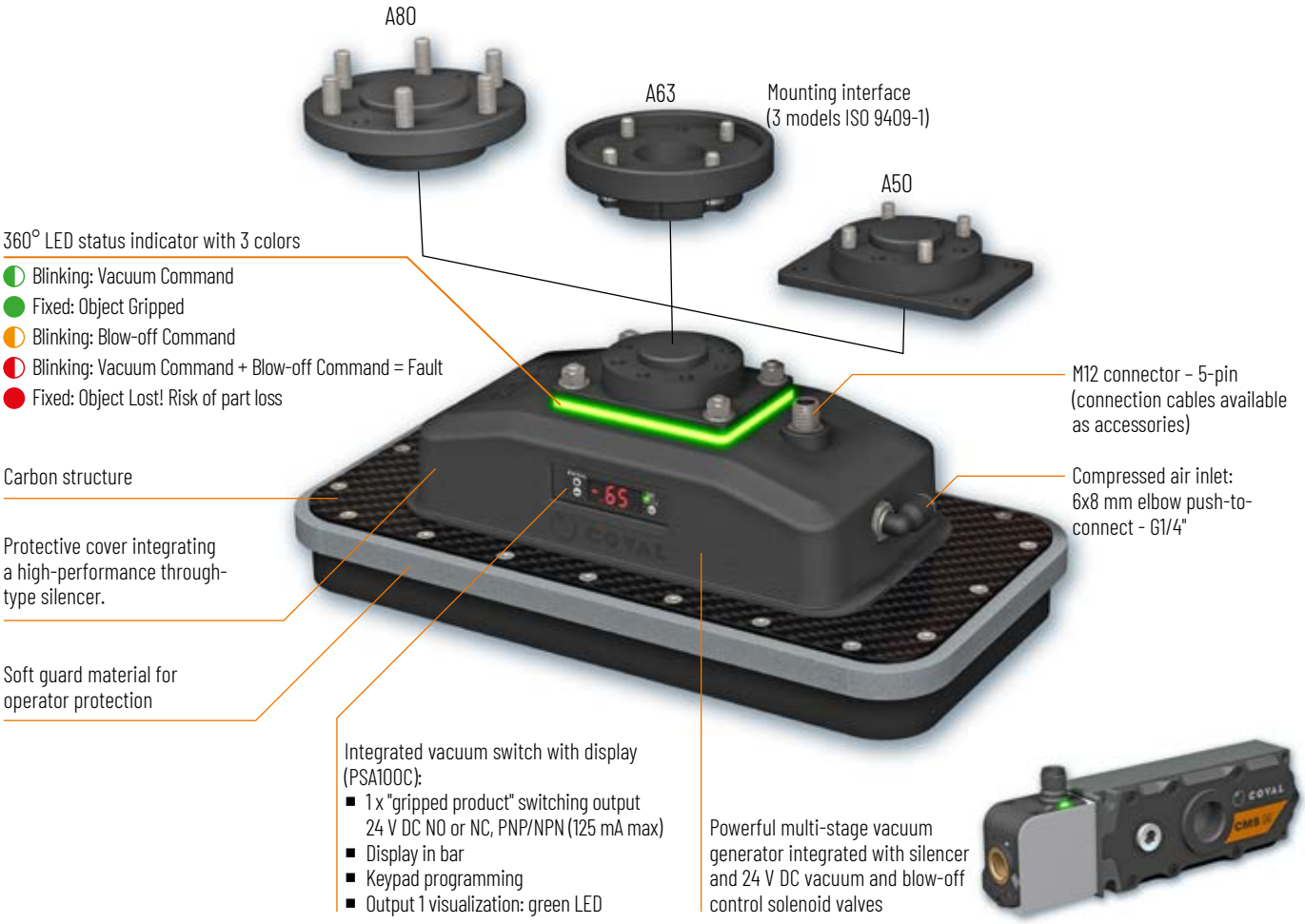
The **CVGC** carbon vacuum grippers use **flow control nozzles** to limit the leakage rate from uncovered areas. This technology yields several advantages:

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

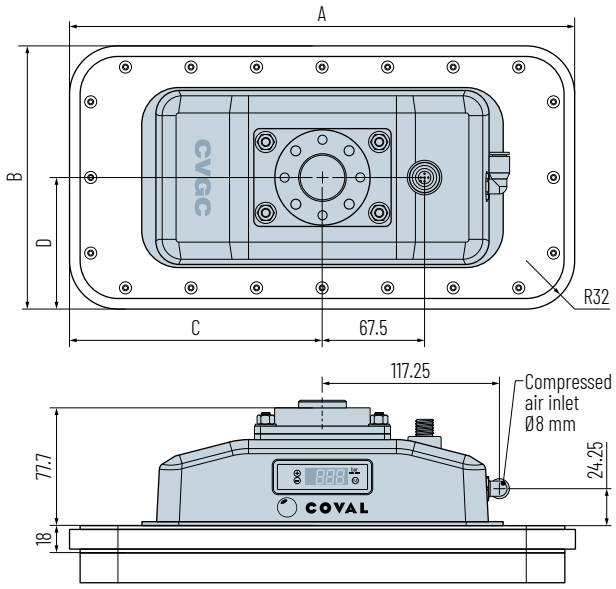


7. OVERVIEW AND DIMENSIONS

7.1. Overview of Vacuum Grippers with Integrated Vacuum Generator: CVGC_M2_



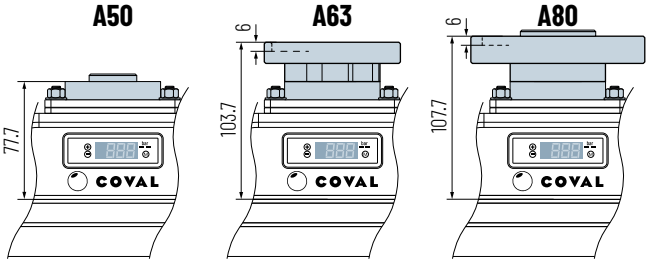
7.2. Dimensions



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

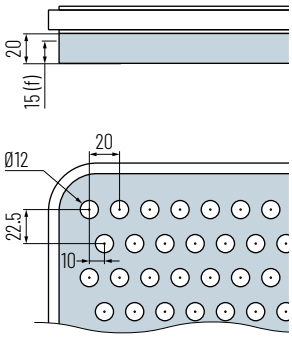
Note: all dimensions are in mm.

ISO 9409-1 Robot Mounting Interface

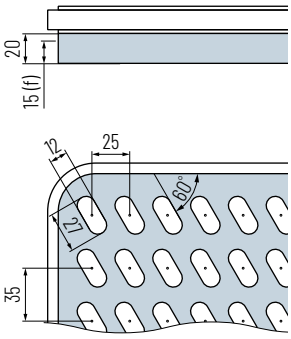


Gripping Interfaces

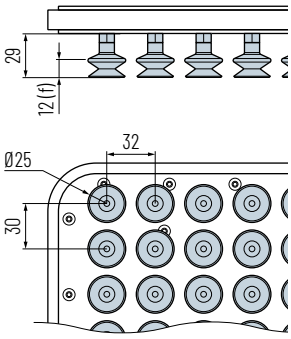
CVGC_X_**QF2S**____



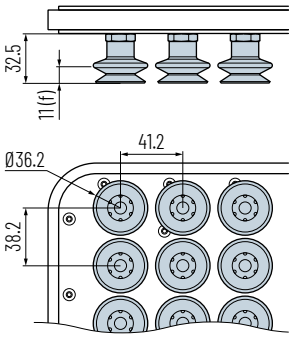
CVGC_X_**DF2L**____



CVGC_X_**DVSA25JI**____



CVGC_X_**DVSA33JK**____



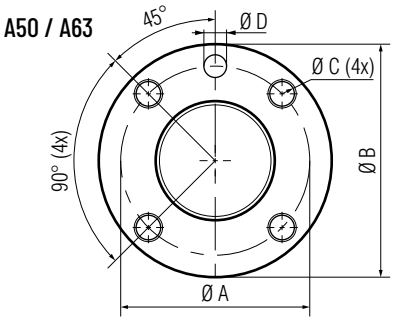
Number of holes/suction cups per interface type.

	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

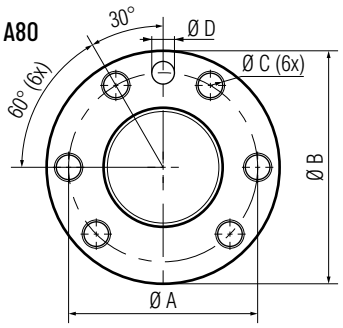
7.3. ISO 9409-1 Robot Mounting Interface

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 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

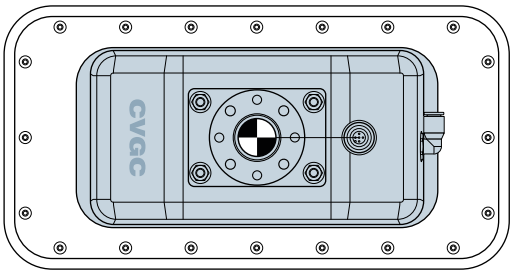
A50 / A63

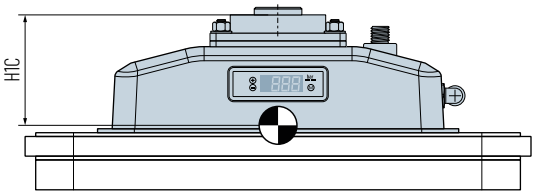


A80



7.4. Centers of Gravity





H1C Value

CVGC**240**X**120**___

Mounting Interface	Gripping Interfaces F2L	F2S	VSA25	VSA33
CVGC_____GO__**A50**	58.35	58.57	61.37	64.5
CVGC_____GO__**A63**	72.48	72.71	75.55	78.76
CVGC_____GO__**A80**	74.05	74.29	77.15	80.38

CVGC**320**X**160**___

Mounting Interface	Gripping Interfaces F2L	F2S	VSA25	VSA33
CVGC_____GO__**A50**	63.05	63.28	68.2	71.55
CVGC_____GO__**A63**	77.69	77.92	83	86.48
CVGC_____GO__**A80**	79.45	79.69	84.83	88.36

CVGC**350**X**250**___

Mounting Interface	Gripping Interfaces F2L	F2S	VSA25	VSA33
CVGC_____GO__**A50**	67.99	68.17	74.19	79.21
CVGC_____GO__**A63**	83.31	83.5	89.77	95.06
CVGC_____GO__**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 Nl/min (19.42 SCFM)
- Air Consumption: 280 Nl/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

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 (Nl/min) / *(SCFM)*	Flow rate (Nl/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.
CMSM90X30	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.

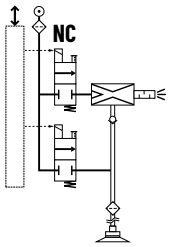
Permissible tightening torque:
- G1/4" pressure connection: 2 N m

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.

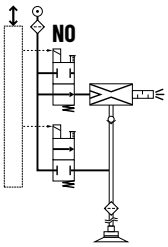
- NC blow-off and vacuum control: solenoid valves.



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.

1	+24 V DC permanent
2	24 V DC suction command [1]
3	0 V - GND
4	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
5	24 V DC blow-off command

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

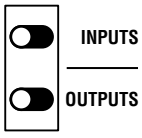
9.4. Inputs/Outputs Switching Mode

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.

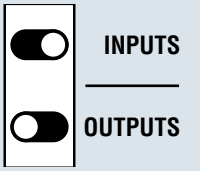
By default, inputs and outputs are configured as PNP.

Inputs	PNP
Outputs	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 CCM12F5PM8F8PL015C1 connection cable:

- Inputs: NPN
- Outputs: PNP



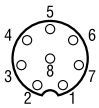
9.5. Accessories: Connection Cables

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 (!)
FANUC: CRX-5iA, CRX-10iA, CRX-10iA/L, CRX-20iA/L, CRX-25iA
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.



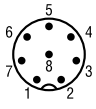
1	NC
2	NC
3	NC
4	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
5	+24 V DC permanent
6	24 V DC PNP/NPN blow-off command
7	24 V DC PNP/NPN suction command
8	0 V - GND

NC: not connected.

CCM12F5PM8M8PL015C2

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

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



1	+24 V DC permanent
2	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
3	NC
4	NC
5	24 V DC PNP/NPN suction command
6	24 V DC PNP/NPN blow-off command
7	NC
8	0 V - GND

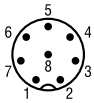
NC: not connected.

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*



1	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
2	24 V DC PNP/NPN suction command
3	24 V DC PNP/NPN blow-off command
4	NC
5	+24 V DC permanent
6	NC
7	NC
8	0 V - GND

NC: not connected.

CCM125PL2 / CCM125PL5

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

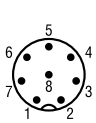
FANUC: CR-4, CR-7, CR-7 A/L, CR-14 A/L
Yaskawa: HC10
+ any application requiring cables to be routed outside the robot arm.
+ any robot whose housing connection does not match with connection cables.

1	Brown: +24 V DC permanent
2	White: 24 V DC PNP/NPN suction command
3	Blue: 0 V - GND
4	Black: "Gripped product" switching output 24 V DC PNP/NPN NO or NC
5	Grey: 24 V DC PNP/NPN blow-off command

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



1	+24 V DC permanent
2	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
3	NC
4	24 V DC PNP/NPN suction command
5	24 V DC PNP/NPN blow-off command
6	NC
7	NC
8	0 V - GND

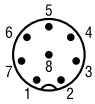
NC: not connected.

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.



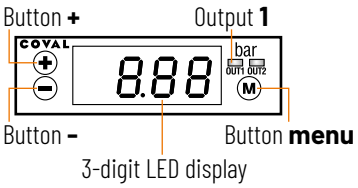
1	NC
2	NC
3	24 V DC PNP/NPN suction command
4	24 V DC PNP/NPN blow-off command
5	+24 V DC permanent
6	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
7	NC
8	0 V - GND

NC: not connected.

10. INTEGRATED VACUUM SWITCH WITH DISPLAY (PSA100C)

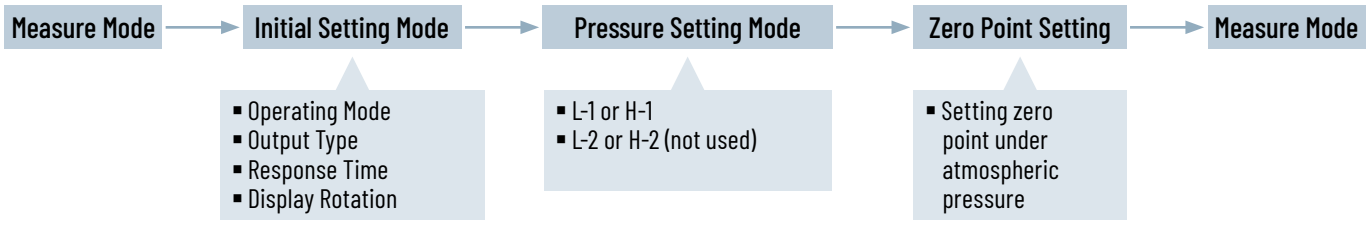
Integrated vacuum switch
with display (PSA100C):

- 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

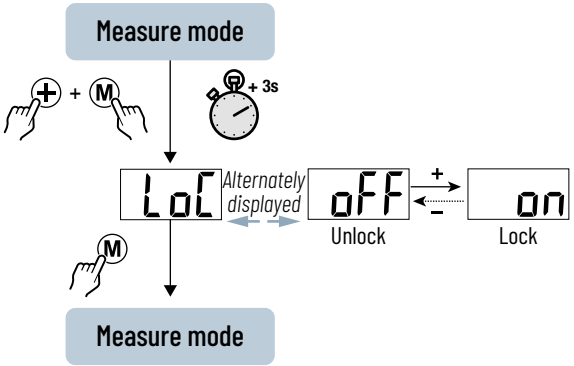


- Compatible Fluids: All non-corrosive, filtered, non-lubricated gases
- Power Supply: 24 V DC ± 10%
- Current Consumption: <60 mA
- 1 x Switching Output "gripped product": 24 V DC NO or NC, PNP/NPN (125 mA max)
- Output 1 Visualization: Green LED
- Keypad Programming
- Display in bar
- EMC Industrial 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

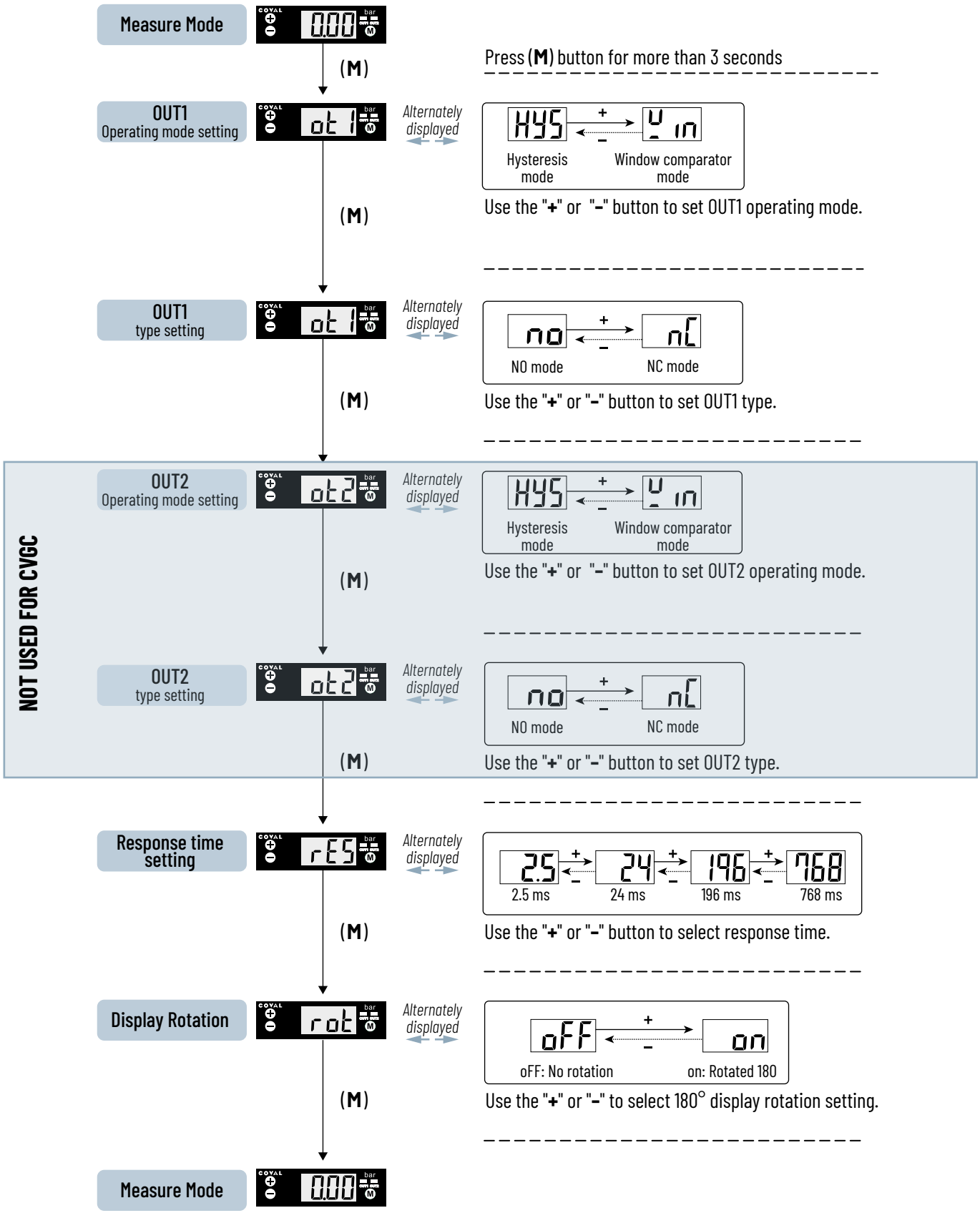


10.2. Key Lock/Unlock Mode



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

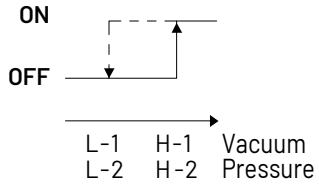
10.3. Initial Setting Mode



10.4. Output Type

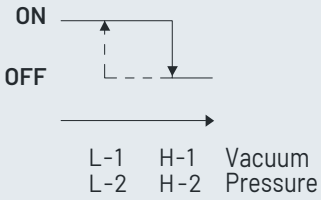
Hysteresis mode

Normal open mode



OPERATING MODE FOR CVGC

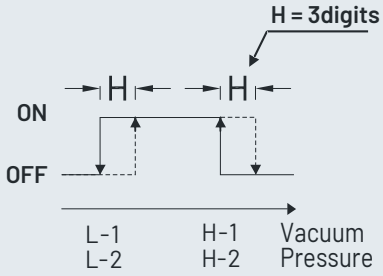
Normal close mode



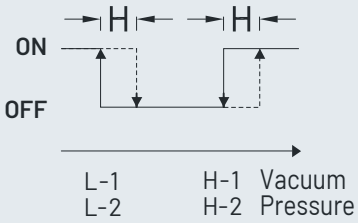
Note: When hysteresis mode setting is within 2 digits, if the input and pre-set pressure is quite near, pressure sensor output might cause chattering.

Window comparator mode

Normal open mode



Normal close mode



EXISTING PSA100C MODES NOT USED FOR CVGC

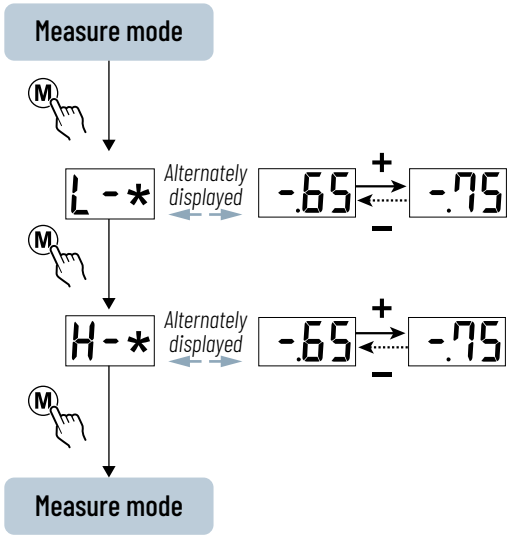
Note: Hysteresis is fixed in 3 digits. Pressure value level setting : At least 6

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:

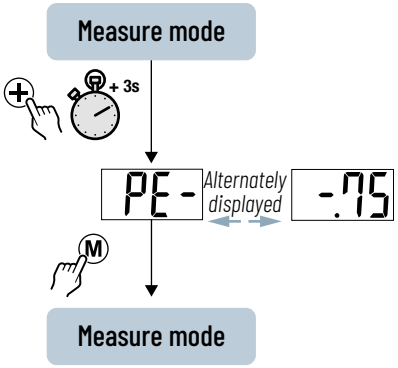


Use the **+** or **−** buttons to set the value.

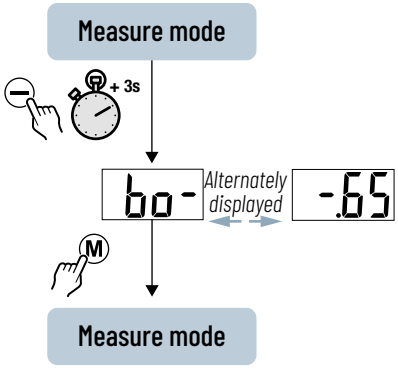
* When out 1,"*****" displays 1
When out 2,"*****"displays 2

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	Er 1	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	Er2		
Residual pressure error		Er 3	During zero reset, ambient pressure is over ±3% F.S.	Change input pressure to ambient pressure and perform zero reset again.
Applied pressure error		HHH	The applied pressure is excess the upper limit of pressure setting.	Adjust the pressure within applied pressure range.
		LLL	The applied pressure is excess the lower limit of pressure setting.	
System error		Er 4	Internal data error	Turn power off, and then restart. If error condition remains, please return to factory for inspection.
		Er 6	Internal system error	
		Er 7	Internal data error	
		Er 8	Internal system error	

11. INDICATOR: 360° LED STATUS DISPLAY

360° LED status indicator with 3 colors

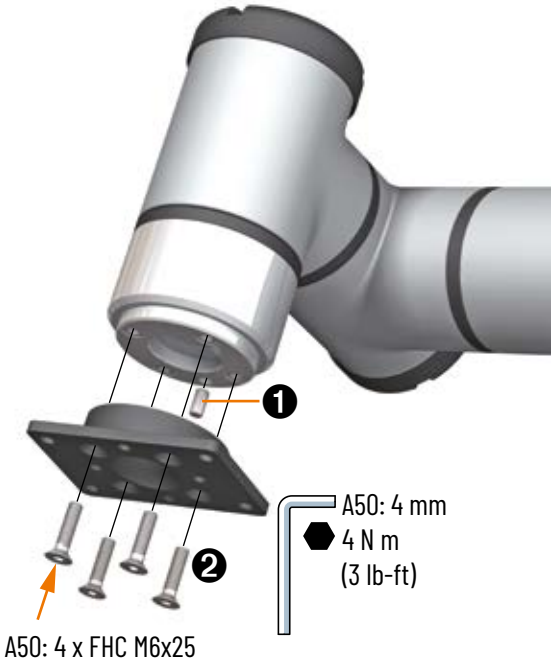
- Blinking: Vacuum Command
- Fixed: Object Gripped
- Blinking: Blow-off Command
- Blinking: Vacuum Command + Blow-off Command = Fault
- Fixed: Object Lost! Risk of part loss

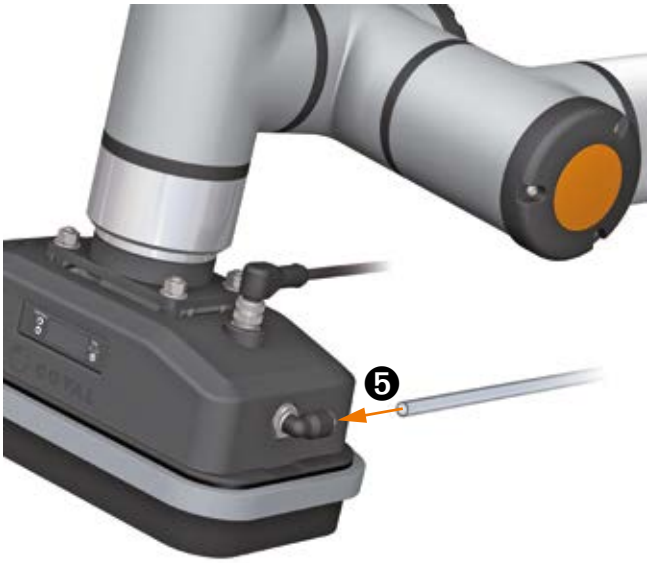
12. ASSEMBLY INSTRUCTIONS

12.1. Assembly Instructions for CVGC A50

NOTE:

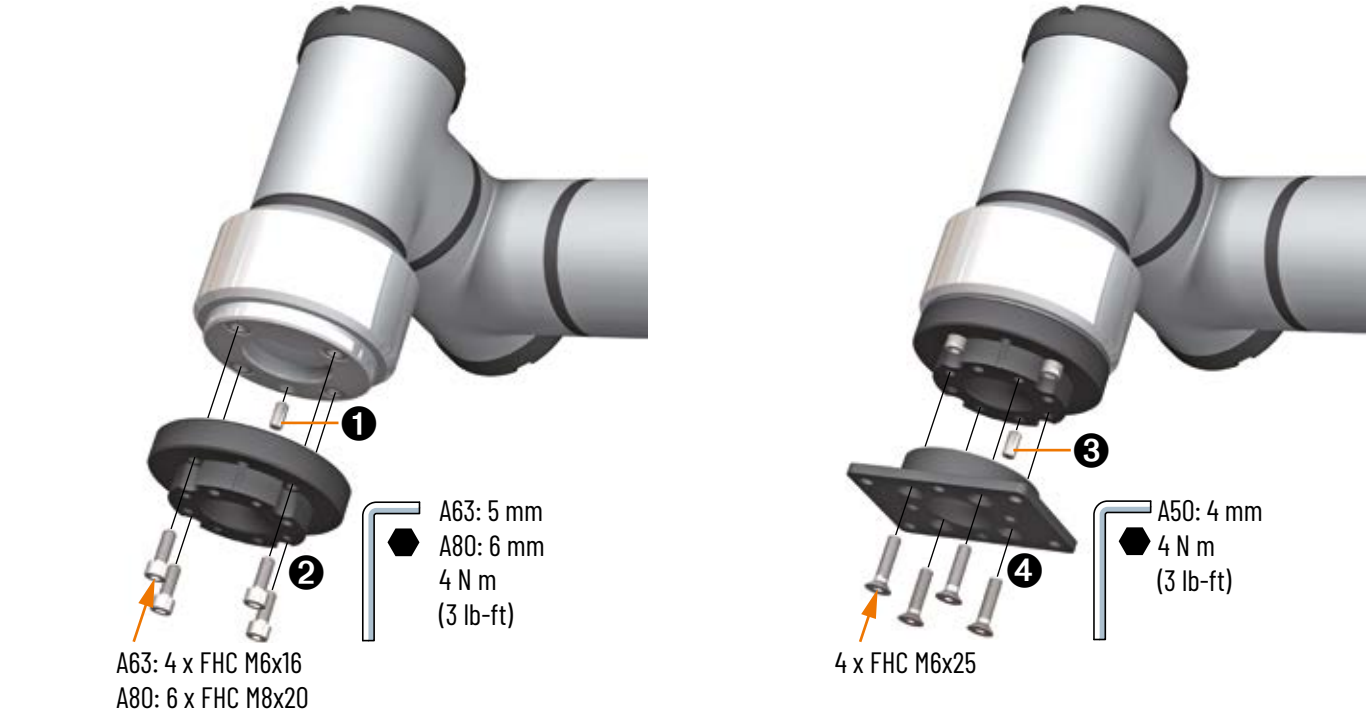
- Ø 6 mm indexing pin (❶) supplied for A50 version.





12.2. Assembly instructions for CVGC A63 and A80

NOTE : ▪ Ø 6 mm indexing pin (❶) supplied for A63 version.
▪ Ø 8 mm indexing pin (❶) 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

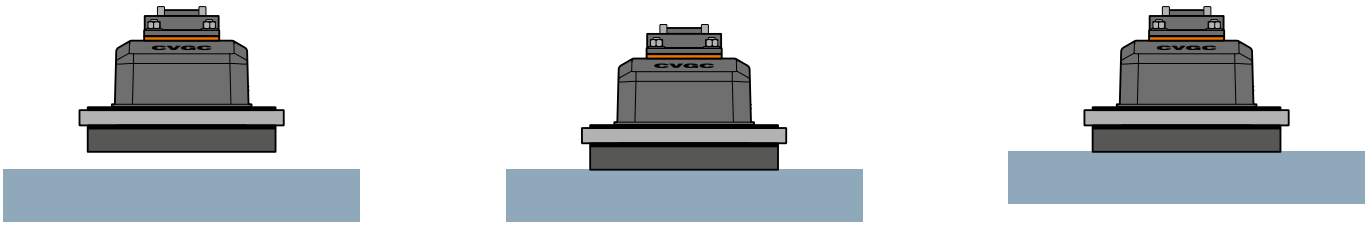
13. OPERATING THE VACUUM GRIPPER

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

Recommendation:

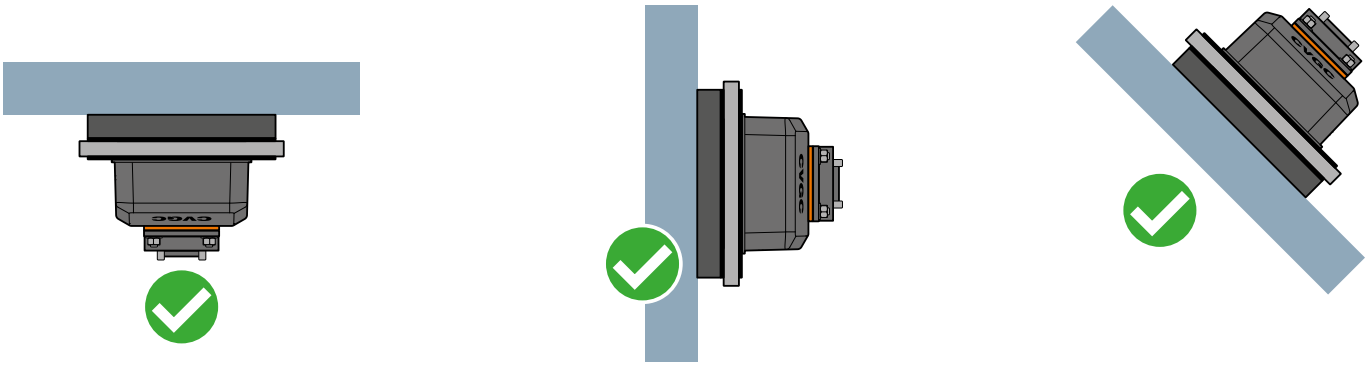
- Operating temperature: from -40 to 120 °C (from -40 to 248 °F)
- Avoid protruding shapes
- Pay attention to the angle of approach and stroke of robot
- Cover 50% of the surface of the foam gripping interface
- Gripper position:
  - Always place the gripper in the center of the load to be handled
  - 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.

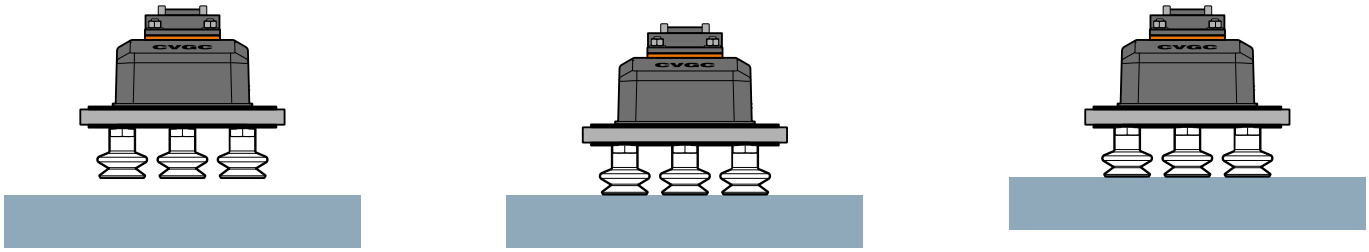
Note: Handling with the vacuum gripper in an upright position may subject the gripping foam to shearing stress. Depending on the load's weight and/or center of gravity, the foam may deteriorate quickly. We recommend always performing preliminary tests on actual samples of the objects to be handled.

Contact the COVAL team to perform validation tests if necessary.

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

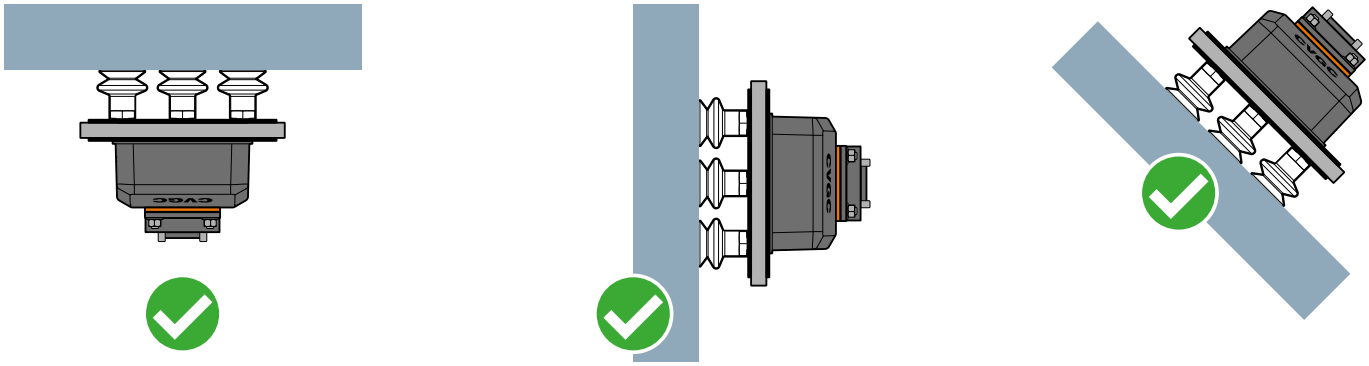
- Operating temperature: Dependent on the material of the suction cups used.
- Food compatibility: Dependent on the material of the suction cups used.
- Avoid protruding shapes.
- Pay attention to the approach angle and stroke of the robot.

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 tighteness 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

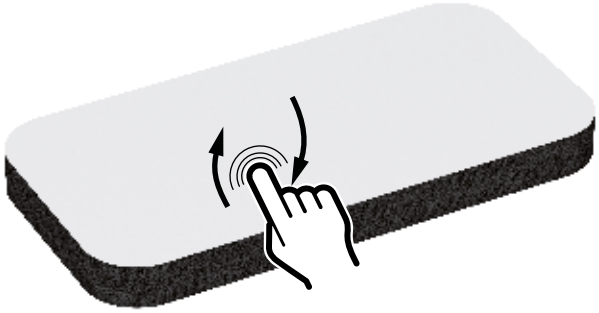
Failure	Possible cause	Remedy
Vacuum level too low or vacuum not reached fast enough	Gasket damaged	Check and replace as required
	Leakage in lines	Check tubes
	The foam or suction cups may be damaged	Replace any damaged suction cup or foam
Object not gripped	Low vacuum level	See above
	Insufficient 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
	Objects are not suitable for lifting with this system	Replace the gripping solution
Suction cups wear out very quickly	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

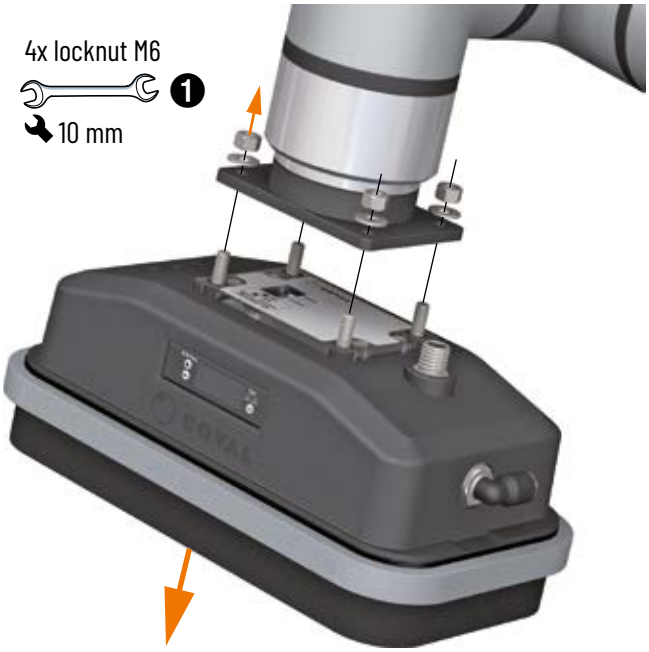
The suction cups are mounted on barbed fittings. Simply pull the suction cup to remove it.

Tip for mounting the suction cups:
Soak the suction cup neck in lukewarm water to facilitate the mounting on the fitting.

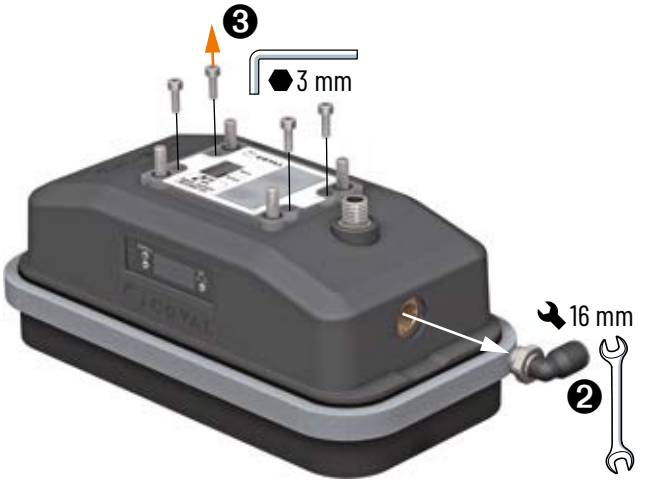
14.4. Replacement of the PSA100C Vacuum Switch or Disassembly of the Multi-stage Mini Vacuum Pump CMSM90X30_

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

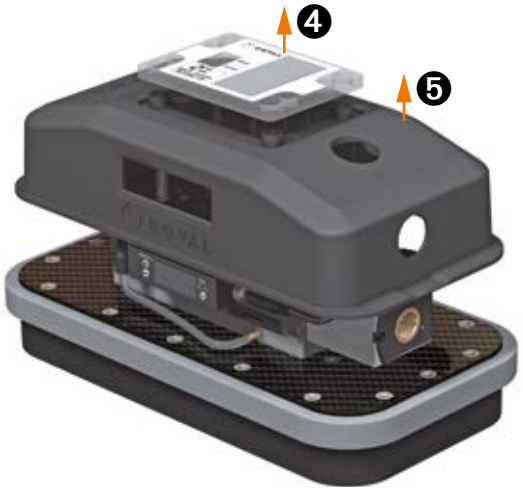
- ❶ Unscrew the 4 M6 locknuts using a 10 mm hex wrench to detach the CVGC gripper from the robot.



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

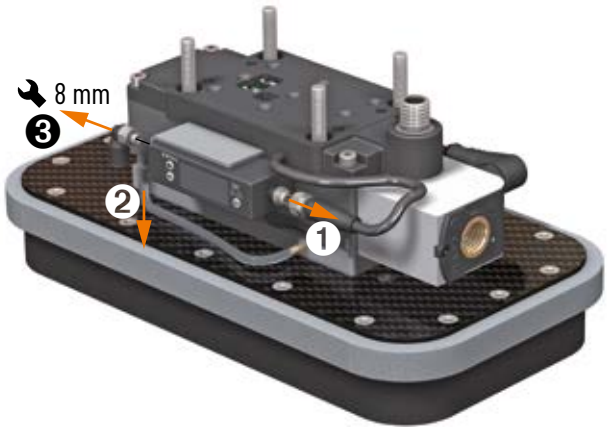


- ❹ Remove the LED diffuser.
- ❺ Remove the protective cover.

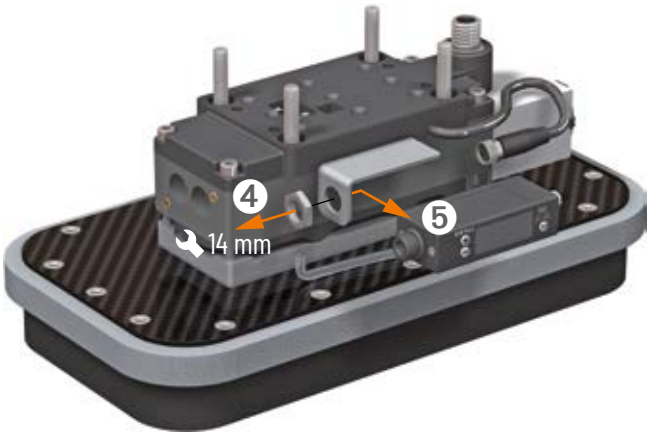


14.4.1. Replacement of the electronic vacuum switch, ref. PSA100C

- ❶ Unscrew and disconnect the M8 connector from the vacuum switch.
- ❷ Disconnect the vacuum hose.
- ❸ Unscrew and remove the elbow push-in fitting using an 8 mm hex wrench.



- ❹ Unscrew the nut using a 14 mm hex wrench.
- ❺ Remove the PSA100C vacuum switch.

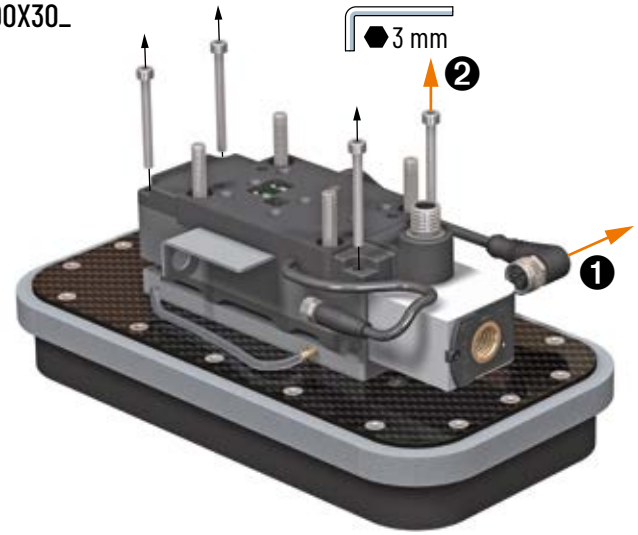


- ❻ Place the new PSA100C vacuum switch.
- ❼ Screw in the nut using a 14 mm hex wrench (torque of 1 N m, 0.74 lb-ft).
- ❽ Screw in the push-in fitting and connect the vacuum hose.
- ❾ Connect and screw in the M8 connector.

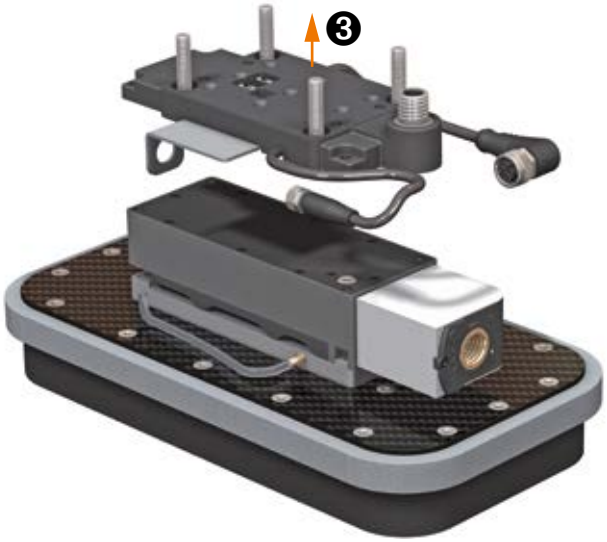
14.4.2. Disassembly of the multi-stage mini vacuum pump CMSM90X30_

- ❶ Unscrew the M12 connector located on the control valve block.

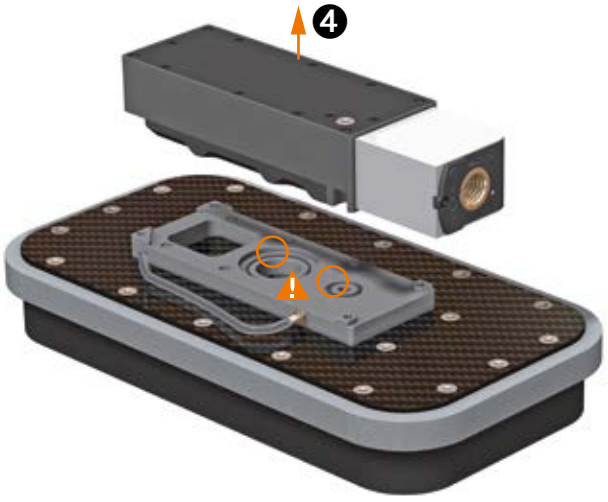
- ❷ Unscrew the 4 M4x40 socket head cap screws using a 3 mm hex bit.



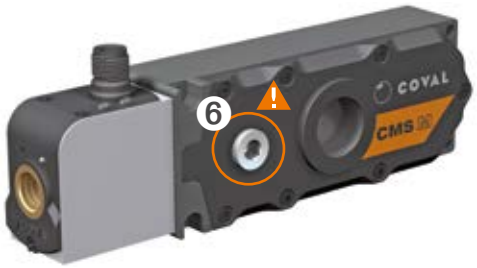
- ❸ Remove the "electronic board support" plate.
  ⚠ Do not touch the electronic board.



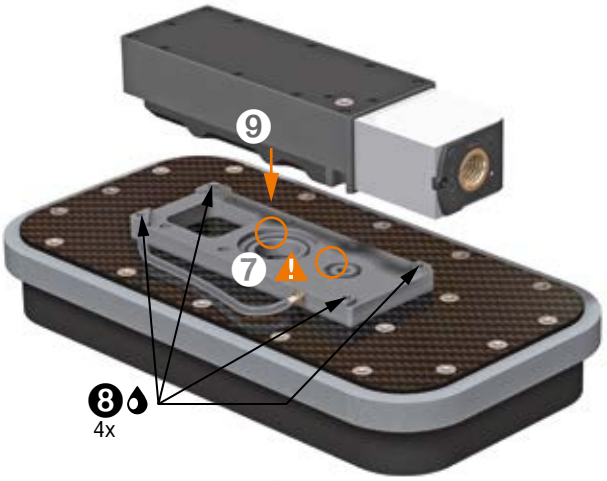
- ❹ Remove the multi-stage mini vacuum pump CMSM90X30.
  ⚠ The seals may be stuck to the flange.
  Ensure they are positioned in their housing.



- ❺ 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

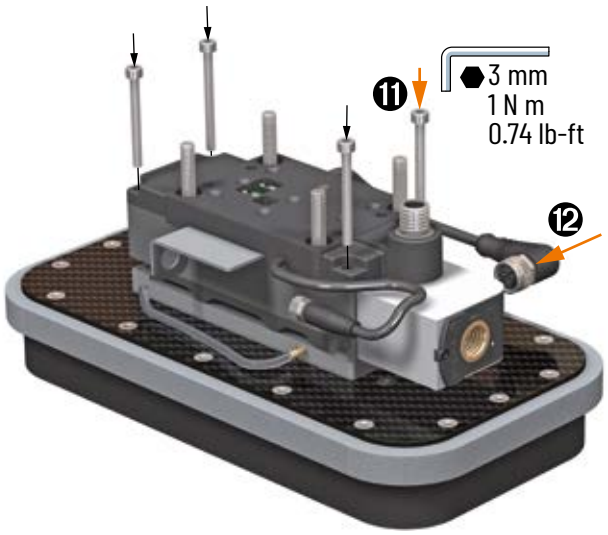


- ❻ Assembly of the multi-stage mini vacuum pump CMS90X30.
  ⚠ Remove the G1/8" plug located on the front flange of the CMS M pump.



- ❼ Ensure that the 2 seals are properly positioned in their housing.
- ❽ Add a drop of threadlocker to the 4 M4 threaded holes (Loctite 242).
- ❾ Position the multi-stage mini vacuum pump CMSM90X30.

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



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

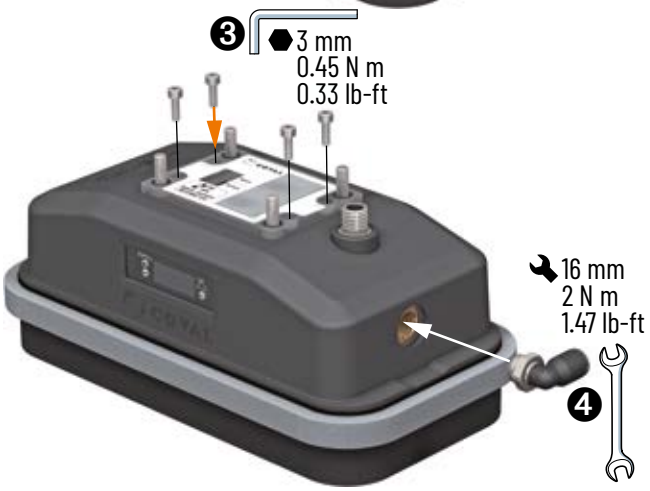
14.4.3. Assembly of the protective cover

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

- ❷ Position the LED diffuser.

- ❸ Screw in the 4 M4x12 socket head cap screws using a 3 mm hex bit (torque 0.45 N m, 0.33 lb-ft).

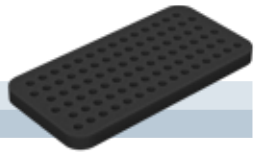
- ❹ Screw in the elbow quick connector for the compressed air supply using a 16 mm wrench (torque 2 N m, 1.47 lb-ft).



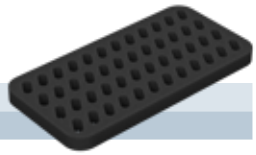
15. SPARE PARTS

15.1. Foam Gripping Interface

15.1.1. Spare foam bases



Foam bases for CVGC "**mini**" type foam (CVGC__**Q**F2**S** _)		
Part number	*For model*	*Description*
80009114	**CVGC240X120QF2SX**	Foam mini type, holes ø12 mm, thk 20 mm for CVGC 240x120 mm
80009116	**CVGC320X160QF2SX**	Foam mini type, holes ø12 mm, thk 20 mm for CVGC 320x160 mm
80009120	**CVGC350X250QF2SX**	Foam mini type, holes ø12 mm, thk 20 mm for CVGC 350x250 mm



Foam bases for CVGC "**maxi**" type foam (CVGC__**D**F2**L** _)		
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	*Ø (mm)*	*Material*	*Description*
VSA25NR	Ø 25	Natural rubber	Natural rubber, 1.5 bellows suction cup Ø25 mm
VSA33NR	Ø 33	Natural rubber	Natural rubber, 1.5 bellows suction cup Ø33 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)*

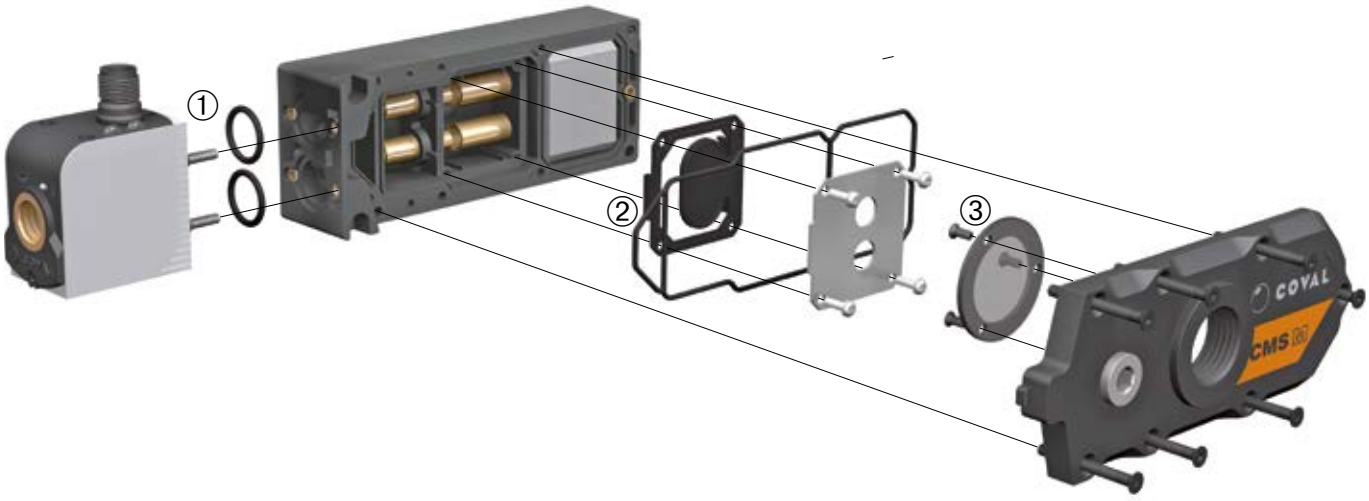
15.4. CVGC Protective Cover

Part number	*Description*
80009145	CVGC Protective cover

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

Part number	*Description*
CMSM90X30SV0C14PG2X	CMSM NC/NC controlled multistage mini vacuum pump for CVGC___**M2S**_
CMSM90X30VV0C14PG2X	CMSM NO/NC controlled multistage mini vacuum pump for CVGC___**M2V**_

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



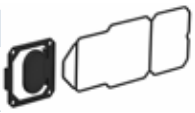
① Valve block for CMS M controlled (CMSM__SV0/NV0)

For model	*Description*	*Part number*
CMSM90X__**SV0**_	• Valve block • O-ring 14X2 NBR x 2 • Zinc-plated CHC screw M3X40 ZN x4	**80009451**
CMSM90X__**VV0**_	• Valve block • O-ring 14X2 NBR x 2 • Zinc-plated CHC screw M3X40 ZN x4	**80009452**

MAINTENANCE KITS

② VACUUM CHECK VALVE KIT CMS M

Description	*Part number*
• molded gasket x 1 • vacuum check valve x 1	**80009444**



③ VACUUM FILTER KIT CMS M

Description	*Part number*
• Vacuum filter 350 µm x 1 • Filter washer x 1 • Screw for plastic TFX 2.5X6 ZN (45°) black nickel x 3.	**80009445**

15.7. Vacuum switch

Description	*Part number*
Vacuum switch for CVGC__**M2_VA**_	**PSA100C**

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.

COVAL
vacuum managers

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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