CVGC

CARBON Vacuum Grippers

EN

OPERATING INSTRUCTIONS

CVGC (v05-2021)

This manual is intended for users of carbon vacuum grippers, **CVGC** series.
You will find the necessary information for the integration of the grippers on the cobots, as well as for their use and maintenance.

For further information, please contact COVAL:
Mail: coval@coval.com
Phone: +33 (0)4 75 59 91 91

UNIVERSAL ROBOTS

In the case of integration on a collaborative robot, Universal Robots (e-Series), the download of the URCap plugin is on our web site:
https://doc.coval.com/CVGC
Here you will find instructions for installing and programming the URCap plugin.

SUMMARY

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

Please find all the documents in different 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

With their innovative design, Coval's **CVGC** carbon vacuum grippers correspond perfectly to the weight constraints, flexibility and safety of collaborative robot applications.

The **CVGC** series is composed of:
- a carbon structure, 2.5 times lighter than aluminum and offering mechanical strength 6 times greater
- flexible material on the gripper edges, to protect both gripper and operator
- foam gripping interface, for versatile product handling
- a plastic "function" block, including vacuum generator, pilot control cartridge, silencer and vacuum switch…

… all this, in a very compact and ultralight design, guarantees a fast setup and easy integration on the robot.

The three standard formats allow you to choose your **CVGC** and ensure the handling of your loads: corrugate, plastics, metal/glass plates, etc.

REMINDER OF POSSIBLE CONFIGURATIONS:

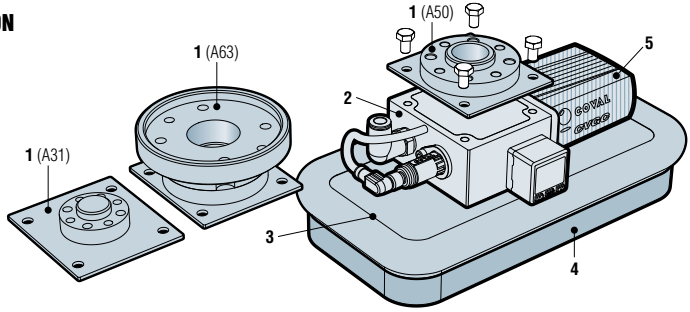
CVGC | **240X120** | | **A50** | | **C1**

DIMENSIONS	
150 x 150 mm	**150X150**
240 x 120 mm	**240X120**
320 x 160 mm	**320X160**

ISO 9409-1 ROBOT MOUNTING INTERFACE	
A31	ISO 9409-1-31.5-4-M5
A50	ISO 9409-1-50-4-M6
A63	ISO 9409-1-63-4-M6

ELECTRICAL CONNECTIONS	
C1	M8 - Female 8-pins
C2	M8 - Male 5-pins
C3	M8 - Male 8-pins
C4	Wire outlet 2 m.
C5	Wire outlet 5 m.
C6	Molex connector 8-pins

I. COMPOSITION

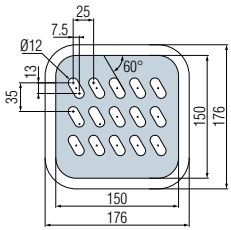


Ref.	Designation	CVGC150x150…	CVGC240x120	CVGC320x160
1	Mounting interface type A31 **(ISO 9409-1-31.5-4-M5)**		80004902	
	Mounting interface type A50 **(ISO 9409-1-50-4-M6)**		80004903	
	Mounting interface type A63 **(ISO 9409-1-63-4-M6)**		80004905	
2	Function block (vacuum generator, control, electronic vacuum switch, silencer)			
	Electrical connection version C1	VBC1XC1	VBC2XC1	VBC3XC1
	Electrical connection version C2	VBC1XC2	VBC2XC2	VBC3XC2
	Electrical connection version C3	VBC1XC3	VBC2XC3	VBC3XC3
	Electrical connection version C4	VBC1XC4	VBC2XC4	VBC3XC4
	Electrical connection version C5	VBC1XC5	VBC2XC5	VBC3XC5
	Electrical connection version C6	VBC1XC6	VBC2XC6	VBC3XC6
3	Carbon structure + foam protection	80004901	80004914	80004918
4	Foam gripping interface	80005296	80005297	80005298
5	Silencer	/	80005226	80005226

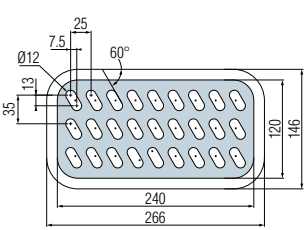
II. DIMENSIONS / CENTERs OF GRAVITY

II.1 Dimensions

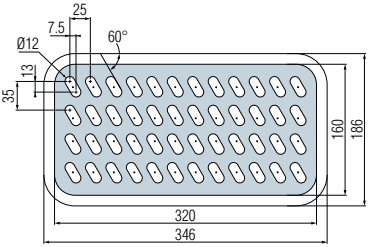
CVGC150X150A____



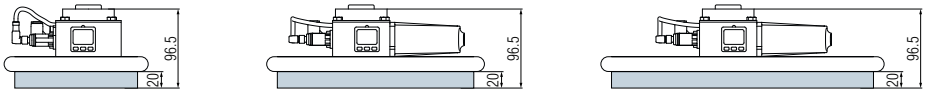
CVGC240X120A____



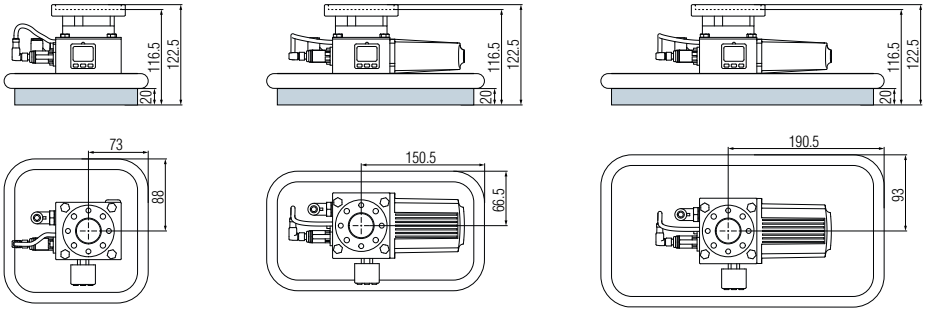
CVGC320X160A____



Mounting interfaces A31 or A50



Mounting interface A63

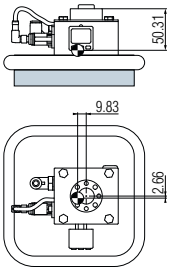


Note: All dimensions are in mm.

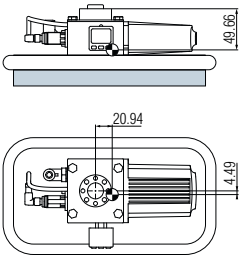
COVAL vacuum managers

II.2 Centers of gravity

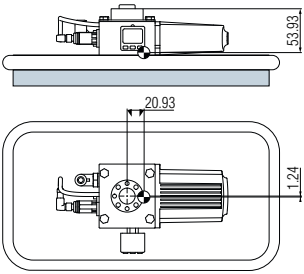
CVGC150X150A31__



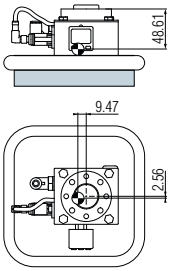
CVGC240X120A31__



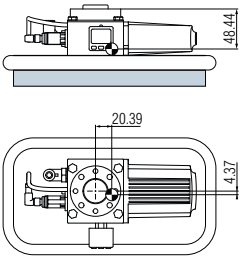
CVGC320X160A31__



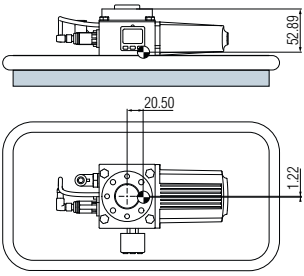
CVGC150X150A50__



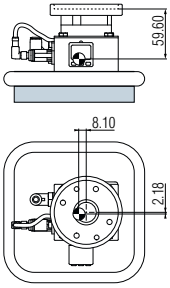
CVGC240X120A50__



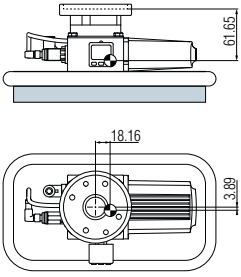
CVGC320X160A50__



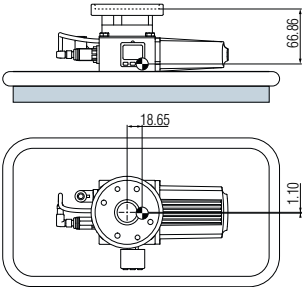
CVGC150X150A63__



CVGC240X120A63__



CVGC320X160A63__

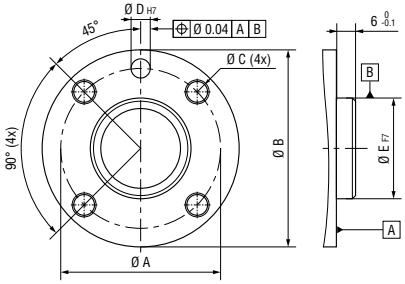


Note: All dimensions are in mm.

COVAL vacuum managers

III. MOUNTING INTERFACES (ISO 9409-1)

Version	Standard	Ø A (mm)	Ø B (mm)	Ø C (mm)	Ø D (mm)	Ø E (mm)	
A31	ISO 9409-1-31.5-4-M5	31.5	40	M5 (4 screws)	5	20	Fanuc CR-4, CR-7, CR-7 A/L, CR-14 A/L
A50	ISO 9409-1-50-4-M6	50	63	M6 (4 screws)	6	31.5	Universal Robots UR3, UR5, UR10, UR16 + e-Series Omron/Techman TM5, TM12, TM14 Doosan Robotics M0609, M0617, M1013, M1509, H2017, H2515 Fanuc CRX10-iA
A63	ISO 9409-1-63-4-M6	63	80	M6 (4 screws)	6	40	Yaskawa HC10, HC10DT



IV. ELECTRICAL CONNECTIONS

CVGC Carbon Vacuum Grippers must be used with power supply units that provide a Protective Extra Low Voltage (PELV) and with an isolation of the supply voltage according to EN60204.

IV.1 Electrical characteristics

- Control voltage: 24 V DC +/-10%
- Vacuum control: 24 V DC PNP/NPN
- Power consumption: 65 mA max. (no load)
- The switching type of the inputs / outputs is configurable to PNP or NPN
- Outputs (see detailed instructions for the PSD100CPNP electronic vacuum switch):
  - 1 x "Vacuum level" signal analogic 1 to 5 V DC
  - 1 x "Gripped product" switching output 24 V DC PNP/NPN NO or NC (125 mA max.)

IV.2 Electrical connections depending on the version

■ **C1**: M8 connector - female 8-pins elbow, cable length 150 mm

Universal Robots CB3 UR3, UR5, UR10 + e-Series UR3e, UR5e, UR10e, UR16e (URCap plugin available) / Fanuc CRX10-iA

1	"Vacuum level" signal analogic 1 to 5 V DC
2	–*
3	–*
4	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
5	+24V DC permanent
6	–*
7	Vacuum Control 24 V DC PNP/NPN
8	0 V - GND

** not used in this configuration*

■ **C2**: M8 connector - male 5-pins elbow, cable length 150 mm

Omron/Techman TM5, TM12, TM14

1	+24V DC permanent
2	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
3	Vacuum Control 24 V DC PNP/NPN
4	"Vacuum level" signal analogic 1 to 5 V DC
5	0 V - GND

■ **C3**: M8 connector - male 8-pins elbow, cable length 150 mm

Doosan Robotics M0609, M0617, M1013, M1509, H2017, H2515

1	"Gripped product" switching output 24 V DC PNP/NPN NO or NC
2	Vacuum Control 24 V DC PNP/NPN
3	–*
4	–*
5	+24V DC permanent
6	–*
7	–*
8	0 V - GND

** not used in this configuration*

■ **C4 / C5**: 5-wire output, cable length 2 m (C4) or 5 m (C5)

Fanuc CR-4, CR-7, CR-7, CR-7 A/L, CR-14 A/L + any application requiring cables to be routed outside the robot arm + any robot whose housing connection does not match C1/C2/C3/C6.

1	Brown: +24V DC permanent
2	Blue: 0 V - GND
3	Black: "Gripped product" switching output 24 V DC PNP/NPN NO or NC
4	White: Vacuum Control 24 V DC PNP/NPN
5	Grey: "Vacuum level" signal analogic 1 to 5 V DC

■ **C6**: Molex 8-pole connector, 50 mm long cable.

Yaskawa HC10, HC10DT (+ analog I/O card if required).

1	Brown: +24V DC permanent
2	Blue: 0 V - GND
3	Black: "Gripped product" switching output 24 V DC PNP/NPN NO or NC
4	White: Vacuum Control 24 V DC PNP/NPN
5	Grey: "Vacuum level" signal analogic 1 to 5 V DC
6	–*
7	–*
8	–*

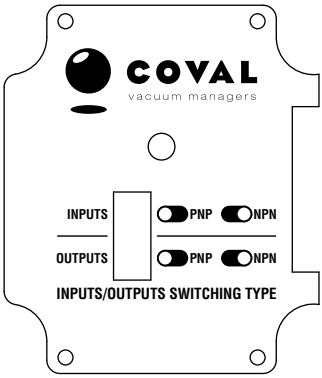
** not used in this configuration*

COVAL vacuum managers

V. INPUTS/OUTPUTS SWITCHING MODE

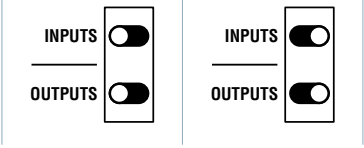
The CVGC's input/output signals can be configured in PNP (switching to positive potential charge) or NPN (switching to negative potential charge) to adapt to characteristics of the robot/ controller used.

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



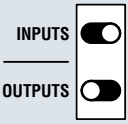
By default, the inputs/outputs are configured:
- PNP for versions C1,C3,C4 and C5
- NPN for versions C2 and C6

Version	C1/C3/C4/C5	C2/C6
Inputs	PNP	NPN
Outputs	PNP	NPN



Example of specific configuration

Inputs/Outputs setting for connecting **C1 Version** to the tool connector of the Universal Robots UR3/UR5/UR10/CB3 Series:
- Inputs: NPN
- Outputs: PNP



VI. SUPPLY AND PNEUMATIC CONNECTION OF VACUUM GRIPPERS

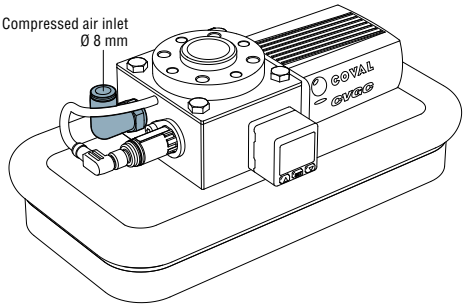
VI.1 Pneumatic supply characteristics

- Supply: non-lubricated air, 5 microns filtered, according to ISO 8573-1:2010 [4:5:4].
- Operating pressure: from 5 to 6 bar
- Optimal pressure:
  – CVGC150x150 / CVGC 320x160: 5.5 bar
  – CVGC240x120: 6 bar

	Air consumed	Air drawn in	Max. vacuum (%)	Sound level (dBA)
CVGC150X150	135 Nl/min (4.77 SCFM)	90 Nl/min (3.18 SCFM)	85	72
CVGC240X120	270 Nl/min (9.53 SCFM)	180 Nl/min (6.36 SCFM)	85	71
CVGC320X160	345 Nl/min (12.2 SCFM)	210 Nl/min (7.42 SCFM)	85	66

VI.2 Connection

Connect the compressed air to the push-in connector Ø 8 mm.

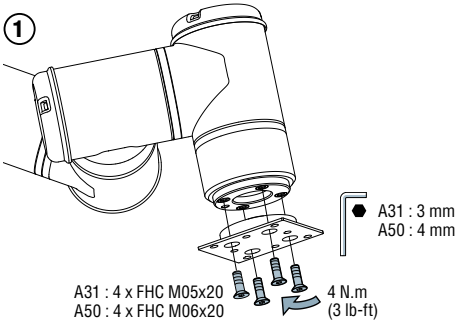


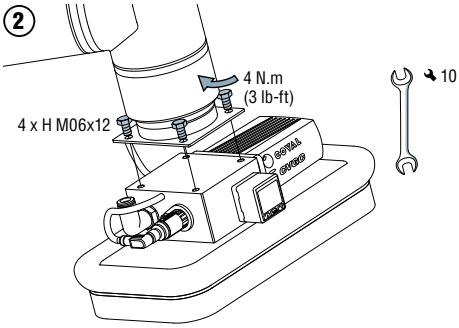
VII. ASSEMBLY INSTRUCTIONS

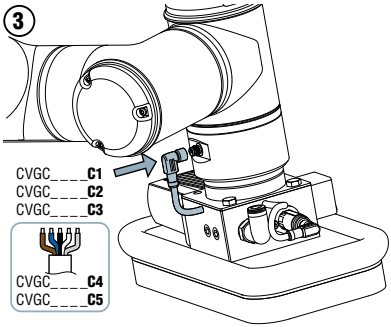
VII.1 Assembly instructions for CVGC

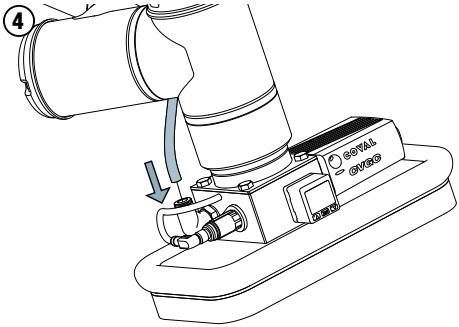
A31	C1
A50	C2
	C3
	C4
	C5

Note: - M5 indexing pin provided for A31 mounting interface
- M6 indexing pin provided for A50 mounting interface







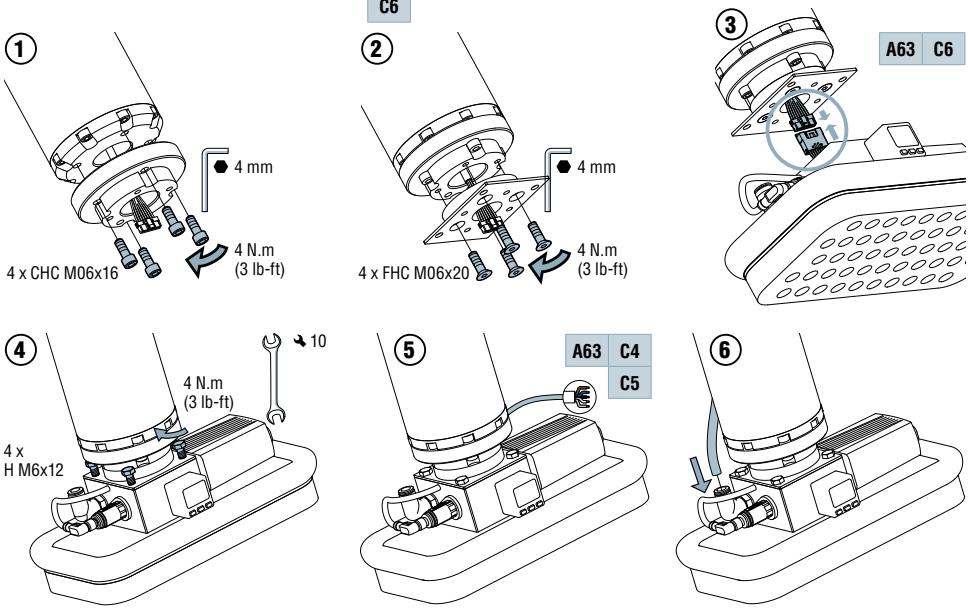


COVAL vacuum managers

VII.2 Assembly instructions for CVGC

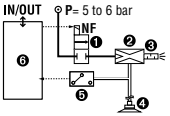
A63	C4
	C5
	C6

Note: - M6 indexing pin provided for A63 mounting interface



For the use of CVGC series carbon vacuum gripper on UNIVERSAL ROBOTS e-Series robots, a URCap plugin with installation and programming instructions are available for download on the COVAL website: https://doc.coval.com/CVGC

VIII. GENERAL CHARACTERISTICS



❶ "Vacuum" solenoid valve
❷ Venturi
❸ Through-type silencer
❹ Foam gripping interface
❺ Electronic vacuum switch
❻ Input / Output board

- Supply: non-lubricated air, 5 microns filtered, according to ISO 8573-1:2010 [4:5:4].
- Operating pressure: from 5 to 6 bar
- Optimal pressure:
  - CVGC150x150 / CVGC 320x160: 5.5 bar
  - CVGC240x120: 6 bar
- Maximum vacuum: 85%.
- Vacuum command light: orange LED
- Electric protection grade: IP40
- Control voltage: 24 V DC +/-10%
- Vacuum control: 24 V DC PNP/NPN
- Power consumption: 65 mA (no load)
- The switching type of the inputs / outputs is configurable to PNP or NPN
- Outputs:
  - 1 x "Vacuum level" signal analogic 1 to 5 V DC (depending on robot model, see "Electrical Connections" section)
  - 1 x "Gripped product" switching output 24 V DC PNP/NPN NO or NC (125 mA max.)
- Service life: 30 million cycles
- Operating temperature: from 0 to 50° C.
- Materials:
  - Gripper: carbon, PA 6.6 15% FG, brass, stainless steel, PETP.
  - Valve: aluminum, steel, NBR.
  - Foam gripping interface: EPDM.
- Noise level:
  - CVGC 150x150: 72 dBA
  - CVGC 240x120: 71 dBA
  - CVGC 320x160: 66 dBA

The values represent the average characteristics of our products.

IX. USE AND APPLICATION

Max. capacity

	Capacity (1) (kg)	(2) (kg)
CVGC 150X150	30	0.80
CVGC 240X120	38	1.0
CVGC 320X160	68	1.3

(1) Indicative force for a vacuum gripper with foam interface covered 100% by the load, including a safety factor of 2 for horizontal handling and rigid, airtight surface.
(2) Weight indicated for a gripper with A31 or A50 mounting. For a gripper with A63 mounting, add 136 g.

Recommendation

- Cover 100% of the surface of the foam gripper interface.
- Position of the gripper:
  - Always position the gripper in the centre of the load to manipulate.
  - CVGC vacuum grippers are designed for the handling of loads in horizontal movement.
- It is not recommended to use the CVGC for vertical gripping as the foam could deteriorate quickly.
  - In the rare case of vertical use, tests should be performed prior to commercial use
  - COVAL will not be held responsible for the premature degradation of the foam.

Foam Interface

- Operating temperature: from -40 to 180° C (from -40 to 356° F)
- Avoid prominent shapes
- Caution: angle of approach.

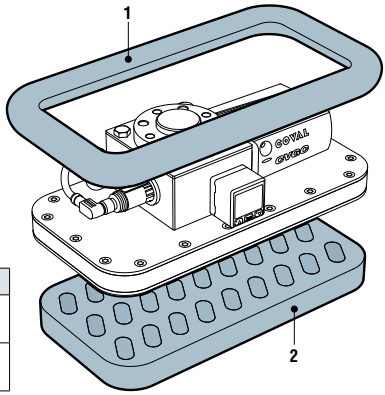
Note: For applications with high accelerations, or a grip in vertical position, the safety factor must be calculated according to application-specific conditions.

X. MAINTENANCE

X.1 Frequency

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

→ **To be defined by the user.**

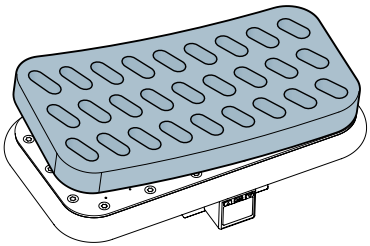


Spare parts *(Order code according to CVGC model)*

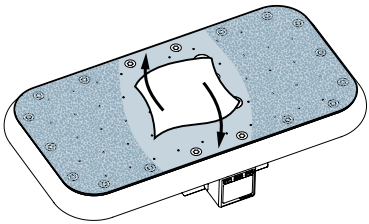
Ref.	Designation	CVGC150x150…	CVGC240x120	CVGC320x160
1	Foam protection	80005438	80005439	80005440
2	Foam gripping interface	80005296	80005297	80005298

X.2 Procedure for replacing the gripping foam

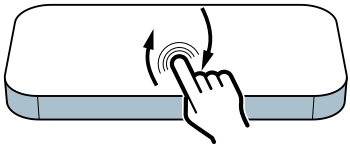
1. Manually remove the used FOAM interface.



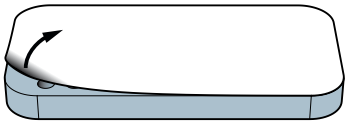
2. Clean the carbon plate with a chemical degreaser (e.g. NECTRAL) to remove unwanted compounds (adhesive residue, grease...).



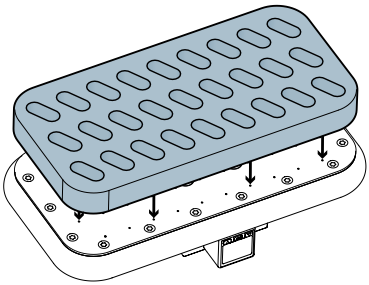
3. On the replacement foam, rub the protective film on the adhesive side for a few seconds to activate the cells and promote bonding.



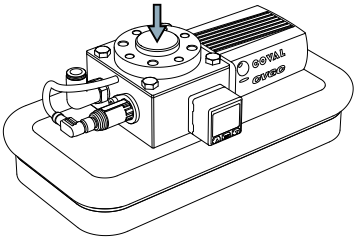
4. Remove the protective film.



5. Adhere foam to carbon plate by aligning the holes.



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



To check proper functioning of the vacuum gripper, complete airtight leak test (see chapter XI).

XI. VACUUM GRIPPER AIRTIGHT LEAK TEST

To ensure the proper functioning of the CVGC vacuum grippers after a maintenance operation, it is important to complete an airtight leak test:

1. Place the gripper on a clean, smooth, flat and waterproof surface.
2. Activate vacuum.
3. Check the vacuum level on the electronic vacuum switch. It must be at least 80% (-800 mbar) at the optimal functioning pressure of the housing.

If the vacuum level is not reached, check:

- the quality of the test surface,
- the wear of the gripping foam and its adhesive
- the size of the compressed air hose (internal Ø 6 mm minimum),
- the quality of the compressed air network (connections, pipes, leaks or damage) and replace defective components.
- the pressure of the compressed air network:
  - Optimal functioning pressure:
    - CVGC150x150 / CVGC 320x160 : 5.5 bar
    - CVGC240x120 : 6 bar

XII. RELATED DOCUMENTS TO BE DOWNLOADED

- Vacuum switch manual PSD100CPNP: https://doc.coval.com/PSD
- Installation and operating instructions for the URCap plugin: https://doc.coval.com/CVGC


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


Please find all the documents in different 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

COVAL
vacuum managers

A TECHNOLOGICAL PARTNER ON A GLOBAL SCALE

Located in the southeast region of France, COVAL conceives, manufactures and globally distributes high performance, advanced vacuum automation components and systems for industrial applications in all branches.

COVAL is an ISO 9001: V2015 certified company which offers innovative solutions integrating reliable and optimized components with intelligent functionalities. The focus is to provide the most personalized and economic solution to a given application while assuring a significant improvement in the productivity and the safety for the vacuum users around the world.

COVAL has an ambition for technical excellence and innovation. As a specialist in vacuum automation, COVAL is reputed for offering reliable, personalized, cost effective and productive solutions.

The references of COVAL can be found in several industrial sectors (Packaging, Automotive Industry, Plastic, Graphic, Aeronautic…) where vacuum handling is important for high efficiency and productivity.

COVAL markets its products and services all over Europe, in the United States and South America through its subsidiaries and authorized distribution network. COVAL strives to provide customer driven solutions and gives the best possible treatment to satisfy all its clients.

For all enquiries from Australia, Africa and Asia kindly contact COVAL head office in France.

COVAL S.A.S.

(Head Office)
Mail: coval@coval.com
Phone: +33 (0)4 75 59 91 91
www.coval.com

COVAL INC.

Mail: contact@coval-inc.com
Phone: (919) 233 4855
www.coval-inc.com

COVAL IBERICA

Mail: contacto@coval.com
Phone: (+34) 930 185 441
www.coval-iberica.com

COVAL GERMANY

Mail: kontakt@coval.com
Phone: +49 (0)7121 7999-250
www.coval-germany.com

COVAL ITALIA

Mail: coval.it@coval.com
Phone: +39 011 958 8660
www.coval-italia.com

COVAL CHINA

Mail: sales@coval.net.cn
Phone: +86 21 64295600
www.coval.net.cn

ADVANCED VACUUM SOLUTIONS