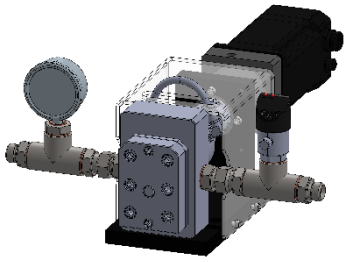
DAVtech

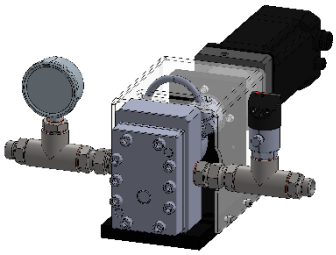
PARTS, SYSTEMS AND AUTOMATIONS FOR FLUID DISPENSING

USE AND MAINTENANCE MANUAL

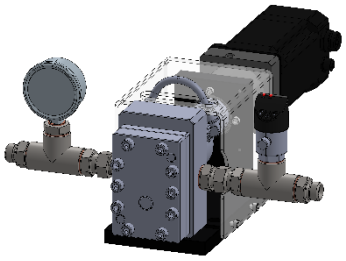
GP GEAR PUMP



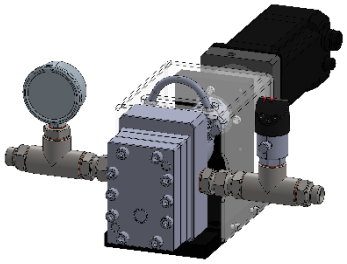
GP-06



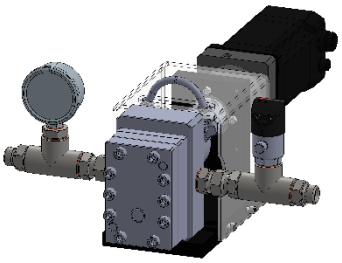
GP-2



GP-4



GP-10



GP-20

COD.: **DTVI_GP_2440**
REV.: **01**
DATE: **02/12/2025**

TRANSLATED FROM ORIGINAL
Read carefully before use!

EN

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1 GENERAL INFORMATION

This manual contains information regarding the installation, use, maintenance and end of life of the component and provides indications for the most appropriate behavior for correct operation. This manual has been designed to be simple and as immediate as possible, with a subdivision between chapters and sub-chapters that allows any desired information to be found quickly. Furthermore, the manual begins by giving a general description of the content, then an overview of the component, to arrive at aspects of safety, transport, installation and use and finally the end of life. In case of doubts about the interpretation or reading of this document, please contact the manufacturer.

DAV Tech disclaims all responsibility relating to improper use of the component. Comply with what is specified in this manual.

Read this manual before handling the component or performing any action on it

The manual constitutes an essential safety requirement and must accompany the component throughout its entire life cycle.

It is the responsibility of the end user to optimize the functionality of the component, always keeping in consideration the purpose for which it was built.

This manual must be kept, together with the attached documentation, in good condition, readable and complete. Furthermore, it must be stored near the component or, in any case, in a place accessible and known to all personnel who use the component itself or who must carry out maintenance or inspection interventions. In the event that the manual deteriorates or is no longer complete, a copy must be requested from the manufacturer, indicating the manual code and revision.

The manual is intended for personnel who use the component (operators), who perform maintenance on it (maintenance technicians), and personnel who must carry out checks or inspections. The manufacturer is not liable for damage to the component caused by personnel who have not followed the indications contained within the manual itself.

In case of doubts about the correct interpretation of the information contained in this manual, please contact the manufacturer.

GUARANTEE

During the design phase, materials and components were carefully selected for implementation in the project and subjected to routine inspection prior to delivery. All elements, from fastening assemblies to control mechanisms, have been engineered and manufactured with an appropriate safety factor to withstand loads exceeding those encountered during normal operating conditions.

For additional notes regarding equipment warranty provisions, please refer to Section 7 of the "GENERAL CONDITIONS OF SALE AND WARRANTY" form issued during either the quotation or order confirmation phase.

1.1 Symbology

The following symbols are used to give greater impact to the importance of the concept to be conveyed.

ATTENTION!
Refers to a warning that could lead to minor damage (minor injuries, damage to the component requiring maintenance technician intervention).

DANGER!
Refers to a major event that could cause significant damage (death, permanent injury, irreversible component failure).

NOTE. Indicates relevant information or elaboration.

OBLIGATION. Indicates an activity that must be performed, related to both the component and the manual.

REFERENCE. Refers to an external document that is important to view.

Furthermore, the symbol list is integrated with that of personnel authorized to use the component and their function, together with other symbols used within the manual.

Operator
Qualified person capable of operating on the component, performing adjustment, cleaning, start-up or restart operations. The operator is not authorized to perform maintenance.

Mechanical maintenance technician
Qualified technician capable of performing mechanical interventions, adjustment, maintenance and ordinary repair described in this manual. Not qualified to perform interventions on electrical systems in the presence of voltage.

Electrical maintenance technician
Qualified technician capable of performing electrical interventions, adjustment, maintenance and ordinary repair described in this manual. Capable of working in the presence of voltage on electrical cabinets and junction boxes. Not qualified to perform interventions on the mechanical side.

Manufacturer's technician
Qualified technician made available by the manufacturer to perform complex operations in particular situations, or in any case according to what has been agreed with the customer.

1.2 Reference standards

The normative and directive references for this manual are as follows:

Directives

- 2006/42/EC – Machinery Directive;

Essential safety and health requirements (ESHR) applicable from Directive 2006/42/EC, reported in Annex I, paragraph:

- 1.1.2: Principles of safety integration;
- 1.1.3: Materials and products;
- 1.1.5: Machine design for handling purposes;
- 1.3.4: Risks due to surfaces, edges or corners;
- 1.5.1: Electrical energy;
- 1.5.2: Static electricity;
- 1.5.4: Assembly errors;
- 1.5.8: Noise;
- 1.5.9: Vibrations;
- 1.6.3: Isolation from energy supply sources;
- 1.6.4: Operator intervention;
- 1.7.4: Instructions

1.3 Declaration of incorporation (Annex II B DIR. 2006/42/EC)

Manufacturer's name: **DAV Tech Srl**
Address: Via G. Ravizza, 30, .36075, Montecchio Maggiore (VI)

DECLARES THAT THE PARTLY COMPLETED MACHINERY

Component: GP-06, GP-2, GP-4, GP-10, GP-20
Model: Gear pump
Year: 2024
Intended Use: Volumetric gear feed system

COMPLIES WITH THE INCORPORATION PROVISIONS DICTATED BY DIRECTIVE 2006/42/EC

The technical documentation has been drawn up in compliance with Annex VII B, as required by the following:

- Machinery Directive 2006/42/EC of the European Parliament and Council of 17 May 2006

FURTHER DECLARES THAT:

- The product has been designed and manufactured in accordance with the essential safety and health requirements provided by Directive 2006/42/EC of the European Parliament and Council, of 17 May 2006, relating to machinery, and satisfies all applicable safety regulations indicated in chapter 1.2 of this manual;
- We undertake to transmit, in response to an adequately motivated request from national authorities, relevant information on this partly completed machinery;
- The technical file has been constituted by Andrea Grazioli, via Ravizza, 30, Montecchio Maggiore (VI), IT.

This partly completed machinery cannot be used until the machinery on which it will be used is declared compliant with standard 2006/42/EC.

Montecchio Maggiore, 30 September 2024

The legal representative

Andrea Grazioli

1.4 Glossary

The following are the most used terms within this manual with their meanings.

TERM	DEFINITION
Enable	Term that defines the act of preparing (enabling) an action. The action will be activated as soon as criteria are satisfied which, as a consequence, lead to the activation of the enabled action.
Activate	The action that is performed instantaneously upon command actuation.
Hold-to-run Commands	Commands that, used for manual operations, must be kept activated for the action to be completed. When the command is released, the action stops.
Two-hand Commands	Hold-to-run commands that require simultaneous actuation of two manual commands to perform an action.
PPE	Personal Protective Equipment. Includes all objects necessary to ensure personnel protection from possible accidental damage (safety shoes, gloves, helmet, and others).
Display	Used to display information. Can be in any form and size, including touch screen.
Manufacturer	Natural or legal person who designed and manufactured the component subject to this manual.
HP	High Pressure. Abbreviation indicating high pressure.
Icon	Small image that symbolically represents a command, function or even a document or operating program, which appears on a computer screen. When selected by the user, it starts the function or program it symbolizes.
Joystick	Lever controller used in command panels.
N/A	Not Applicable, indicating a field that does not apply to this particular manual and cannot be integrated into the component.
Operator Panel	Command station where machine control instruments are located.
P.I.	Possible Implementation, currently absent from the component described in this manual, but possible to add and implement.
Screen	Interface system between man and component. Screen images displayed on the operator panel that allow the user to receive and provide information to the management software.
Control Panel	Composition of buttons and selectors that allow direct action on component behavior.
Keyboard	Keyboard only (standalone element) or in addition to a display (keys only, no selectors or other).
Touch Screen	Touch screen that allows the user to interact with a graphical interface using fingers or special objects.

1.5 Service and manufacturer contact details

For any reason relating to use, maintenance or request for spare parts, the customer must contact the manufacturer directly (or the service center if present), specifying the component identification data.

The customer can avail themselves of commercial technical support from area agents or importers, who are in direct contact with DAV Tech Srl.

Company name	**DAV Tech Srl**
Postal address	Via Ravizza, 30, 37065, Montecchio Maggiore (VI) – (IT)
Telephone	+39 0444 574510
Fax	+39 0444 574324
email	davtech@davtech.it
Website	www.davtech.it

2 PRESENTATION AND OPERATION

This manual aims to elaborate on the operation of the GP gear pump, which has been designed to feed a pressure-time dosing system while being fed by a pressure-time system with fluids of various viscosities. In other words, this dosing system serves to convert a pressure-time dosing system into a volumetric dosing system.

In other words, the function of this component is:

TO CONVERT A PRESSURE-TIME DOSING SYSTEM INTO A VOLUMETRIC DOSING SYSTEM

The intended use is considered to be that described in the chapter below, while improper use is considered to be any other use that is not described within this manual, with products of material and format different from those for which it was built.

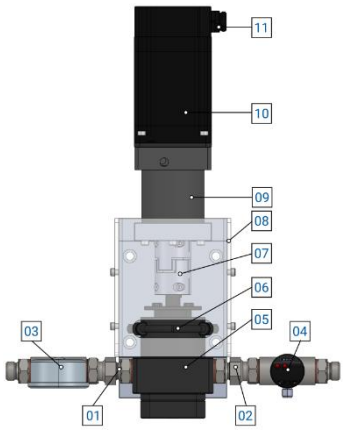


Figure 01 – GP detail

No.	DESCRIPTION
01	Fluid inlet
02	Fluid outlet
03	Analog pressure gauge (inlet)
04	Digital transducer (outlet)
05	GP pump body
06	Leakage control tube
07	Flexible coupling
08	Protection carter
09	Gearbox
10	Electric motor
11	Motor connectors

Before using a specific type of fluid, it must be verified that:

- The fluid viscosity is compatible with the component characteristics;
- The fluid characteristics satisfy the desired requirements;
- The fluid technical data sheet provided by the manufacturer contains all information regarding the product such as viscosity, applications, drying and storage times;
- The fluid storage time has not been exceeded;
- The fluid packages are hermetically sealed.

When it is necessary to use multiple fluids with the same component, every part of the system must be thoroughly cleaned to prevent residues from previous processing from affecting the processing to be performed.

SPECIAL VERSIONS

This component can have both analog and digital pressure gauges, both inlet and outlet, based on customer requirements and if other pressure gauges are present within the system. It is recommended to have the digital pressure gauge mounted at the outlet, so as to control the outlet pressure through an appropriate control system.

OPERATION

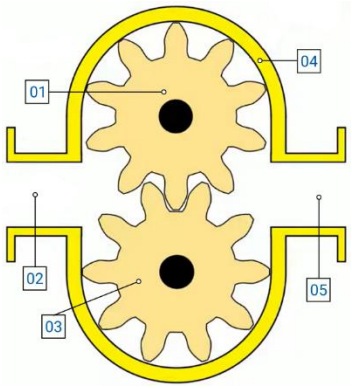


Figure 02 – GP internal section

No.	DESCRIPTION
01	Drive gear
02	Fluid inlet
03	Driven gear
04	Container
05	Fluid outlet

This type of pump operates using the external gear method, meaning there are two gears present, one driven by the motor (drive) and the other supporting (driven), controlled by the movement of the other gear. The gear size varies based on the pump size, allowing a specific volume to be delivered with each complete revolution of the gears themselves. If necessary, it is possible to implement a larger gearbox (i=10) to increase the torque applied by the motor.

For minimum working pressures, refer to chapter 2.2.

This component cannot operate autonomously. For it to dispense product, it must be connected to a supply source, which can be a tank, pump, or other, based on the system and customer requirements.

ATTENTION!
It is recommended to connect the pumps to the sources indicated in this manual in chapter 2.2. Connecting them to other sources or to products with characteristics not indicated in this manual could damage them.

To properly adjust this component, the pump size "cc/rev" is written on the front plate of the pump and the correct reduction factor "i" on the gearbox, which must be set in software on the controller (K pump and Gearbox) so that the pump delivers the precise amount of fluid written in this manual.

ATTENTION!
These settings are adjusted by the manufacturer's technicians and must not be modified subsequently, unless the manufacturer's technicians themselves recommend it.

The following explains the operation of GP pumps.

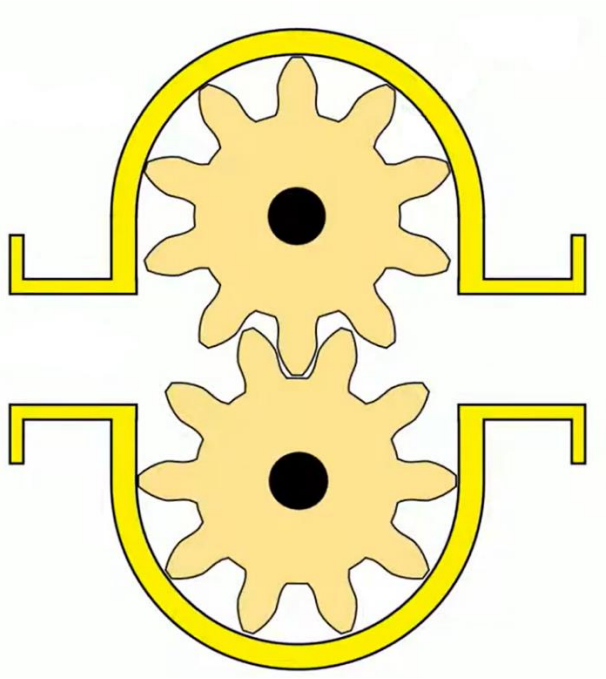


Figure 03 – Rest phase

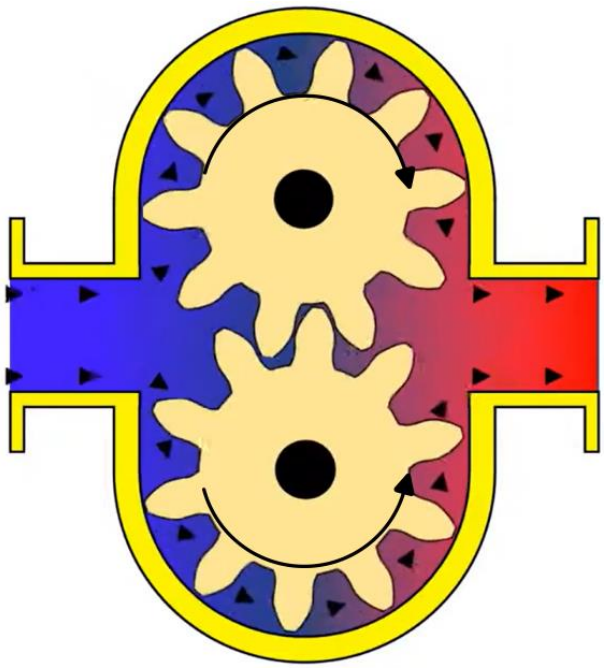


Figure 04 – Work phase

The inlet fluid is pushed by the pressure of the upstream feed system, which can be a pressure plate pump, diaphragm pump, or pressurized tank; therefore, the inlet fluid has a pressure equal to that at the outlet of the feed system (without considering pressure drop). From here, the fluid enters the gear pump and, if at rest, stops at the inlet. When the electric motor is commanded, the gears begin to rotate and carry the fluid toward the outside of the gears themselves, filling the "chambers" formed by the gears and the fluid is accompanied toward the outlet hole. When the gears intersect, the fluid does not pass through the gears, since the space is almost non-existent (they are designed to be coupled almost perfectly); therefore, the fluid is pushed outward, with a flow rate that varies based on the motor rotation speed, which falls within the ranges indicated in chapter 2.2.

Ideally, the gear pump could generate much higher outlet pressure (if the motor rotated very quickly), creating high flow rate and consequently excessive pressure for the downstream system; to avoid this, a digital pressure transducer is placed at the pump outlet, verifying in real time that the outlet pressure remains below a certain threshold.

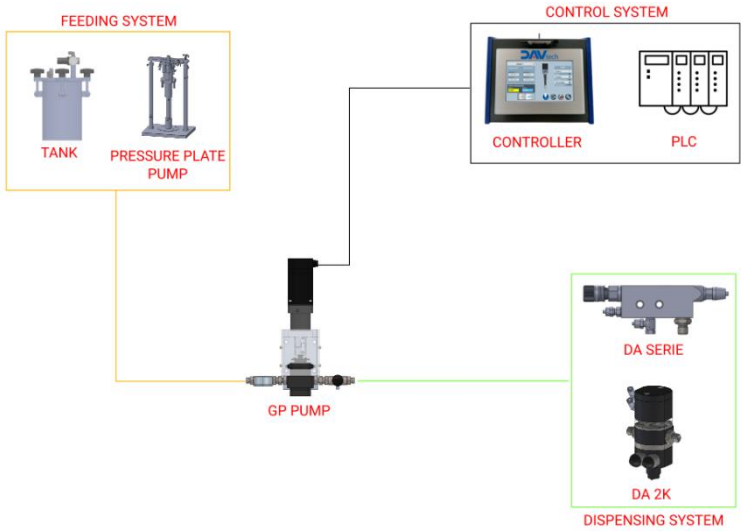
DANGER!
If the generated outlet pressure is too high, there is a risk of damaging the downstream circuit.

ATTENTION!
If the inlet flow rate to the GP pump were lower than the required outlet flow rate from the pump itself, a cavitation phenomenon could occur (air generation in the fluid).

USEFUL TIPS

ATTENTION!
The reported parameters are indicative. Always ask technicians for advice during the design phase to have an application suitable for your use.

- Maintain a minimum inlet pressure to the pump (recommended by the manufacturer's technicians), otherwise there is a risk of having little fluid arriving from the feed system and risking pump cavitation;
- Always check the maximum outlet pressures of the system, which can be given either by the maximum pressure bearable by the dosing valve (based on its configuration), or by the maximum sealing pressure of the piping;
- Use the "K pump" parameter and the "Gearbox" reduction parameter corresponding to the pump used. Modify these parameters only under advice from the manufacturer's technicians;
- This component can operate either through a dedicated controller (Controller GP EVO) or within a machine that has a dedicated driver (Driver GP). In both cases, it cannot operate without a dedicated control system.

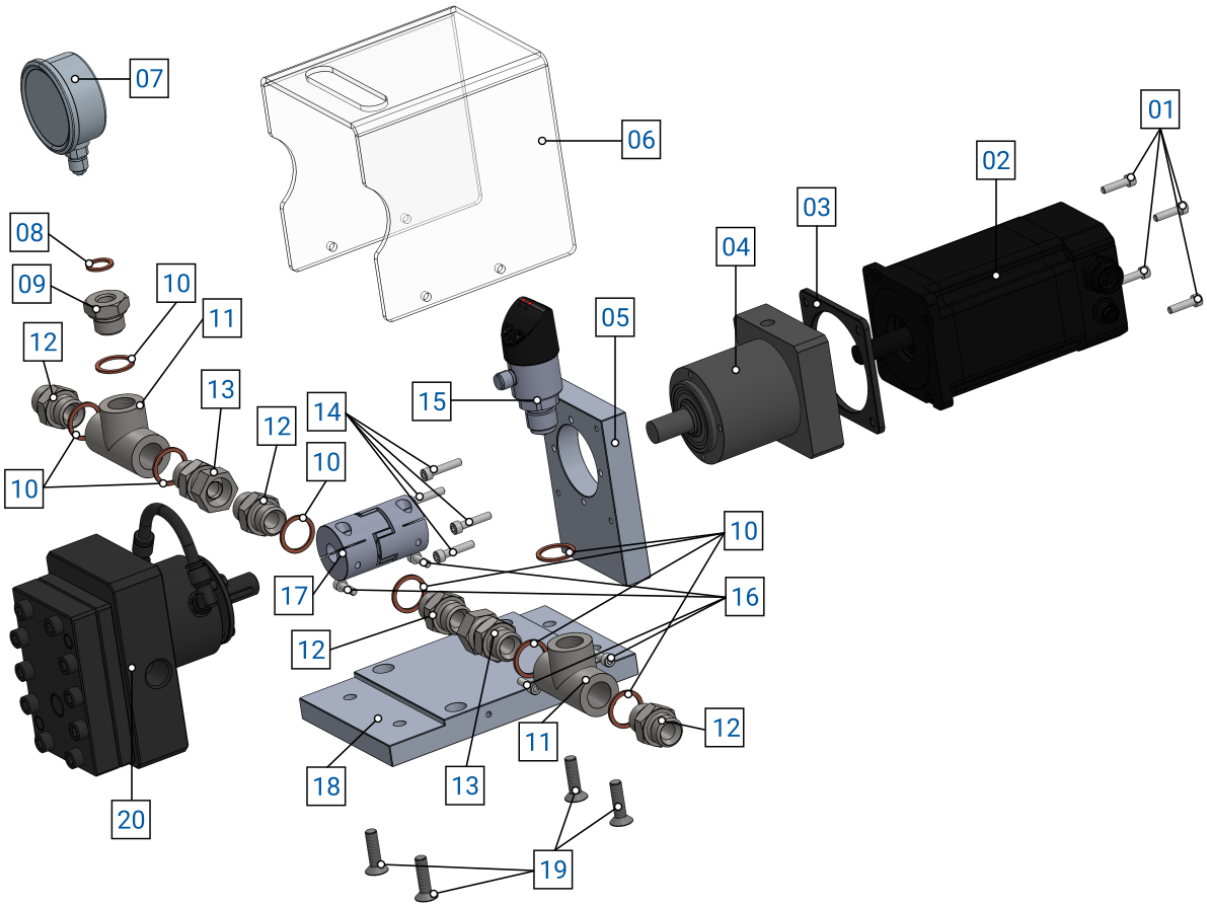


COLOR	MEANING
YELLOW	Fluidic supply
GREY	Controllers
GREEN	Dosing systems
RED	Notes

Figure 05 – Connection example

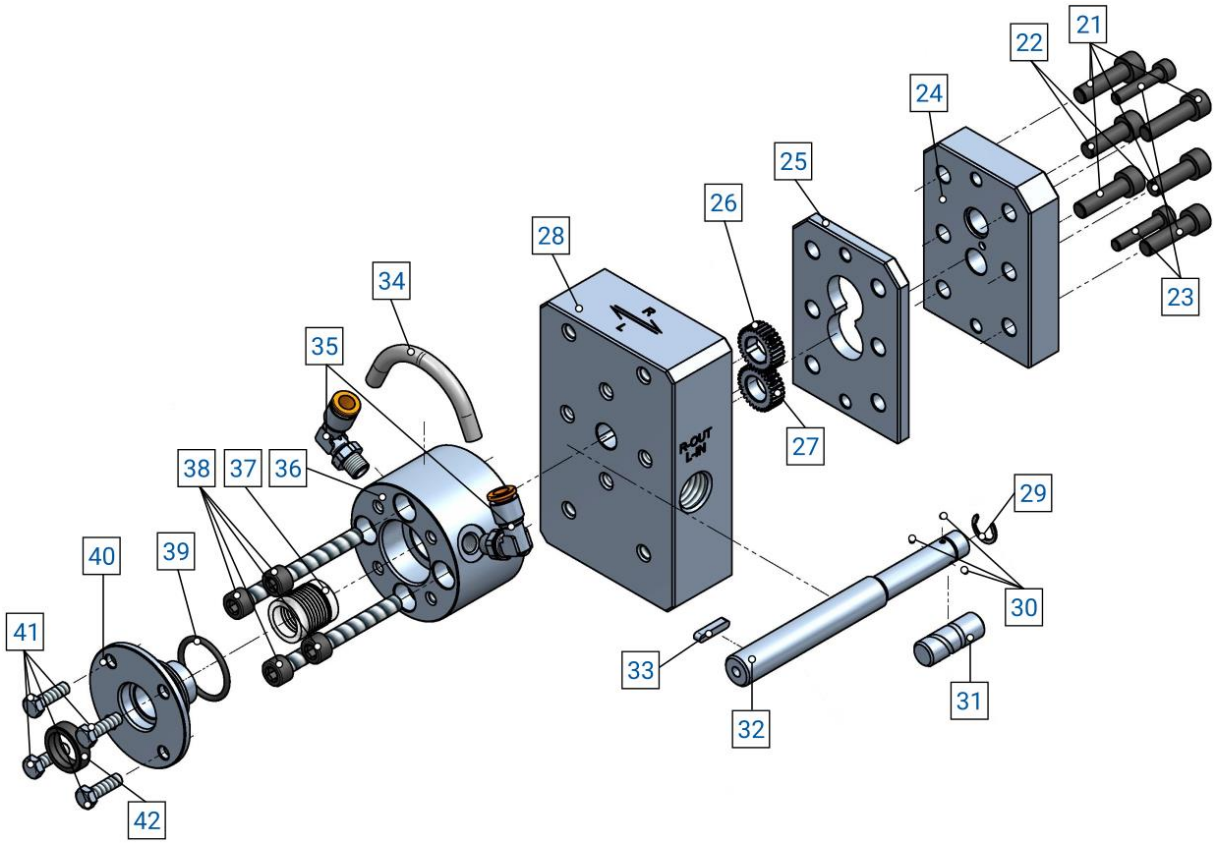
2.1 Exploded view

The following is a list of the main components with spare part codes.

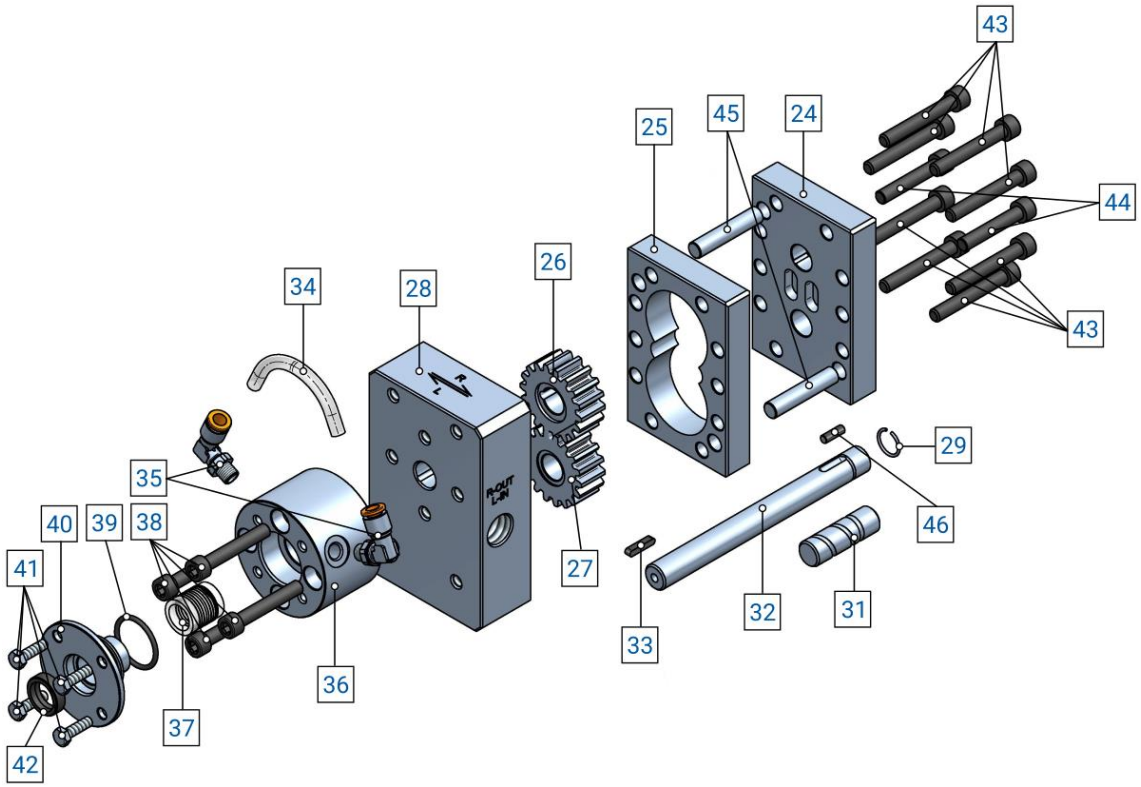


No.	Description	Var.	Code	Variant details
01	SCREW ISO 4762 M5X20	-	TCEI M5X20	-
02	ELECTRIC MOTOR	-	M86SH118-TO0512P24C	-
03	MOTOR SPACER	-	080618502418	-
04	EPICYCLIC GEARBOX 1:5	-		-
-	-	04.a	SGP11070005S01	Epicyclic gearbox 1:5
-	-	04.b	SGP1107001012SM286100000	Epicyclic gearbox 1:10
05	MOTOR BRACKET	-	270418512418	-
-	-	05.a	270418512418	NEMA34 motor bracket 82.25 for GP-06, GP-2, GP-4
-	-	05.b	231118507418	NEMA34 motor bracket 87.5 for GP-10, GP-20
06	GP SHAFT PROTECTION	-	050919500000	-
07	FLUIDIC PRESSURE GAUGE 160 BAR 1/4" GAS	-	MAN160-14	-
08	COPPER WASHER 1/4" GAS	-	RR1_4	-
09	HP REDUCTION M 1/2" GAS -- F 1/4" GAS	-	ADM12FG14	-
10	COPPER WASHER 1/2" GAS	-	RR1_2	-
11	T FITTING HP FFF 1/2" GAS	-	ATFF12	-
12	HP ADAPTER M 1/2" GAS -- M 1/2" GAS	-	ADNIP12	-
13	HP ADAPTER M 1/2" GAS -- F SWIVEL 1/2" GAS	-	ADMFG12	-
14	SCREW ISO 4762 M5X25	-	TCEI M5X25	-
15	DIGITAL PRESSURE TRANSDUCER	-	PSD-4	-
16	SCREW ISO 4762 M5X16	-	TCEI M5X16	-
17	FLEXIBLE COUPLING	-	CPJC40-RD-14-16	-
18	PUMP BASE PLATE	-	270418522418	-
19	SCREW ISO 10642 M8X30	-	TSPEI M8X30	-
20	MAIN BODY	-	-	-
-	-	20.a	GP06	Main body GP-06
-	-	20.b	GP2	Main body GP-2
-	-	20.c	GP4	Main body GP-4
-	-	20.d	GP10	Main body GP-10
-	-	20.e	GP20	Main body GP-20

The following shows the exploded view of the main body for various models.



Main body exploded view GP-06



Main body exploded view GP-2, GP-4, GP-10, GP-20

No.	Description	Var.	Code	Variant details
21	SCREW M8X30 UNI 5931 TCCE	-	2E29F306	-
22	SCREW M8X25 UNI 5931 TCCE	-	2E29F256	-
23	SCREW M6X30 UNI 5931 TCCE	-	2E29E306	-
24	EXTERNAL PLATE VL805	-	-	-
-	-	24.a	CPE100000000Y	External plate for GP-06
-	-	24.b	CPE1V80000001	External plate for GP-2, GP-4
-	-	24.c	CPE1X00000002	External plate for GP-10, GP-20
25	GEAR CARRIER PLATE VL899	-	-	-
-	-	25.a	CPN1V60000003	Gear carrier plate for GP-06
-	-	25.b	CPN1002000002	Gear carrier plate for GP-2
-	-	25.c	CPN1004000003	Gear carrier plate for GP-4
-	-	25.d	CPN1010000002	Gear carrier plate for GP-10
-	-	25.e	CPN1020000003	Gear carrier plate for GP-20
26	DRIVE GEAR	-	-	-
-	-	26.a	CRE1V60000003	Drive gear for GP-06
-	-	26.b	CRE1002000004	Drive gear for GP-2
-	-	26.c	CRE10040I0001	Drive gear for GP-4
-	-	26.d	CRE10100I0001	Drive gear for GP-10
-	-	26.e	CRE10200I0001	Drive gear for GP-20
27	DRIVEN GEAR	-	-	-
-	-	27.a	CR01V60000003	Driven gear for GP-06
-	-	27.b	CR01002000001	Driven gear for GP-2
-	-	27.c	CR01004000001	Driven gear for GP-4
-	-	27.d	CR01010000001	Driven gear for GP-10
-	-	27.e	CR01020000001	Driven gear for GP-20
28	SUPPORT PLATE VL805	-	-	-
-	-	28.a	CPI1X00000002	Support plate for GP-06
-	-	28.b	CPS1V80000001	Support plate for GP-2, GP-4
-	-	28.c	CPS1X00000001	Support plate for GP-10, GP-20
29	RETAINING RING	-	-	-
-	-	29.a	ZX71H134	Retaining ring Ø13 nickel-plated for GP-06
-	-	29.b	ZX71A162	Ring UNI 7433-A-16 for GP-2, GP-4, GP-10, GP-20
30	DRIVE BALL 3/32" HRC = 63	-	ZX69A042	-
31	FIXED PIN	-	-	-
-	-	31.a	CNP100000000I	Fixed pin Ø 13 L36 for GP-06
-	-	31.b	CNP1000000003	Fixed pin Ø 16 L38 for GP-2
-	-	31.c	CNP1000000004	Fixed pin Ø 16 L44 for GP-4
-	-	31.d	CNP1020000001	Fixed pin Ø 16 L50 for GP-10
-	-	31.e	CNP1000000000	Fixed pin Ø16 L60 for GP-20
32	DRIVE SHAFT	-	-	-
-	-	32.a	CAM7V60200002	Drive shaft for GP-06
-	-	32.b	CAM7003200004	Drive shaft Ø16X153 for GP-2
-	-	32.c	CAM7004200002	Drive shaft PL2L2B 200-016 L157 for GP-4
-	-	32.d	CAM7010200003	Drive shaft PL2L2B 200-016 L164 for GP-10
-	-	32.e	CAM7020200003	Drive shaft for GP-20
33	KEY A 4X4X20 UNI6604-69	-	2E98C202	-
34	TUBE FOR LEGRIS FITTINGS Ø8X6	-	ZY50B001	-
35	ADJUSTABLE ELBOW FITTING 1/8" GAS	-	ZY64B070	-
36	GLAND HUB	-	CMOZ00000000D	-
37	V-COLLAR PACKAGE 16/22-H25 PL2 STANDARD	-	COLLAR-GP	-
38	SCREW M8X50 UNI5931 12.9 TCCE	-	2E29F506	-
39	GASKET OR3112 VITON 2.62X28.25	-	05021V3112	-
40	GLAND	-	CSTZ00000000A	-
41	SCREW M6X20 UNI 5739 ZINC. TE	-	2E33E207	-
42	RING SM 16247 VITON Ø16X24X7	-	05051V1602	-
43	SCREWS	-	-	-
-	-	43.a	2E29F406	Screw M8X40 UNI 5931 TCCE for GP-2 pump
-	-	43.b	2E29F456	Screw M8X45 UNI 5931 TCCE for GP-4 pump
-	-	43.c	2E29F556	Screw M8X55 UNI 5931 TCCE for GP-10 pump
-	-	43.d	2E29F656	Screw M8X65 UNI 5931 TCCE for GP-20 pump
44	SCREWS			-
	-	44.a	2E29F356	Screws M8X35 UNI 5931 TCCE for GP-2 pump
	-	44.b	2E29F406	Screw M8X40 UNI 5931 TCCE for GP-4 pump
	-	44.c	2E29F456	Screw M8X45 UNI 5931 TCCE for GP-10 pump
	-	44.d	2E29F556	Screw M8X55 UNI 5931 TCCE for GP-20 pump
45	FIXED PIN	-	-	-
-	-	45.a	CNP100000000V	Fixed pin Ø10X36 for GP-2 pump
-	-	45.b	CNP100000000A	Fixed pin Ø10X39 for GP-4 pump
-	-	45.c	CNP100000001E	Fixed pin for GP-10 pump
-	-	45.d	CNP100000000U	Fixed pin Ø10X54 for GP-20 pump
46	KEY	-	-	-
-	-	46.a	CHV4000000009	Key Ø5 h10X5.8 for GP-2 pump
-	-	46.b	CHV4000000006	Key Ø5X7.5 for GP-4 pump
-	-	46.c	CHV400000000H	Key for GP-10 pump
-	-	46.d	CHV400000003T	Key Ø5 h10X23 for GP-20 pump

2.2 Technical data

All the technical characteristics concerning the component of this manual are indicated below.

SPECIFICATIONS						
Description	**UdM**	**Values**				
Model	\	GP-06	GP-2	GP-4	GP-10	GP-20
Actuation	\	Electric				
Electrical Characteristics						
Motor type	\	HT Bipolar Hybrid Stepper				
Maximum current	A	6				
Fluid characteristics						
Maximum fluid pressure inlet	bar	150				
Maximum fluid pressure outlet	bar	150				
Connection type (inlet/outlet)	GAS	F 1/2"				
Fluid working temperature	°C	0 ÷ 130				
Nominal flow rate	cc/rev	0.6	2	4	10	20
Mechanical characteristics						
Maximum rotation speed	rpm	150				
Shaft diameter	mm	16				
Materials used	\	Martensitic stainless steel				

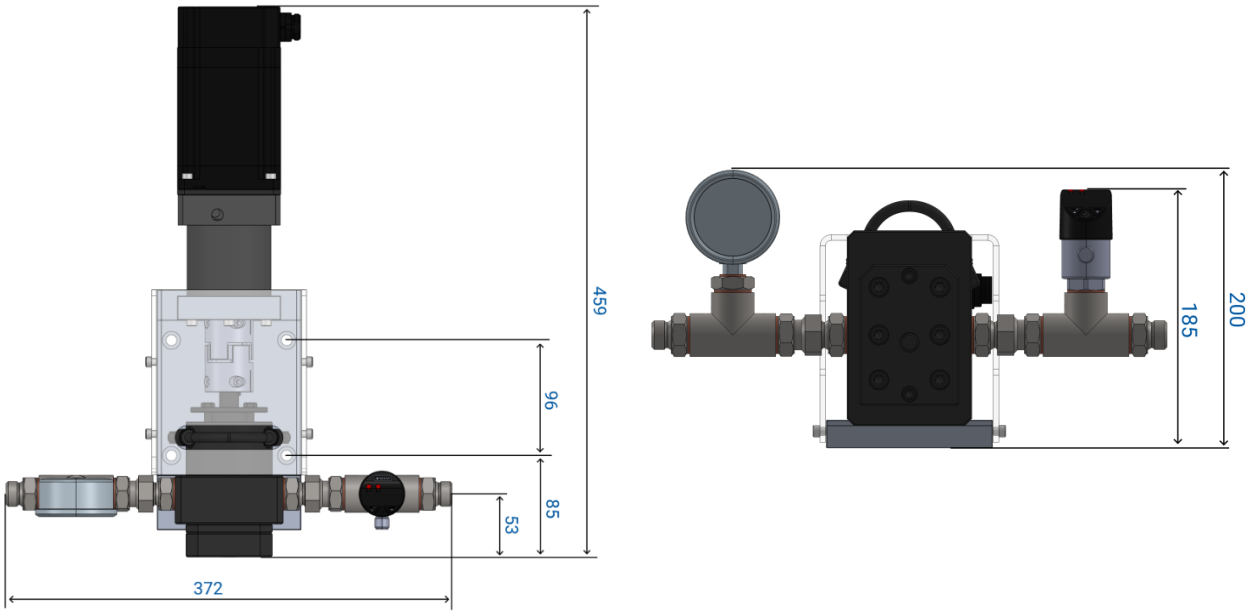
(1) Variable based on the type of fluid used

ENVIRONMENTAL CHARACTERISTICS		
Description	**UdM**	**Values**
Working Ambient Temperature	°C	5 ÷ 45
Storage Ambient Temperature	°C	-20 ÷ 55
Permissible non-condensing humidity	%	5 ÷ 90

USABLE FLUIDS
Silicones
Adhesives
Greases
Resins
Oils
Various products at various viscosities, indicatively 1-10^6 cPs (contact the manufacturer for more information)

DIMENSIONAL AND WEIGHT CHARACTERISTICS		
Description	**UdM**	**Value**
Component length (min ÷ max)	mm	372
Component depth (min ÷ max)	mm	~ 459
Component height (min ÷ max)	mm	185 ÷ 200
Component weight	kg	15 ÷ 20

Component



It is possible to request the component 3D from the manufacturer in the desired version without any obligation.

3 SAFETY

The following presents the list of warnings regarding the component that is the subject of this manual. Please read carefully before proceeding with the next chapters.

DANGER!
Before putting the component into operation or performing any action on it, carefully read this manual.

DANGER!
Do not use the component under the influence of drugs or other substances that may alter attention and reaction capacity.

DANGER!
Operators must perform only operations or interventions that are within the competence of their assigned role and qualification.

FIRE/EXPLOSION HAZARD!
This component is not designed to work in ATEX environment.

DANGER!
Pay close attention during the component maintenance phase, especially when disassembling components that contain pressurized springs internally.

ATTENTION!
No modifications must be made to the component to obtain performance different from that for which it was designed and built, unless authorized by the manufacturer.

ATTENTION!
Avoid introducing foreign bodies into the pneumatic system, even small ones, which could cause system malfunction and compromise machine safety.

The component can only be used by trained and authorized operators and only for the purpose for which it was designed and built.

The component is built in compliance with the technical safety standards in force at the time of its construction.

3.1 Component Safety Devices

ATTENTION!
Replacement of component safety devices is reserved exclusively for the manufacturer's technicians. This operation must be performed respecting the manufacturing specifications.

Safety devices must be maintained in working condition. For any replacement of safety components, use only original spare parts.

Safety devices are all those components (both mechanical and electrical) installed to ensure that personnel can work safely and in compliance with regulations in force at the time of construction. Nevertheless, personnel are required to maintain an adequate level of attention while in the vicinity of the component.

Some of these devices can be fixed and movable barriers, emergency button, electromechanical devices, signaling plates, and others, based on the type, design, and risk analysis of the component itself. The following lists the symbols used for some of the safety devices.

Symbol	Meaning	Presence
	**Emergency button:** A button that, when pressed, removes power from motors, securing the work area	NO
	**Fixed guards:** Devices designed to be static, for example doors that need a key to be opened. Generally do not need to be connected to alarms or block component functions since they can only be accessed through a key or other unlocking device.	YES
	**Movable interlocked guards:** Devices that serve to protect the operator while closed. If opened while the machinery is operating, an alarm is triggered and torque is removed from motors.	NO
	**Safety labels:** Labels placed in places where danger is present and attention is recommended.	NO
	**Air interceptor valve:** A device capable of maintaining air in a specific location even if line air is lost	NO
	**Pneumatic isolator:** A device used to regulate inlet air pressure and, if necessary, remove it (in case of interventions or problems)	NO
	**Electrical isolator:** Positioned just outside the electrical panel and serves to remove torque from motors and voltage from the entire system	NO
	**Light indicators:** A device that indicates the component status. Included in this chapter because it serves to indicate alarm states as well.	NO
	**Audible indicators:** Devices that serve to alert personnel of a particular event (can be an error or even end of cycle, based on settings)	NO

3.1.1 Static signaling devices

These are all devices that serve to signal to the operator or maintenance technician the presence of danger. Generally, static signaling devices can be labels or signs. This component does not have static signaling devices.

3.1.2 Guards (fixed and mobile interlocked)

These are all devices used to secure personnel by closing/blocking certain areas of the component, thus avoiding accidental crushing problems.

This component has the following devices:

- Fixed guard: 1 device provided by the protective carter (chapter 2.1 number 06);

3.1.3 Electrical and pneumatic disconnecting devices

These are all devices that serve to interrupt electrical or pneumatic flow in emergency cases or if maintenance needs to be performed. Pneumatic isolation devices serve to remove air from the system, but electrical power is maintained; while electrical isolation devices serve to remove voltage from the system.

This component does not have an electrical or pneumatic isolation device.

3.1.4 Emergency stop devices

These are all devices that serve to interrupt component operation instantaneously, removing torque from motors and deactivating auxiliary circuits.

This component does not have an emergency stop device.

3.1.5 Signaling devices (light and sound)

These are devices that signal certain component states to personnel. These signals can occur in two ways:

- Visual: through light indications of various colors positioned so as to be visible even from a distance;
- Audible: through sound indications.

This component does not have visual device types or audible device types.

3.2 Free useful spaces

These are spaces that must be respected during component installation and serve to allow personnel passage safely, as well as allow maintenance and cleaning interventions to be performed safely.

For this component, no particular useful spaces are required, since it is adapted to the work environment and fixed on a work bench. It is recommended to keep about 40cm of space on each side of the component itself.

3.2.1 Risk zones and residual risk

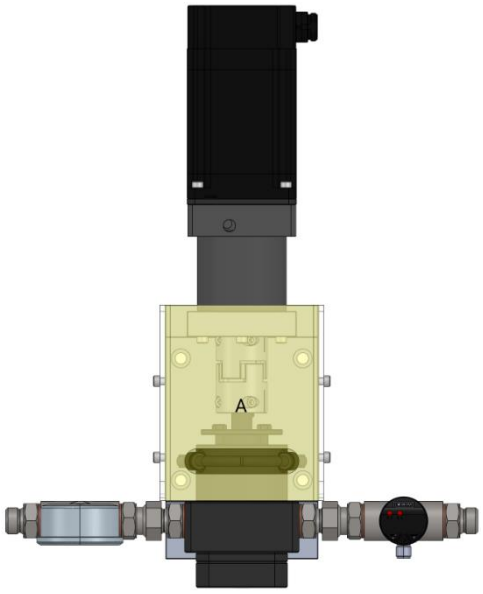
These are areas whose danger has not been completely removed and personnel are recommended to pay particular attention when near those areas. Some methods that remove risk can be the presence of two-hand commands or protections on moving area doors and electrical cabinet doors.

RISK ZONES

N.A.

RESIDUAL RISK ZONES

These are zones in which risks remain even if appropriate safety measures have been taken to reduce them.



In this case there is only one residual risk zone, given by the area under the protective carter (A)

ATTENTION!
Risk of crushing. Pay attention if the component is moving and the appropriate protection is opened.

4 TRANSPORT AND HANDLING

Once the goods are received, it must be verified that the packaging is intact and that there is exact correspondence with the ordered material.

ATTENTION!
The original configuration of the component must not be modified. The manufacturer is not responsible for damage caused by inappropriate use of the component.

ATTENTION!
If the packaging is not intact, immediately contact the manufacturer, also sending photos of the packaging condition. Do not open it before notifying the manufacturer.

5 INSTALLATION

Component installation is performed by the customer. If necessary, they can contact the manufacturer to have a specialized technician assist them.

The component has been designed to be used in line between a pressure/time dosing system and a pressure/time supply system, so as to perform volumetric dosing. Furthermore, it is equipped with 4 through holes located on the component base plate where M8X20 cylindrical head screws must be used.

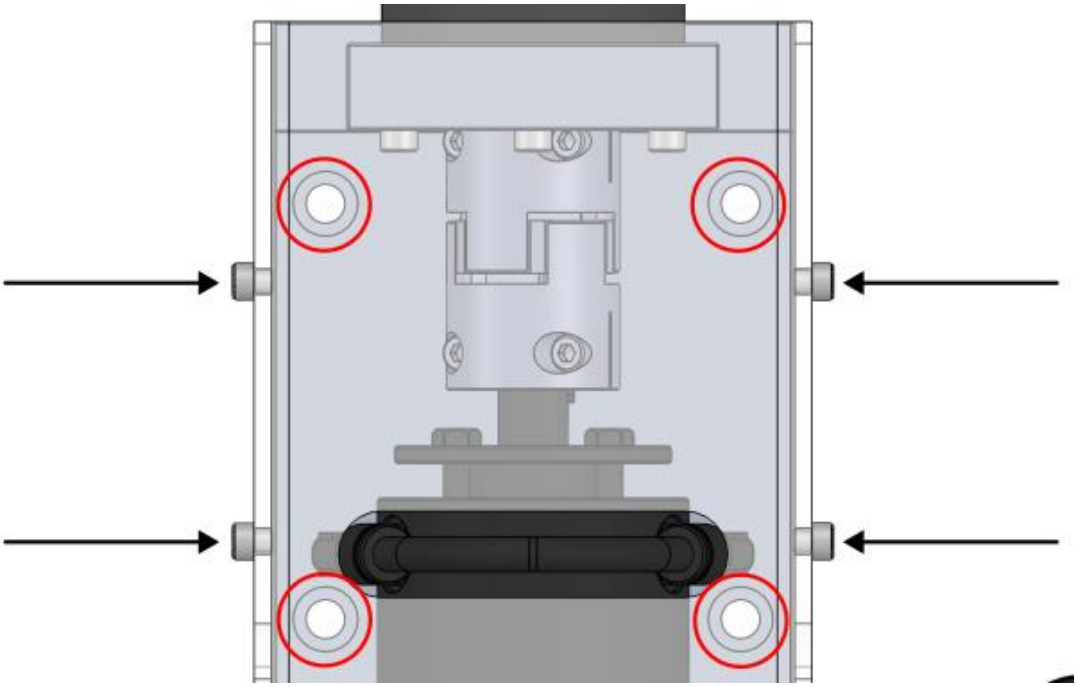
It is recommended to perform a component check before starting installation. If it shows evident damage, please contact the manufacturer.

ATTENTION!
Please remove packaging with maximum care. In case damage is caused to the component, the manufacturer is not responsible.

Perform packaging disposal correctly, considering the different nature of components and following the regulations in force in the Country.

5.1 Positioning

To position the component, the component shaft protection must be removed by unscrewing the 4 lateral screws of the protection itself (see arrows). Once removed, access is gained to the Ø9mm through holes, where 4 M8X20 screws must be used, as shown in the following image.



5.2 Connections

This chapter explains the connection method to be used for the component. The following types of connections are provided:

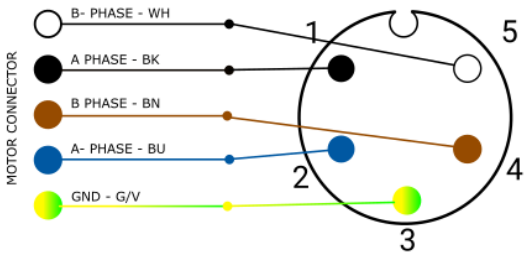
- Electrical connection;
- Fluidic connection;

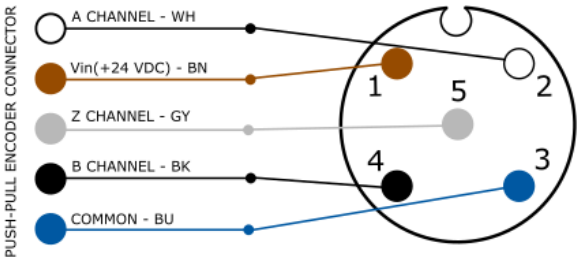
5.2.1 Electrical

Authorized personnel		**PPE to wear**	    
Component status	Installed control system		
Supply values	See chapter 2.2		
Necessary preparations	N.A.		
Required material	N.A.		
Required equipment	N.A.		

Electrical connection is the customer's responsibility.

To perform the electrical connection, the electrical cable (which must comply with the specifications reported in chapter 2.2) must be connected to the appropriate connectors, which must be connected to the controller respecting the connection direction. The following provides a diagram of what the connector pins do:





The encoder cable is M12 5-pole M type, while the motor cable is 7/8 5-pole M

5.2.2 Fluidic

Authorized personnel	 **PPE to wear**     
Component status	Component installed and shut down
Connection diameter	See chapter 2.2
Necessary preparations	N.A.
Required material	N.A.
Required equipment	N.A.

Fluidic connection is the customer's responsibility.

To perform the fluidic connection, the appropriate tube (which can be armored, PTFE, or other variants, based on the specific application) must be brought to the component inlet and outlet. Care must be taken to install the tube coming from the fluidic supply system at the inlet, while at the outlet the tube going to the dosing system.

In case the inlet and outlet are reversed, the pump can work equally, just remember to change the appropriate parameter within the control system and reverse the two pressure switches, since otherwise they would always go into error.

DANGER!
A high-pressure tube must be used at the pump outlet due to the pressure generated by the pump itself, especially in case of obstructions.

5.3 Commissioning

Component commissioning is performed once positioning and connection operations are completed. Before performing component commissioning, the following checks must be performed:

- Verify that connections have been made correctly;
- Verify that the component is free of dirt or residues of various types;

ATTENTION!
If even one of the points reported above is not compliant, commissioning must not proceed. Commissioning must proceed only when all points are successfully completed.

6 SOFTWARE

N.A.

7 PROCEDURE

N.A.

8 MAINTENANCE

Maintenance interventions are all those activities to be performed on the component which, if performed correctly, allow it to have a longer life. In general, maintenance is divided into two groups:

- **Ordinary maintenance**, which are interventions at regular intervals or that can be performed by the customer's personnel, are the most important activities as they allow the component to be maintained in good working conditions;

ATTENTION!
Ordinary maintenance interventions must be performed with the methods and timing indicated in the following chapters.

- **Extraordinary maintenance**, i.e., all those interventions that are not at regular intervals or that have not been foreseen, or interventions that cannot be performed by the customer. They can also arise from the lack of ordinary maintenance interventions.

ATTENTION!
Extraordinary maintenance interventions must be performed together with the manufacturer's specialized technicians.

Regarding frequency, it must be considered that:

- **When necessary:** Operation to be performed when the need to perform it is seen;
- **Every machine start or end of work:** Indicates a daily time period, in general. This can imply every 24 hours (therefore at the beginning of shift every day, or end of shift every day), or even more frequently, based on applications;
- **Long pause:** Indicates a time period greater than approximately one hour;
- **Every drum change:** Indicates every time the supply system is changed (tank, drum, cartridge or other);
- **Every mixer disassembly:** Indicates that every time the mixer is replaced, a specific operation must be performed;
- **Weekly:** Indicates a time span equal to seven calendar days;
- **Monthly:** Indicates a time span equal to one calendar month;
- **Semi-annual:** Indicates a time span equal to six calendar months;
- **Annual:** Indicates a time span equal to one calendar year.

ATTENTION!
The times indicated below are indicative as they depend on how the component is used. Follow the variations suggested by technicians.

Assigned	Description	Frequency	Chapter
	Oil check on transparent tube (No.06 Figure 01 chapter 2)[1]	Every component startup or end of work	\
	Perform superficial cleaning of the component	Every machine startup or end of work	\
	Check for leakage presence near the flexible coupling (No.17 chap. 2.1) of the component	Every machine startup or end of work	\
	Component seal replacement	Annual[2]	8.1
	Internal cleaning of main body	Annual	8.1

(1) If the tube is empty of oil, or if the oil is dirty, meaning not transparent, proceed with component seal replacement
(2) This time can vary based on use and fluid type. Ask the manufacturer for more information

ATTENTION!
For cleaning use only soft brushes or cotton cloths.

8.1 Replacing the Component Seals

Assigned	Periodicity	Materials and equipment
	Annual	• Allen keys 3mm, 4mm, 5mm, 6mm; • 10mm wrench; • Torque wrench with 6mm socket at 32 Nm.

PPE to wear

ATTENTION!
Before performing this procedure, it is necessary to discharge pressure from the system and disconnect the air connection.

This procedure serves to perform only component seal replacement. In case complete pump disassembly and reassembly is necessary, the appropriate application note must be requested from the manufacturer.

01

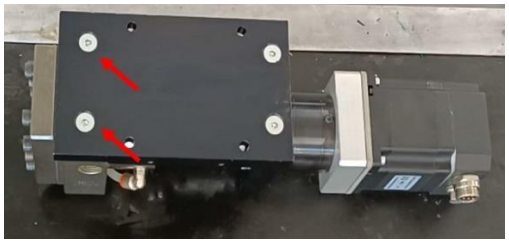
N.A.

Remove the screws from the carter using a 3mm Allen key and remove the carter, so as to access the internal area.

02

Loosen the two coupling screws on the pump side, so as to let the pump shaft slide freely.

03



Remove the screws (No.19 chap. 2.1) that keep the main body (No.20 chap. 2.1) locked to the pump base plate (No. 18 chap. 2.1). Once this is done, extract the pump main body.

04

Placing a cloth or container, remove the Legris fitting tube (No.34 chap. 2.1), so as to remove the oil inside the tube itself.

05

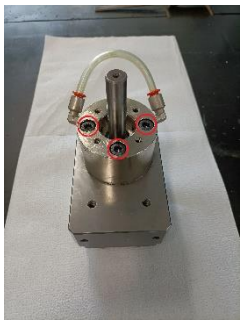
Unscrew the 4 screws (No.41 chap. 2.1) that keep the gland (No.40 chap. 2.1) under pressure with the gland hub (No. 36 chap. 2.1). Pay attention to any oil remaining inside the chamber.

06

N.A.

Remove the gland, lifting it with the help of a screwdriver so as to exert sufficient force to lift it. Once lifted, remove the Viton SM ring (No. 42 chap. 2.1) with the help of a flat screwdriver being careful not to scratch the component surface.

07



Remove the 4 screws (No.38 chap. 2.1) so as to be able to lift the gland hub (No. 36 chap. 2.1)

08

N.A.

The V-collar package (No. 37 chap.2.1) can be either on the component just removed or on the drive shaft, and can be either lip seals (if new version) or PTFE cord (if old version). In any case, remove them.

09

Place the V-collars two by two on the drive shaft, paying attention to the lip direction, meaning the V part must be placed toward the pump main body. Common grease can be used to facilitate their insertion.

10

N.A.

Insert the gland hub in the same position where it was removed at point 06 and apply the screws (No.38 chap. 2.1) tightening them to 32Nm.

11

Position the new Viton SM ring removed at point 05 in its position. To be able to fix it in its seat, use a vise, so that the ring can lock inside the gland.

N.A.

ATTENTION!
Do not use grease or oil to make the ring slide inside the seat, otherwise it could come out of the seat itself.

12

Position the gland in its position and fix it with the appropriate screws, removed at point 04, until resistance is felt, due to the V-collars. Do not go beyond

N.A.

The distance between gland and gland hub must be between 3 and 5 mm

13

Insert the tube into one of the two fittings and, through the other fitting, fill the tube with vaseline oil or equivalent, as long as it is white or transparent. The level is correct when it is possible to see both the air bubble and the oil from both sides of the tube.

Proceed with pump closure following steps 03, 02, and 01 in reverse order.

9 TROUBLESHOOTING

This chapter addresses the most common problems that could arise when using the component in this manual.

ATTENTION!

Once the operator has found a problem or suspects there is a problem, they must call the technician responsible for maintenance. Maintenance must always be performed by a specialized and qualified technician.

DEFECT	CAUSE	SOLUTION
There is inlet pressure but not outlet pressure	The electric motor does not receive power	Check motor connection
	The electric motor has rotation spikes	Check encoder connection
	Inlet and outlet fluidic connections have been swapped	Swap fluidic tubes
		Change controller settings
	Inlet and outlet sensors swapped	Check correct pairing between sensor and direction of use
	Main body gears are blocked	Perform internal cleaning of main body
The transparent control tube has no oil inside	Internal seals of main body are worn	Perform seal replacement
	The oil tube is not fixed correctly	Check that the tube is not damaged
	The external plate is not fixed correctly (No.40 chapter 2.1)	Tighten locking screws (No.41 chapter 2.1)
The transparent control tube has dirty oil inside	Internal seals of main body are worn	Perform seal replacement
Leaks from fluidic connections	Fittings are not well tightened	Check fluidic connection tightening
Low flow rate or low pressure despite set speed	The pump is not correctly fed at inlet	Ensure there is suitable flow rate/pressure at inlet
	Air enters inside tube connection	Check connections
	Worn pump	Inspect and possibly overhaul the pump
	Clogged filter (if present)	Inspect filter, clean or change it
Irregular dosing, air bubbles at outlet	The pump is not correctly fed at inlet	Ensure there is suitable flow rate/pressure at inlet
	Air enters inside tube connection	Check connections
	Worn pump	Inspect and possibly overhaul the pump
Drive shaft blocked	Fluid temperature is lower than operating temperature	Increase fluid temperature until reaching working temperature
	Gears blocked due to product	Inspect and possibly overhaul the pump
		Remove pressure and manually move flexible coupling (No. 17 chapter 2.1)
	Difference between inlet and outlet pressure too high	Reduce inlet (or outlet) pressure to the pump
Abnormal noises during operation	Pump cavitation	Increase supply pressure to the pump
	Speed too high for fluid viscosity	Decrease working speed
	Clogged filter (if present)	Clean filter
	Air bubbles inside fluid	Remove air bubbles from fluidic circuit

10 END OF LIFE

End of life means all those activities that put the component out of service. End of life activities can be:

- **Storage**, meaning when the component is temporarily placed inside the warehouse for future use;
- **Stocking**, meaning when the component is placed inside the warehouse for an unspecified period waiting for a third party to buy the component;
- **Dismantling**, meaning when the component has reached the end of work period, whether due to age, obsolescence, or faults that cannot be repaired, or that can be repaired but it is more convenient to buy a new component.

If installation is not planned in the short term, the component can remain packaged and must be stored in a sheltered and preferably enclosed place. The ambient temperatures to be respected are reported in chapter 2.2.

Instead, for dismantling and consequent scrapping of the component or its parts, the different nature of the various components must be considered and differentiated scrapping must be performed. It is recommended to entrust specialized companies for this purpose and current laws regarding waste disposal must always be observed.