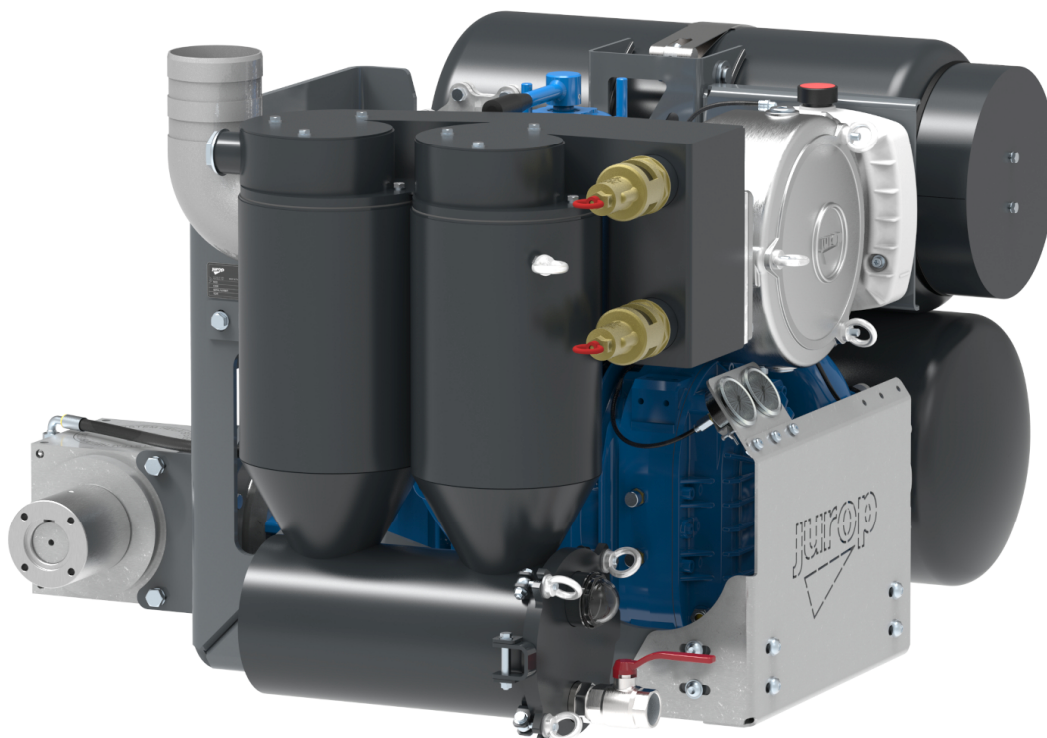
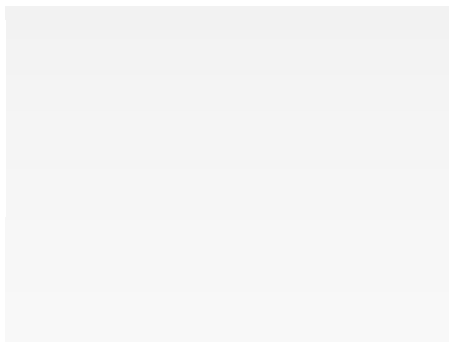


TRANSLATION OF ORIGINAL INSTRUCTIONS



SUPPLEMENT TO THE  
INSTALLATION, USE AND  
MAINTENANCE MANUAL



Rev. 00  
09-11-2023

COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV  
ISO 9001

COMPANY WITH  
ENVIRONMENTAL SYSTEM  
CERTIFIED BY DNV  
ISO 14001

COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV  
ISO 3834-2

2023 – **Juop** – Azzano Decimo (PN)

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## Contents

<b>1. General warnings</b>	page	4
1.1 Introduction		4
1.2 Request for spare parts		5
1.3 Warranty terms and conditions		5
<b>2. Technical data</b>	page	5
2.1 Dimensions HELIX 140-180-220 SYSTEM		6
2.2 Dimensions HELIX 300 SYSTEM		6
2.3 Dimensions HELIX 300 HYD SYSTEM		7
2.4 Performance		7
2.5 Hydraulic motor power supply		8
2.6 Noise		8
<b>3. Safety and accident prevention</b>	page	8
3.1 General recommendations		8
3.2 Intended use		9
<b>4. Installation</b>	page	9
4.1 Inspection on receipt		9
4.2 Warehouse storage		9
4.3 Handling		9
4.4 Example of unit installation on vehicle		10
4.5 Assembly - Power transmission		11
4.6 Start-up and preventive checks		13
<b>5. Maintenance</b>	page	13
5.1 HELIX compressor / vacuum pump		14
5.2 Suction unit		16
5.3 Silencers		17
5.4 Air filter		18
5.5 Cyclone purifier		18
5.6 Gearbox		21
5.7 Vacuum gauge and remote thermometer		21
SPARE PARTS SHEET – HELIX 140-180-220 SYSTEM		23
SPARE PARTS SHEET – HELIX 300 SYSTEM		26

# 1. General warnings

## 1.1. Introduction

This manual provides indications regarding the use and maintenance of the HELIX SYSTEM unit, as well as some warnings for the operator regarding basic safety regulations.

Knowing the information below is essential to use the unit properly.

Following the instructions below contributes to limiting unit repair expenses by extending its duration, as well as preventing hazardous situations, thereby increasing its reliability.

In case the hydraulic motor is present, refer to the specific manufacturer's manual.

It is essential to:

- Read and apply the instructions before starting up the unit.
- Keep the manual in a place known to all users.

Below is a brief description of the symbols used in this manual.

	Safety regulations, non-compliance with which may result in injuries to operators and significant damage to the unit or system
	Safety regulations, non-compliance with which may damage the unit or system
	Suggestions for using the unit respecting the environment
	Useful advice to simplify the use and maintenance of the unit

The graphic representations and photographs contained in this manual are there to illustrate the product in the parts that make it up and in specific operating phases. Though the model shown in the manual may differ from the one purchased, the operating principle at the base of the illustrated operating phase is the same.

Each HELIX SYSTEM unit has an identification plate, in which the following are detectable: code, model, serial number (the same as the vacuum pump/compressor) and year of construction.

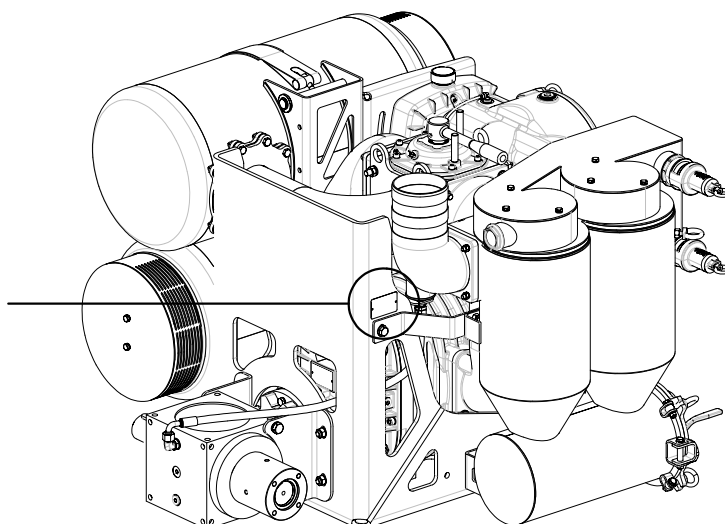
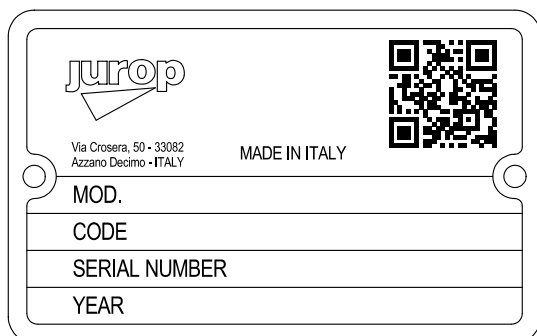


Fig. 1.1

**Each HELIX vacuum pump/compressor can only be installed if it has an identification plate.**

## 1.2. Request for spare parts

Use only genuine spare parts for maintenance and repairs.  
To order spare parts, provide the following details.

EXAMPLE:

a) Unit type	HELIX SYSTEM 300
b) Serial number (see plate):	J90001
c) Name (see list of spare parts):	CYCLONE PURIFIER
d) Quantity (see spare parts list):	1
e) Code (see list of spare parts):	14450 065 E0

## 1.3. Warranty terms and conditions

Compliance with the installation, use and maintenance instructions provided by this manual is a requirement for recognition of the warranty on defective parts.

## 2. Technical data

HELIX SYSTEM is a module consisting of a vacuum pump/compressor with a three-axis gearbox to be connected to the power transmission of the equipment on which it is mounted. The version with hydraulic motor has no gearbox.

HELIX SYSTEM is equipped with:

- Gearbox or hydraulic motor
- Direct drive - NO coupling
- Vacuum gauge and remote thermometer
- Cyclone purifier
- Injection/discharge silencers
- Air filter
- Flushing kit
- Swiveling conveyors
- 2-way valve set-up
- Oil level sensors

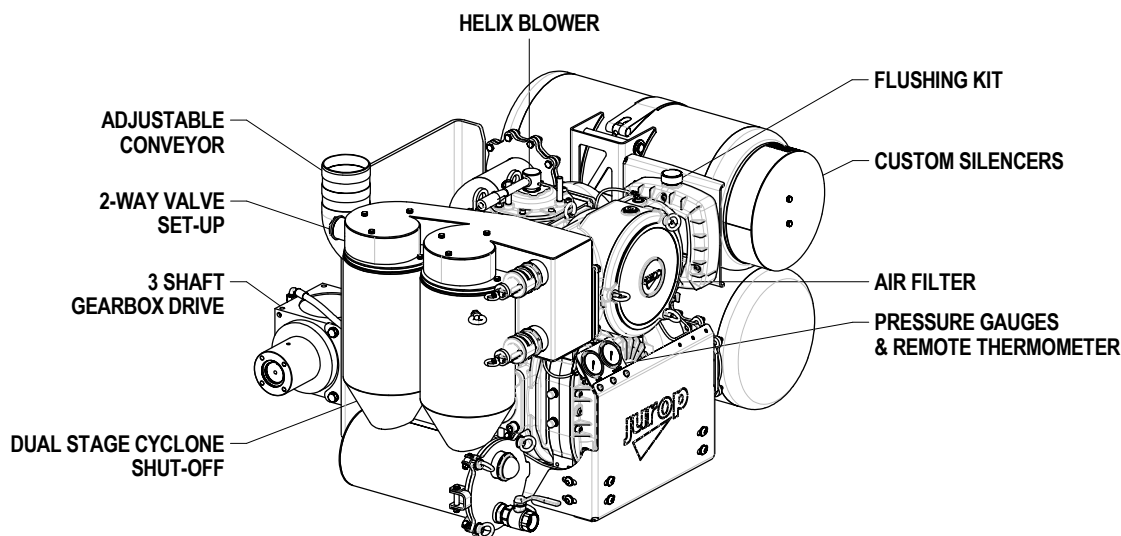
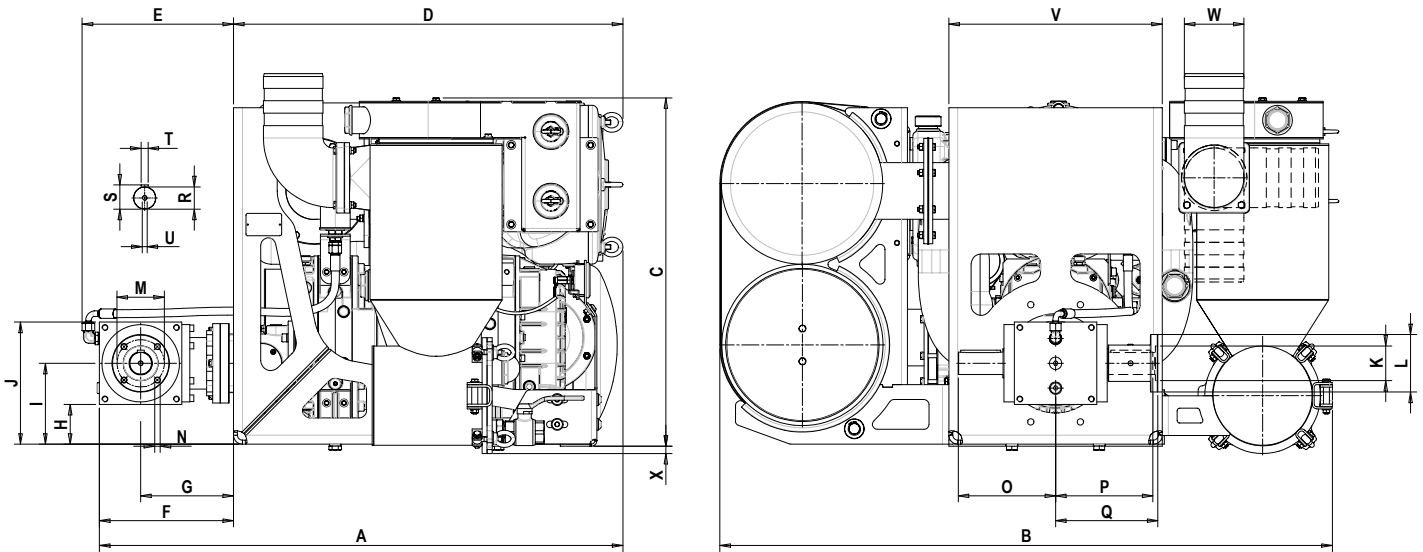


Fig. 2.1

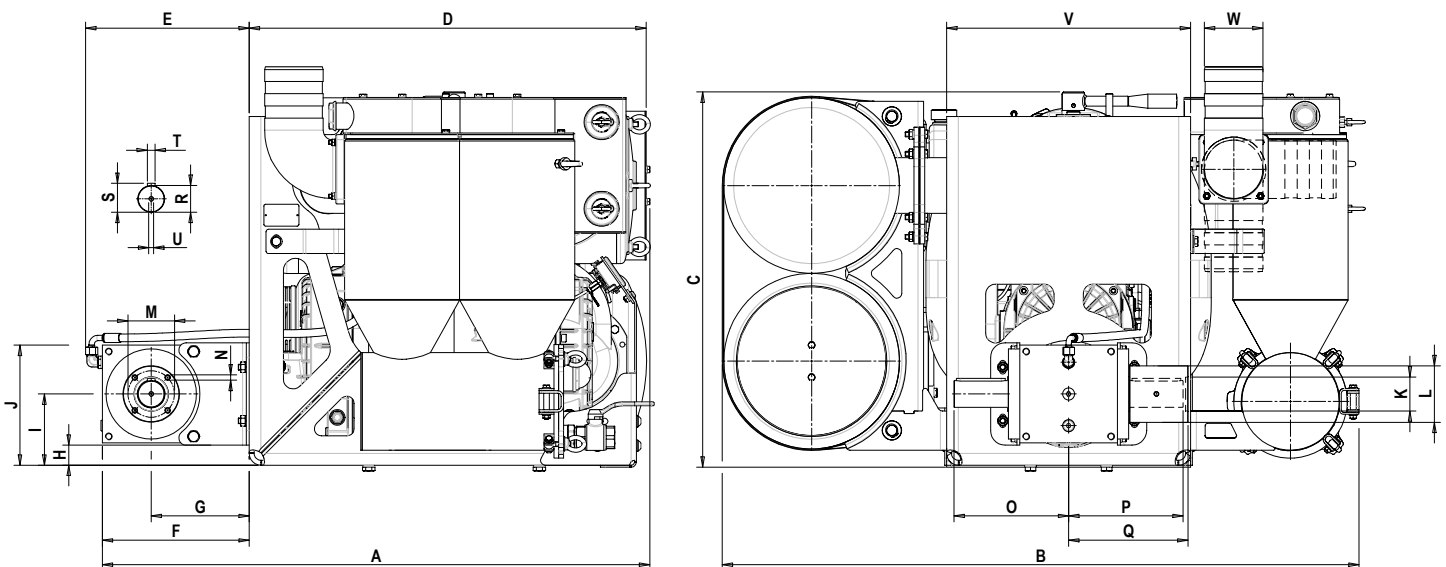
**2.1. Dimensions HELIX 140-180-220 SYSTEM**



		A	B	C	D	E	F	G	H	I	J	K	L
H.S. 140	in	39.5	49	28	31	10	8.7	5.4	3.1	6.4	9.7	Ø 2.8	Ø 5
	mm	1004	1234	702	784	255	220	137	80	163	246	Ø 69.8	Ø 116
H.S. 180	in	40.5	49	28	31	11	9.6	6.4	3.1	6.4	9.7	Ø 2.8	Ø 5
	mm	1029	1234	702	784	280	245	162	80	163	246	Ø 69.8	Ø 116
H.S. 220	in	42	49	28	31	12	10.6	7.4	3.1	6.4	9.7	Ø 2.8	Ø 5
	mm	1054	1234	702	784	305	270	187	80	163	246	Ø 69.8	Ø 116

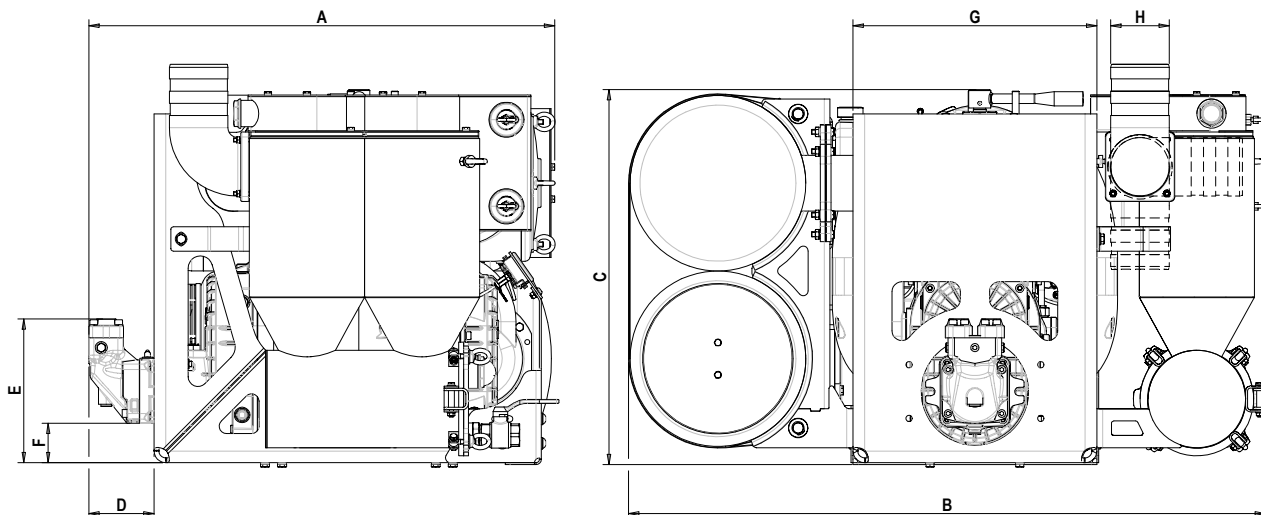
		M	N	O	P	Q	R	S	T	U	V	W	X
H.S. 140	in	Ø 3.8	Ø 0.4	7.7	7.7	8.1	Ø 1.8	1.9	0.6	0.4	16.9	Ø 4.7	1
	mm	Ø 95.2	Ø 11.2	196	196	206	Ø 45	48.8	14	M10	430	Ø 120	15
H.S. 180	in	Ø 3.8	Ø 0.4	7.7	7.7	8.1	Ø 1.8	1.9	0.6	0.4	16.9	Ø 4.7	1
	mm	Ø 95.2	Ø 11.2	196	196	206	Ø 45	48.8	14	M10	430	Ø 120	15
H.S. 220	in	Ø 3.8	Ø 0.4	7.7	7.7	8.1	Ø 1.8	1.9	0.6	0.4	16.9	Ø 4.7	1
	mm	Ø 95.2	Ø 11.2	196	196	206	Ø 45	48.8	14	M10	430	Ø 120	15

**2.2. Dimensions HELIX 300 SYSTEM**



		A	B	C	D	E	F	G	H	I	J	K	L
H.S. 300	in	44	51	30	32	13.2	11.9	7.9	1.6	5.7	9.7	Ø 3	Ø 5
	mm	1122	1306	769	814	336	301	201	41	146	246	Ø 70	Ø 116
		M	N	O	P	Q	R	S	T	U	V	W	
H.S. 300	in	Ø 4	7/16-20 UNF	9.3	9.3	9.6	Ø 2.2	2.3	0.6	0.4	19.7	Ø 4.7	
	mm	Ø 95	7/16-20 UNF	235	235	245	Ø 55	59.3	16	M10	500	Ø 120	

**2.3. Dimensions HELIX 300 SYSTEM with hydraulic motor**



		A	B	C	D	E	F	G	H
HDR	in	37.6	51	30	5	11.6	3.2	19.7	4.7
	mm	955	1306	769	134	295	81	500	120

**2.4. HELIX SYSTEM performance**

The unit can be equipped with gearbox. The gearbox reduction ratio is 1:2. This means that the speed required at the gearbox input is half the speed required by the vacuum pump.

**I The rotation speed values, found in the following table, are those of the required speed at the gearbox input. This does not apply to units with hydraulic motor.**

HELIX SYSTEM	140	180	220	300
Free inlet air flow rate (at rpm max)	500 cfm (14200 l/min)	642 cfm (18200 l/min)	755 cfm (21350 l/min)	1090 cfm (21350 l/min)
Max. rotation speed (with gearbox)	2000 rpm	2000 rpm	2000 rpm	1500 rpm
Recommended rotation speed (with gearbox)	1800 rpm	1800 rpm	1800 rpm	1400 rpm
Recommended rotation speed (with HDR motor)	-	-	-	2900 rpm
Maximum vacuum	27,3 Hg (91 %)	27,3 Hg (91 %)	27,8 Hg (93 %)	27,8 Hg (93 %)
Maximum no-load power	32 HP (24 kW)	43,5 HP (32 kW)	47 HP (35 kW)	75 HP (56 kW)
Maximum pressure	15 psig (1 bar)	15 psig (1 bar)	15 psig (1 bar)	15 psig (1 bar)
Power at maximum pressure	37,5 HP (28 kW)	48 HP (36 kW)	58 HP (43 kW)	79 HP (59 kW)
Helix System weight with gearbox	888 lbs (403 kg)	915 lbs (415 kg)	944 lbs (428 kg)	1197 lbs (543 kg)
Helix System weight with HDR motor	-	-	-	1127 lbs (511 kg)

REFERENCE CONDITIONS - The data shown in the table are subject to a tolerance of +/- 5%.		
Conveyed gas: air	Reference temperature: 20°C(68°F)	Vacuum operation: atmospheric discharge
	Reference absolute pressure: 1013mbar (14.7psi)	Pressure operation: atmospheric intake

## 2.5. Hydraulic motor power supply

The performance data of the hydraulic motor are given in the following table.

HELIX 300 SYSTEM with hydraulic motor			
Displacement	40 cc/rev	Filtration class	20/18/13 (ISO 4406)
Continuous pressure <sup>1</sup>	420 bar	Optimal viscosity	15-30 cSt
Max. drain line pressure	1 bar	Max. viscosity	1000 cSt
Fluid	HLP	Max oil temperature <sup>2</sup>	80 °C

<sup>1</sup> Motor in continuous service. With pump operating within the prescribed operating limits, the actual working pressure is always lower. | <sup>2</sup> With reference to the temperature of the oil present in the main circuit.

## 2.6. Noise

The sound pressure and sound power values of the pump are given inside the HELIX vacuum pump/compressor manual.

The noise value in Db varies according to the system realised, and the supply and suction pipes. Please remember to use Personal Protective Equipment (headphones) to reduce the effect of noise.

Sound power verification cannot be performed without completion of the vacuum line system. This verification is the responsibility of the final installer.

## 3. Safety and accident prevention



Apply these prescriptions carefully.

### 3.1. General recommendations

When transporting the unit, fasten appropriately. Rest the unit on stable points.

Installation and maintenance must be done with the unit stopped, power transmission disengaged and by skilled personnel.

Work on the unit dressed appropriately (avoid ties, wide sleeves, necklaces, etc.) and using suitable protective equipment (gloves, goggles, shoes, etc.).

Before any maintenance operations, stop the unit and bring the system back to atmospheric pressure.

To intervene on the unit, all the components of the unit must be stopped and cold.

To prevent errors and hazardous situations, establish what each operator is responsible for in the different maintenance operations.

Final manufacturer must make the transmission inaccessible by means of a fixed guard or interlocked movable guard. Do not start the unit up without the safety devices required for the transmission parts. Replace damaged protections.

Operators working in the vicinity must avoid prolonged exposure to the noise emitted by the suction equipment if they are not equipped with suitable protection (PPE recommended: ear protectors).

The components can reach very high temperatures (over 90°C) during operation. Use all means necessary to avoid contact.

During vacuum operation, avoid accidental intake of solids: they can be projected at high speed through the discharge manifold, damaging the silencer.

Safety valves: direct the air flow away from operators.

Do not use the unit beyond its limits of use: risk of breakage with consequences for the operators.



Do not exceed the rotation speed and maximum pressure given in the technical table in paragraph 2.4.

Based on the final use of the unit, the insertion in the housing machine and the typology of the same, the designer of the housing machine must apply safety signals (pictograms) to warn the operator on the risk still present. These pictograms essentially refer to three categories:



- signals prescribing the use of Individual Protection Devices (IPDs) such as, in this case, the use of gloves and ear protectors;
- signals indicating to pay particular attention to the dangers related to the machine's components, such as: risk of dragging in the transmission equipment and contact with hot surfaces;
- signals indicating specific parts of the machine for an easier identification, such as: greasing points, oil tanks, etc.

### 3.2. Intended use

HELIX SYSTEM units are intended to be used for loading and unloading liquid material. The units are used for liquid waste transport, septic tank cleaning and other industrial applications.

The HELIX compressor / vacuum pump is suitable for conveying pollutant-free gas such as suspended oil or water: this is enabled thanks to the absence of contact parts and thus lubrication oil inside the compression chambers.

The installer shall use all possible means to prevent foreign objects and liquids from entering the vacuum pump/compressor.



**The entry of foreign objects or liquids may damage the vacuum pump/compressor**

E Avoid suctioning of toxic materials and flammable or explosive gases as the internal components can reach high temperatures.



**Avoid suctioning of toxic materials and flammable or explosive gases as the internal components can reach high temperatures.**

Do not use the unit beyond its intended operating limits (see par. 2.4): risk of breakage and possible transmission damage.

## 4. Installation

### 4.1. Inspection on receipt

When goods arrive, make sure all items are intact: they may have been damaged during transport.

Remove the packaging by removing material that may become hazardous if vacuumed.

Make sure that the HELIX vacuum pump/compressor has the identification plate. Pumps with no plate are considered anonymous and potentially dangerous: they must, therefore, not be used, otherwise the manufacturer cannot be held liable for any event.

### 4.2. Warehouse storage

If the unit is not expected to be used for a long time or in the case of intermediate storage of a non-new unit, observe the following:

- Perform thorough cleaning of the unit before storage, using the flushing kit. The procedure is given in paragraph 5.1.
- Store in a closed and dry place.
- During storage, rotate the input shaft three or four turns every two weeks to keep the internal gears lubricated.

### 4.3. Handling

Verify before each move that lifting equipment is suitable for the capacity. Check the weight of the unit given within this manual.

Harness the machine with suitable straps / chains near the main body, paying attention to the position of the mass center of gravity to ensure the load stability.

The unit is equipped with hooking devices: two sheet metal eye rings and an eyebolt (fig. 4.1).

The hooking devices are screwed into the top of the unit, at a position equidistant (approximately) from the center of gravity of the masses of the unit, to ensure stability during handling.

The unit has no components or accessories that are potentially dangerous, or that can move during lifting, handling or tilting.

When moving, do not lift the packaging or the machine more than 50 cm from the ground. Proceed with the final lifting only near the installation point.

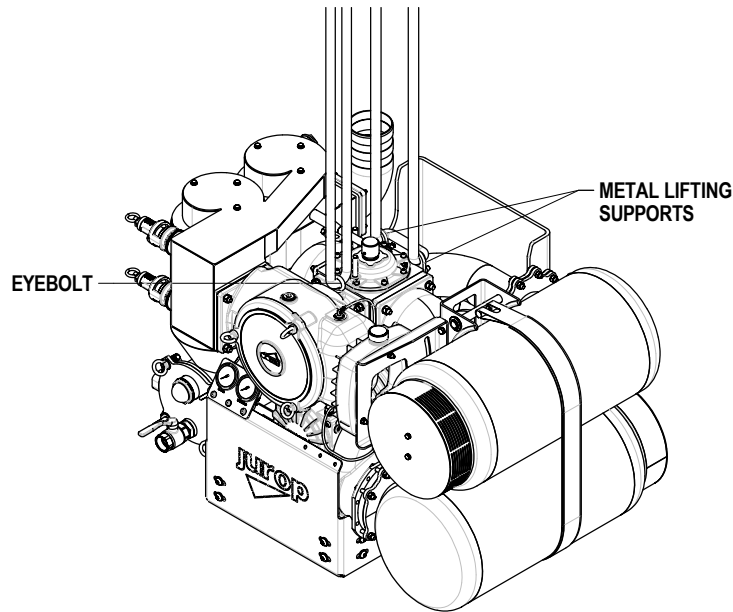


Fig. 4.1

Check that there is space in height to handle the module, once lifted.  
Before lifting the module completely, make sure that transport stability is guaranteed.



**Do not stand under the machine when it is lifted during the installation.**

Before placing the module on the ground, check that:

- It is level, or with a maximum permissible inclination of 3° (degrees), with respect to the horizontal surface.
- There is enough space for people or any vehicles to pass, or to conduct other activities.
- It is not too close to heat sources or open flames, is not on walkways.
- It is stably balanced and accessible from all sides for the activities required for its operation.

#### 4.4. Example of unit installation on vehicle

The frame of the unit lacks the drilling for vehicle installation.

Drill holes in the frame of the unit.

The unit must be connected to the frame by at least 8 M16 class 8.8 bolts, distributed over the entire area. Arrange bolts on a 4x2 matrix; when possible, increase the number of bolts.

Use frame bolts, fine pitch screws and flanged nuts.

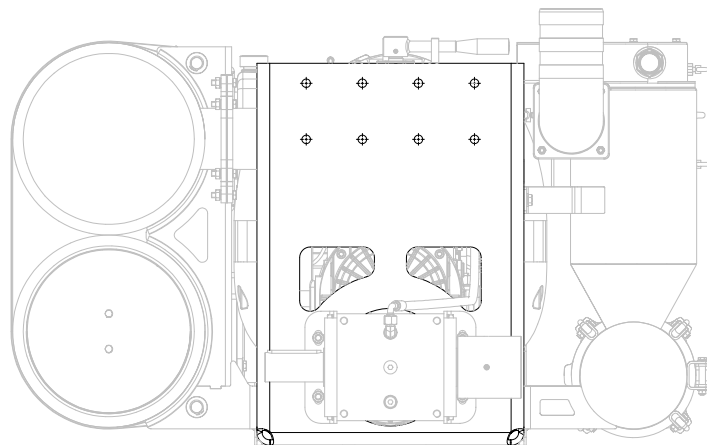


Fig. 4.2

### 4.5. Assembly - Power transmission

For HELIX SYSTEM units, the permissible power transmissions are:

- Direct transmission (e.g.: from agricultural cardan shaft)
- Oil hydraulic transmission (for versions with hydraulic motor).

Protect with a fixed or interlocked guard and signal with pictograms the power transmission chosen and applied by the final installer, if there is the possibility that the operator will come into contact during handling.

#### CARDAN TRANSMISSION

Use telescopic cardan shafts.

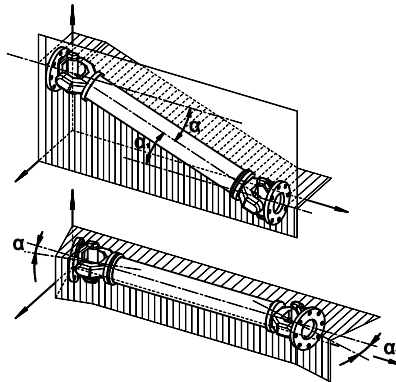


Fig. 4.3

In order to achieve uniform motion of the driven axis, the following conditions must be met (see Fig. 4.3):

- Equal joint angles  $\alpha$  and  $\alpha_1$  of the two joints;
- The inner forks of the joints must be coplanar;
- Driven shaft and coplanar conductors.

It is also advisable to work with small joint angles (max 15° at 1000 rpm and max 11° at 1100 rpm) and to stop the transmission during maneuvers in which the joints work at large angles (steering or lifting).



**Respect the direction of rotation of the unit. Comply with the cardan shaft manufacturer's directions.**

It is the responsibility of the final installer to provide for suitable guards, in presence of transmission shafts exposed during normal operation.



**In any case, the installation, by the final installer, must meet current accident prevention regulations.**

#### OIL HYDRAULIC TRANSMISSION

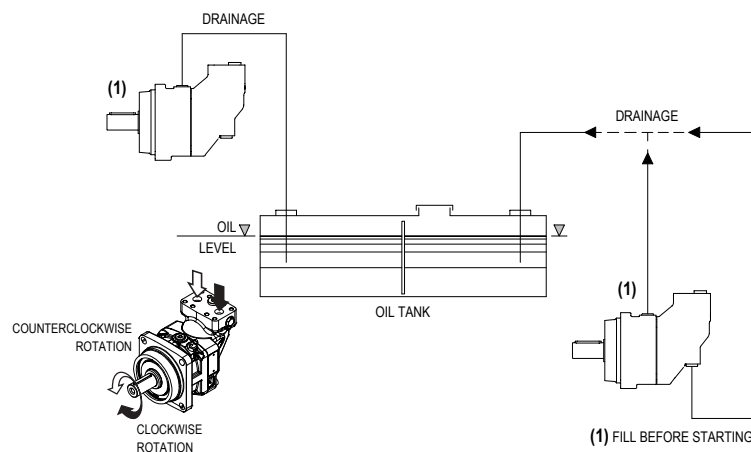


Fig. 4.4

The unit can be supplied with a hydraulic motor instead of a gearbox. Performance data are given in paragraph 2.5.

- Features: fixed displacement high-pressure motor usable in open or closed circuits.
- Flow rate and pressure: to be defined according to the required performance of the decompressor (operating speed and pressure).
- Fluid: mineral oil for HLP DIN51524 hydraulic systems and mineral oil for HL/HM ISO6743-4 hydraulic systems.
- Filtration: class 20/18/13, according to ISO 4406.
- Check the circuit connections: they must be consistent with the direction of rotation of the decompressor indicated by the arrow attached to the front flange of the pump.
- Drainage: connect so that the motor never runs out of oil. Connect the drainage of each motor directly to the tank. Discharge into the tank under the free surface or bend into a U.

DRAINAGE THREADING	IN/OUT FLANGING
M18x1.5	SAE 3/4" 6000psi

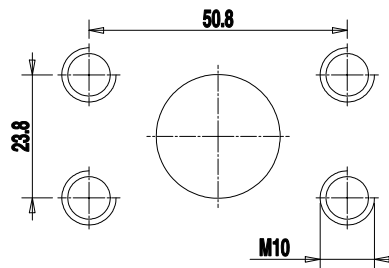


Fig. 4.5

- Start-up: make sure the system is well cleaned and put oil into the tank and motor body (needed for lubrication of internal bearings).
- Vent the circuit and calibrate the maximum pressure valve to the lowest possible value.
- Check the level in the tank.
- Increase pressure and rotation speed up to the working values.
- Avoid reverse rotation when stopping the unit as it can damage the motor with both open and closed circuits. Protect the oil hydraulic circuit from excessive pressure.

**Caution: avoid rotating in the opposite direction when stopping the unit as it can damage the motor.**

Check the rotation speed using the inductive sensor on the front box (use the fitted hole). Connect to a rev counter for inductive sensors 2 kHz max and calibrated for a number of teeth Z (4, for HELIX SYSTEM 300). Or, alternatively, use the service holes on the bell, if any.

The inductive sensor must be powered at 12-24V DC from the rev counter.

Fig. 4.6 shows the wiring diagram of the inductive sensor.

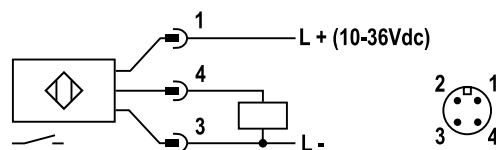


Fig. 4.6

The design of the pipes is the responsibility of the machine / plant manufacturer.

**The design of the pipes is the responsibility of the machine / plant manufacturer.**

#### 4.6. Start-up and preventive checks

It is necessary to check some items before placing the unit on motor vehicles:

- Sufficient size of opening through which to pass the module.
- Stability of the vehicle before and after placing the module. The assembled unit must be accessible for maintenance (longitudinal and transverse tilt max 3°).
- Verification of the total center of gravity (after placing the module on-board).
- Any leaks or refill points for liquids and/or lubricants are reachable for activities necessary for operation.

Before using the unit for the first time, or when using it again after periods of inactivity, check that:

- All components, especially the guards, are present.
- All components are firmly attached.
- Lubricant oil does not leak from the unit.
- If the module is placed on-board a vehicle, it is appropriately fixed and not free.
- The pneumatic actuator of the 4-way diverter, if any, is properly fed and occupies one of the two limit switch positions.
- The hydraulic pump, if any, is properly fed. Dry operation may damage it (risk of seizure).
- There are no obstructions along the suction hose.



**Evidence of any unsuitable conditions for operation involves machine shutdown, or non start-up or a precautionary start-up in safe conditions.**

Misuse, negligence, attempted repairs or modification by unauthorized personnel, will void the warranty conditions and terms.

#### 5. Maintenance and operation tips

To ensure optimal working condition of the HELIX SYSTEM unit, regular maintenance of the unit is recommended.

Use the necessary personal protective equipment before checking the performance of the unit (checks with the unit running). The noise level can exceed 90 dB.

Any maintenance interventions must be performed when the machine is cold, stopped and switched off.

Wear the required PPE (e.g. gloves, etc.) during maintenance.

All disassembly and reassembly operations must be done exclusively by qualified, trained personnel.

The following table summarizes the main checks to be performed and the frequency of intervention.

Status	Intervention area	Check	8 h	50 h	500 h	2000 h	
Unit in operation	Vacuum / pressure line	Checking the efficiency of safety valves (check valve)	•				
		Operating pressure	•				
	Transmission / pump	Rotation speed	•				
		Noise	•				
		Temperature	•				
Unit stationary	Air filter	Air filter cleaning		•			
	Cyclone	Cyclone purifier discharge	•				
	Pump	4-way diverter (optional): adjust and grease			•		
		Checking gearbox lubricant level	•				
		Front box lubricant replacement				•	
		Rear box lubricant replacement				•	
		Internal washing of the vacuum pump/compressor		See dedicated paragraph			
Gearbox	Lubricant replacement					•	

JUROP S.p.A. provides technical support for any information.



**Maintenance operations that require complete disassembly of the HELIX vacuum pump/compressor should be performed at an authorized JUROP service center.**

### 5.1. HELIX compressor / vacuum pump

For more information on routine and extraordinary maintenance of the HELIX vacuum pump/compressor, follow the instructions contained in the specific manual.

#### Lubricant replacement

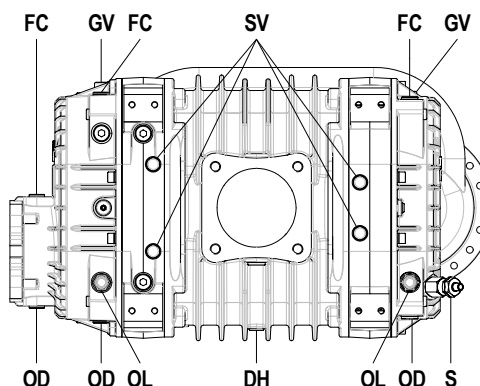


Fig. 5.1

<b>OL</b>	Oil Level	<b>GV</b>	Gearbox Vent	<b>OD</b>	Oil Drainage	<b>DH</b>	Drainage Hole
<b>S</b>	Oil Level Switch	<b>SV</b>	Seals Vent	<b>FC</b>	Filler Cap		

Perform the first oil change after 500 hours. Every 5,000 hours thereafter, but no more than 12 months.

Check the oil level in both boxes (front/rear) with the machine cold, stopped and turned off. Oil level must not drop below the minimum: risk of rapid wear of internal components.

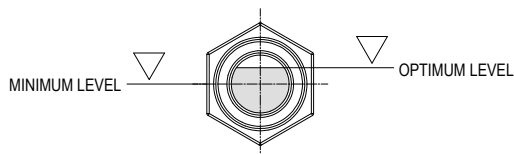


Fig. 5.2

Deterioration of the internal lip seals causes the oil level in the boxes to drop. It is recommended that the oil level be checked often: daily or, at most, weekly since frequent topping up indicates seal wear.

Slowly pour the required amount of oil into the boxes.

**Resorting to a funnel and hose can make refilling easier.**

Top up with the same type of oil; mixing different lubricants is prohibited.

Recommended lubricant: Q8 El Greco 150 synthetic gear oil. Alternatively, the following PAO synthetic lubricants (for temperatures between -15°C and +40°C) are recommended:

Viscosity ISO VG 150	Q8	EL GRECO 150	ESSO	MOBIL SHC 629	TOTAL	CARTER SH 150	BP	ENERSYN HTX 150
	ENI	BLASIA SX 100	SHELL	MORLINA S4 B 150	MOBIL	SHC 629	TENNEX	FACTOR SYNT 150

Recommended lubricating grease (for temperatures between -20°C and +40°C):

Viscosity NLGI 2	Q8	REMBRANDT EP 2	ESSO	GP GREASE NLGI2	TOTAL	MULTIS EP 2	BP	GREASE LTX EP 2
	ENI	GR MU EP 2	SHELL	ALVANIA G. EP 2	MOBIL	MOBILUX EP 2	TENNEX	UNI. GREASE EP 2

The following table shows the amounts of lubricant contained in the front and rear boxes.


	FRONT BOX	REAR BOX
HELIX 140	0,25 l	0,5 l
HELIX 180	0,25 l	0,5 l
HELIX 220	0,25 l	0,5 l
HELIX 300	0,65 l	0,5 l

During the oil replacement, also replace the discharge plug washer.

 **Dispose of waste oil as required by current regulations.**

Operation with insufficient lubrication can cause the internal drive transmission and retaining parts to wear rapidly and/or the vacuum pump / compressor to lock, also damaging the transmission.

Inspection and maintenance of vacuum-pressure line components (filters, safety valve, gaskets, etc.), transmission components (belts, hydraulic drive, etc.) and control and regulation components (rev counter, sensors, etc.), should follow the instructions of the fitter.

 **Inspection and maintenance of vacuum-pressure line components (filters, safety valve, gaskets, etc.), transmission components (belts, hydraulic drive, etc.) and control and regulation components (rev counter, sensors, etc.), should follow the instructions of the fitter.**

### Oil level electric sensor

The HELIX vacuum pump/compressor is equipped with two optical oil level sensors located in the front and rear gearboxes, respectively. When the minimum oil level is reached, the electric switch should feed alarm devices.

The oil level alarm should work only when the vacuum pump/compressor is stopped.

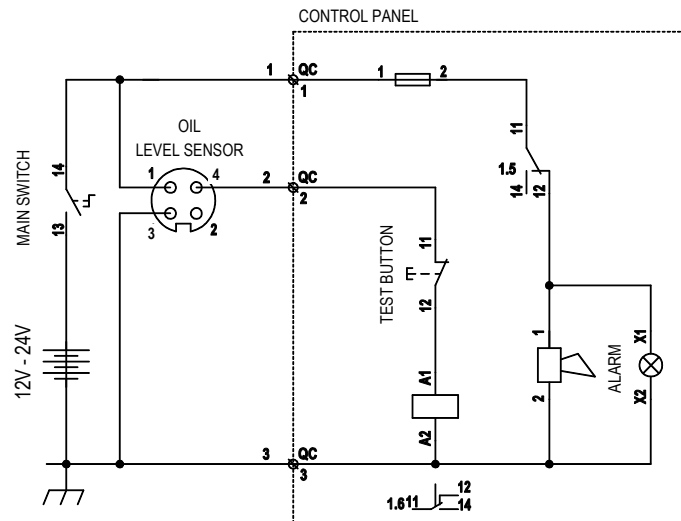


Fig. 5.3

Electrical characteristics of the K11 switch:

- DC power supply: 10-28 V;
- AC power supply: 24 V;
- Protection: IP65 (IEC 529 and DIN 40050);
- Working temperature: -40 to +125°C.

The switch contact for feeding the coil of a power relay is of the NC (normally closed) type. In this way (see wiring diagram above) the alarm device is triggered even in case of accidental breakage of the connecting wires (system failure protection).

Operation with insufficient lubrication can cause the internal drive transmission and retaining parts to wear rapidly and/or the compressor to lock, also damaging the transmission.

Stop and refill the gear boxes with the recommended type of lubricant

**Internal washing of the vacuum pump/compressor**

After operating in dusty environments, after accidentally aspirating liquids, or before a long period of inactivity, internal flushing of the suction equipment is recommended. Wait until the pump has cooled down before this operation; avoid this maintenance operation on very hot suction equipment (e.g., after a day's work) without cooling it down first.

The Flushing Kit is specifically designed for the maintenance of the HELIX vacuum pump/compressor. The use of the kit helps to limit the pump repair costs by increasing its service life. Weekly use of the Flushing Kit is recommended, preferably at the end of the work week and whenever the need arises. Mode of use:

- Wait until the vacuum pump/compressor has cooled down before performing this operation.
- Start the vacuum pump/compressor at medium speed.
- Open the ball valve, allowing the flushing fluid to escape. We recommended the use of Henkel BONDERITE C-NE 5225; 5% concentration in water.

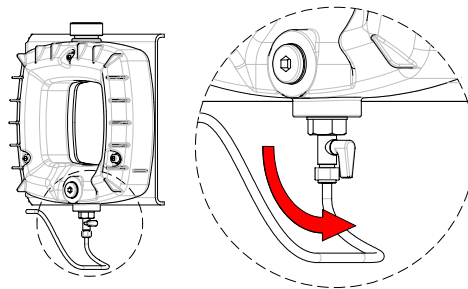


Fig. 5.4

- Flow about 0.2 l of product before closing the ball valve.
- Leave the vacuum pump/compressor running for about a minute after the valve closes, allowing fluid to escape from the pump.
- Stop the vacuum pump/compressor.
- Drain the flushing fluid and dispose of as required by current regulations.



**Recover the liquid detergent or oil residue and dispose of in compliance with the regulations in force**

**5.2. Suction unit**

The suction unit consists of: aluminum and cast iron conveyors, 4-way valve (manual or pneumatic), flap check valve.

Provide for the necessary space to reach the manual 4-way valve to operate it.

Check which position of the built-in 4-way allows vacuum operation and which allows pressure operation.

By turning the manual lever of the 4-way valve, the vacuum pump/compressor switches from suction to compression operation and vice versa.

Avoid placing the lever halfway between the two positions so as not to have neutral operation of the vacuum pump/compressor.

In the case of pneumatic valve, refer to the note below.

**Pneumatic actuator installation**

Fluid		Filtered, dried compressed air
Filtration		ISO 8573-1 class 4 (15 microns)
Temperature	°C	-20 ÷ +80
Nominal Pressure	bar	5.6
Maximum Pressure	bar	8.4
Supply Holes		G 1/4

Adjust movement speed by applying two unidirectional flow control valves. Full rotation should not take less than 1 second.

Fluid filtration: ensure a level equal to or greater than the recommended value.

In the event of pneumatic supply failure, the suction unit inverter will remain in the same position it was when the failure occurred.



### Pneumatic actuator maintenance

N Normally the diverter, once adjusted at the time of installation, requires no further adjustment.

- Diverter lubrication: use NLGI 2 lithium grease. Quantity: 80-100 g every 1000 work cycles.
- A vent hole covered by a filter prevents overfilling of the cavity. Clean the filter if it is dirty.
- For non-dried air, use temperature 0 to +80°C.

In case of interruption of the pneumatic supply, the inverter of the suction unit remains in the same position it was when the failure occurred. The following figure shows a possible schematic view of a pneumatic connection.

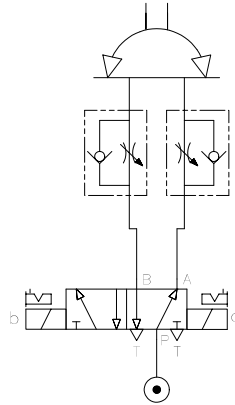


Fig. 5.6

### 5.3. Silencers

Silencers installed at the discharge and injection line of the HELIX vacuum pump/compressor in order to ensure that the noise produced by it is reduced.

The discharge silencer (when assailed by compressor / vacuum pump discharge airflows) is subjected to the passage of high-temperature air that may cause overheating (over 90°C).

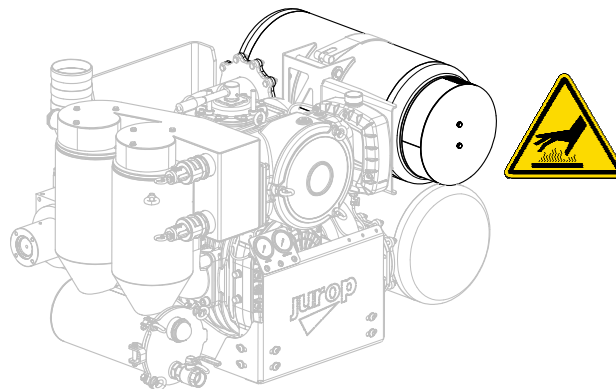


Fig. 5.6

	<b>Use all means necessary to avoid contact.</b>
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### 5.4. Air filter

The air-filter prevents foreign bodies (over a certain size) from entering the pumping system.

Maximum operating pressure	-1 / +0,5 bar
Calculation pressure	-1 / +4 bar
Maximum air flow rate	3600 m³/h
Degree of filtration	mesh 55, with mesh hole ø 0.30 mm (at 300 µm)

The table shows the main operating parameters concerning maximum operating pressures (relative), calculation pressure (relative), air and water flow rate, degree of filtration and weight.

Under ordinary use conditions, we recommend cleaning the filter on a weekly basis. In the event of heavy duty conditions, clean (or replace) the cartridge every time the line performance appears to be compromised. The filter must be cold cleaned.

For routine maintenance proceed as follows.

- Unscrew the eyebolts and remove/open the cover.
- Remove the filtering cartridge and the relevant sealing gaskets, wash with detergent and blow with compressed air until clean.
- Dry the cartridge and the entire filter thoroughly.
- Reinstall the previously removed components taking care to place the gaskets correctly.

The following figure shows a schematic diagram of the maintenance procedure.

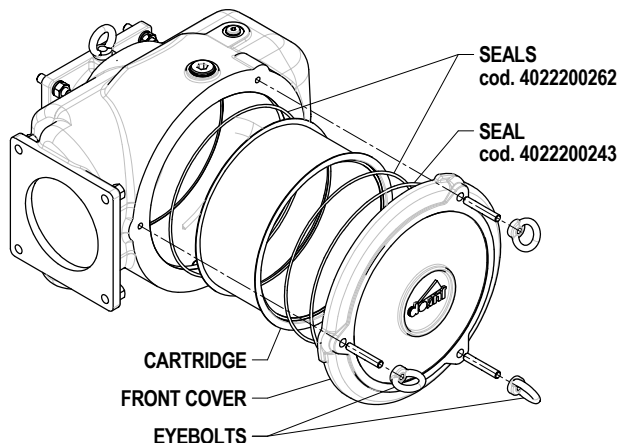


Fig. 5.7

We recommend using non-flammable detergents with passivating and protective properties.



**Recover the liquid detergent and dispose of it in compliance with the regulations in force.**

### 5.5. Cyclone purifier

The purifier prevents foreign bodies (liquids or solids) from entering inside the HELIX compressor / vacuum pump by blocking the intake line with a metal floating ball.

The cyclone consists of a vertical cylinder, which tangentially receives the flow to be purified at high speed. As a result of centrifugal force, the various elements contained inside the fluid are separated according to their density. The purified fluid is freed through the upper axial outlet, whereas the material to be recovered is collected in the lower part and continuously discharged.

The following table shows the main operating parameters concerning maximum flow rate, design pressure and weight of the cyclone purifier.

Maximum air flow rate	1850 m³/h (HELIX 300), 1280 m³/h (HELIX 140-...220)
Design pressure	-1/+4 bar

Under ordinary use conditions, we recommend discharging the purifier on a daily basis. In the event of heavy duty conditions (e.g., intake of high and particularly volatile substances), drain every time the level indicator warns that the cyclone purifier is full.

The material is discharged through the ball valve installed on the lower side.

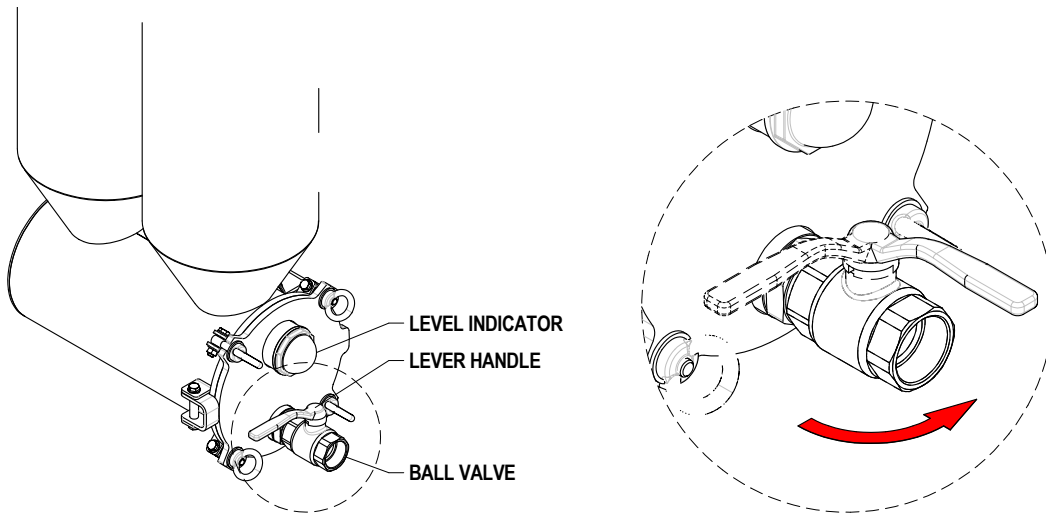


Fig. 5.8

 **Recover the liquid detergent and dispose of it in compliance with the regulations in force.**

After long periods of use, the seal of the cyclone purifier can be worn and, therefore, can lose its tightness.

Remove the eyebolts to open the lid of the collection vessel. Replace the gasket and clean all components. Reinstall the previously removed components.

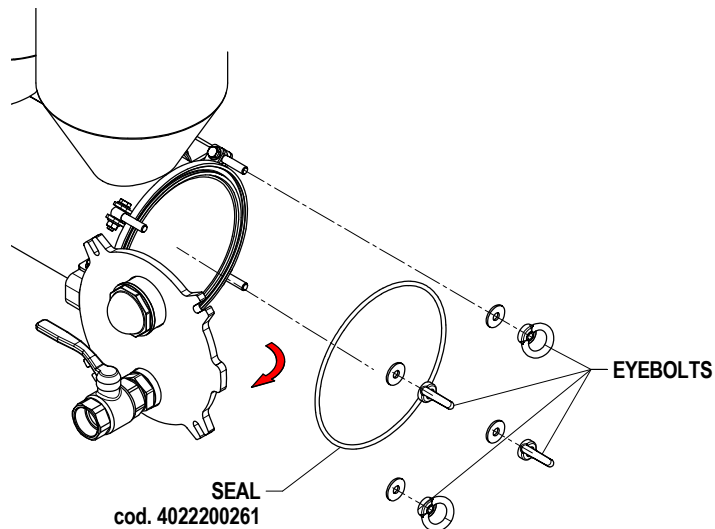


Fig. 5.9

We recommend verifying the operation of the overflow valve periodically, ensuring that the floating ball can move freely.

Remove cover and basket, checking seals and gaskets for wear. Replace if necessary. Clean and reinstall the previously removed components.

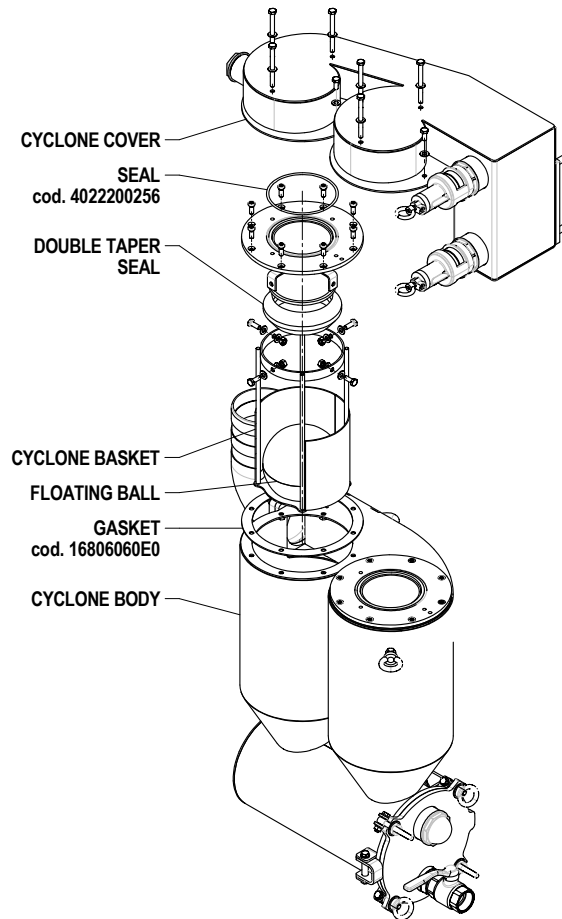


Fig. 5.10

The unit comes with two safety valves (2"), attached to the cyclone.

The function of the valve is to prevent the pressure inside the tank from exceeding the predetermined limit. Therefore, an air discharge occurs through the valve.



**When operating the pressure relief valves, pay attention to the outflow of air.**

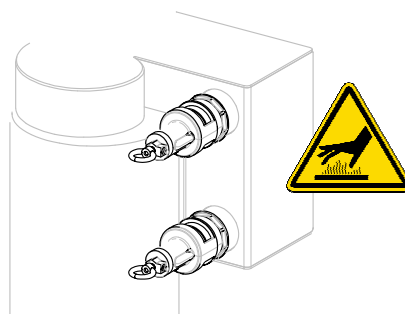


Fig. 5.11

Safety valves are supplied uncalibrated.

For the valve in question to operate properly, you must periodically wash the internal parts. Before performing any maintenance and/or disassembly activities on the valve, make sure that there is no pressure inside the tank.

The final manufacturer should provide the necessary space for maintenance activities on the pressure relief valves.



**Maintenance and calibration of pressure relief valves should be carried out by trained personnel. Incorrect calibration can damage the machine.**

### 5.6. Gearbox

The gearbox is supplied with lubricant.

Check the oil level with the machine cold, stopped and turned off. Oil level must not drop below the minimum: risk of rapid wear of internal components.

Top up as needed with the same type of oil: mixing different lubricants is prohibited. Recommended lubricant: Q8 El Greco 150 synthetic gear oil. Alternatively see paragraph 5.1.

GEARBOX	Oil quantity
QB SERIES 166 code 4025766228 (HELIX SYSTEM 140-180-220)	1,0 kg
QB SERIES 200 code 4025766234 (HELIX SYSTEM 300)	1,9 kg

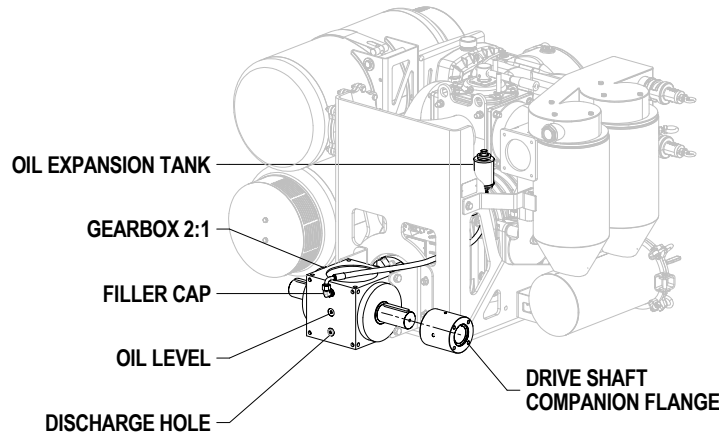


Fig. 5.12

The gearbox can reach very high temperatures (over 90°C).



**Use all means necessary to avoid contact.**

### 5.7. Vacuum gauge and remote thermometer

The unit is equipped with a pressure gauge and remote thermometer. The respective dials are inserted into the front panel of the unit.

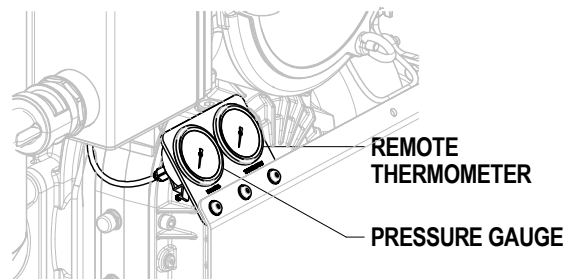


Fig. 5.13

The pressure gauge measures the pressure of the conveyed gas (in this case air) and is connected to the air filter. On the other hand, the remote thermometer detects the outlet temperature of the conveyed gas, and is therefore installed on the outlet of the HELIX vacuum pump/compressor.

When removing the front panel or disassembling the unit, proceed by disassembling the support bracket of the vacuum gauge and remote thermometer, paying attention to the remote thermometer capillary and the vacuum gauge hose.

Maximum operating temperature: 180°C.

If during vacuum operation, the pump temperature reaches and/or exceeds 180°C, stop the vacuum pump.

In any case, the overheat alarm thermostat, located on the outlet of the vacuum pump/compressor, checks at 150°C. Refer to the dedicated paragraph "Overheat alarm" in the HELIX vacuum pump/compressor manual.

If the temperature exceeds 180°C during pressure operation, check the filter. A dirty filter will not allow air to pass to the compressor.

During pressure operation, the air injection cooling system is not active.

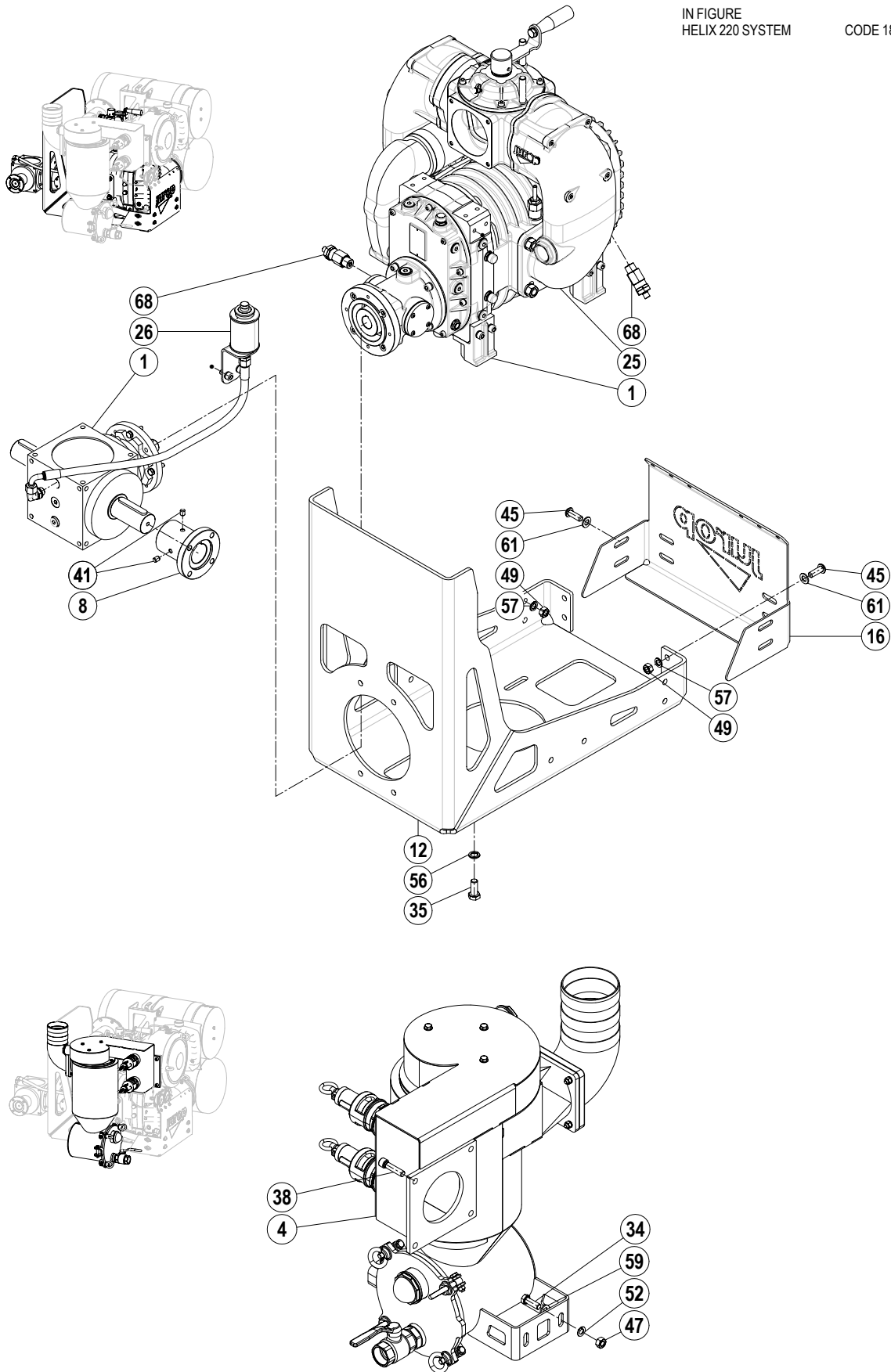
Vacuum/pressure operation: refer to the performance table, in the presence of the gearbox drive consider the multiplication ratio.

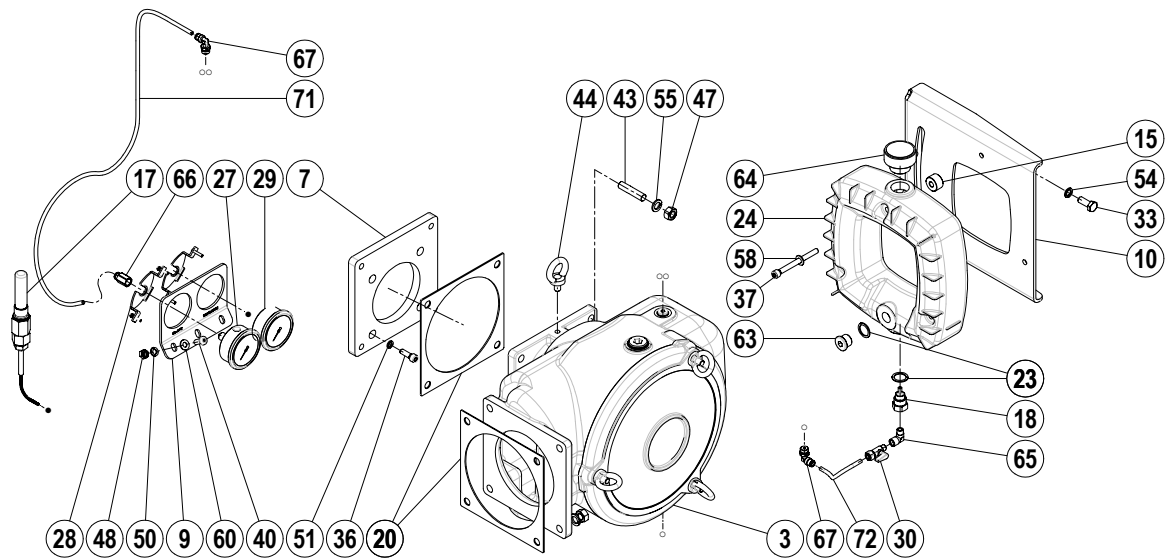
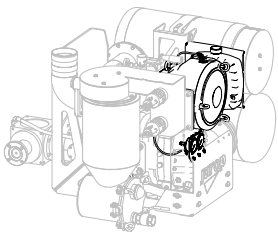
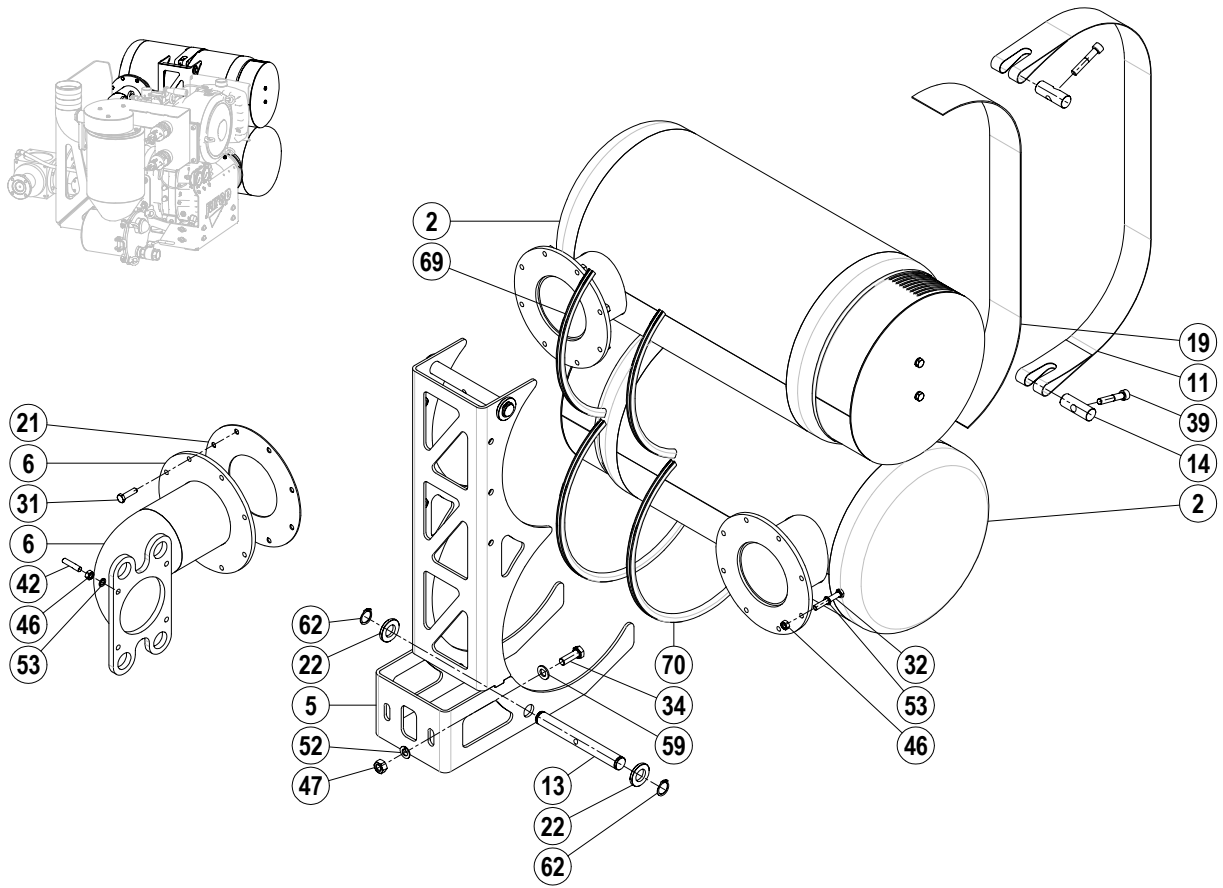
Maximum pressure 15 psig (1 bar).

**HELIX 140-180-220 SYSTEM**

IN FIGURE  
HELIX 220 SYSTEM

CODE 18140088E0







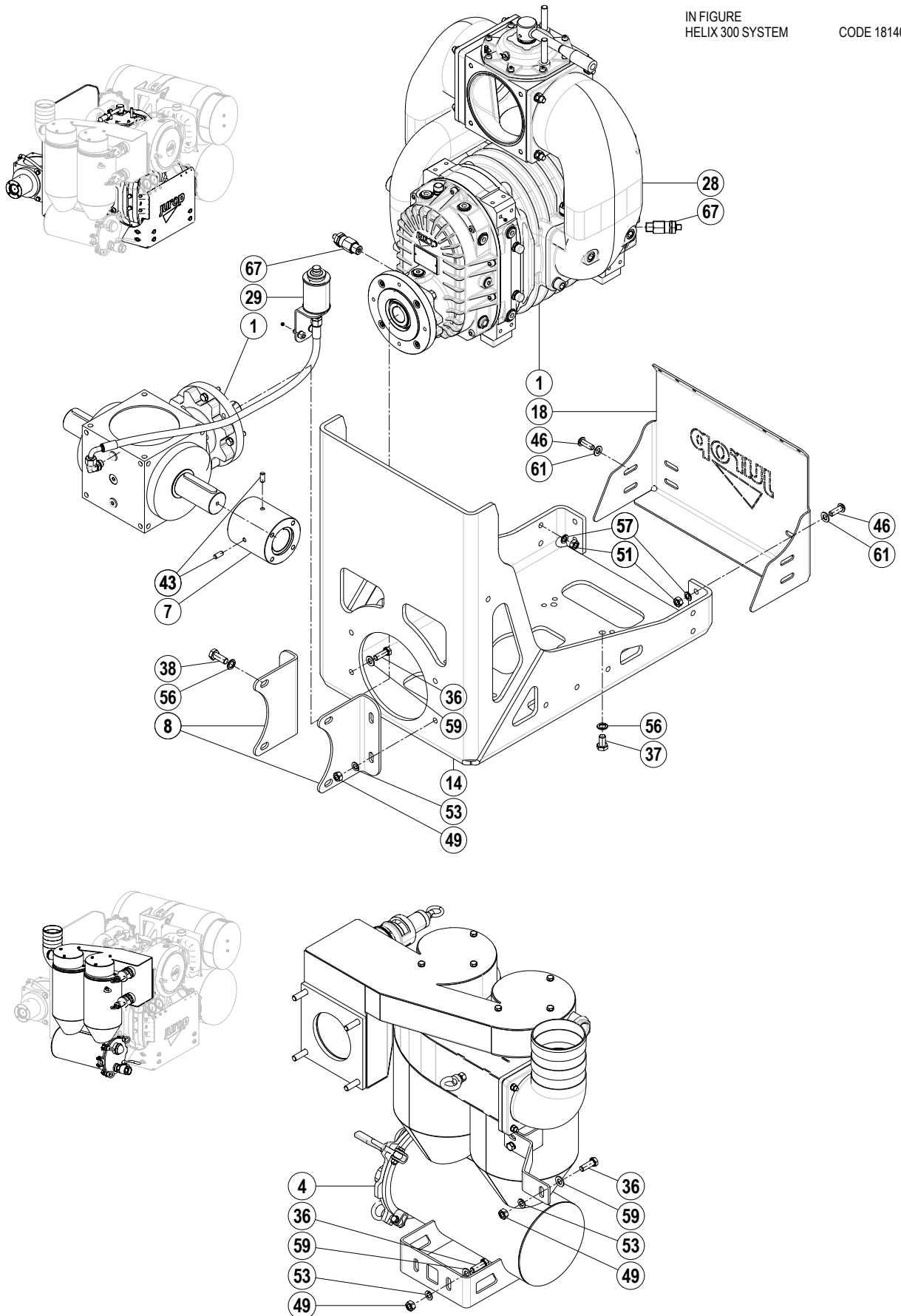
**HELIX 140-180-220 SYSTEM**

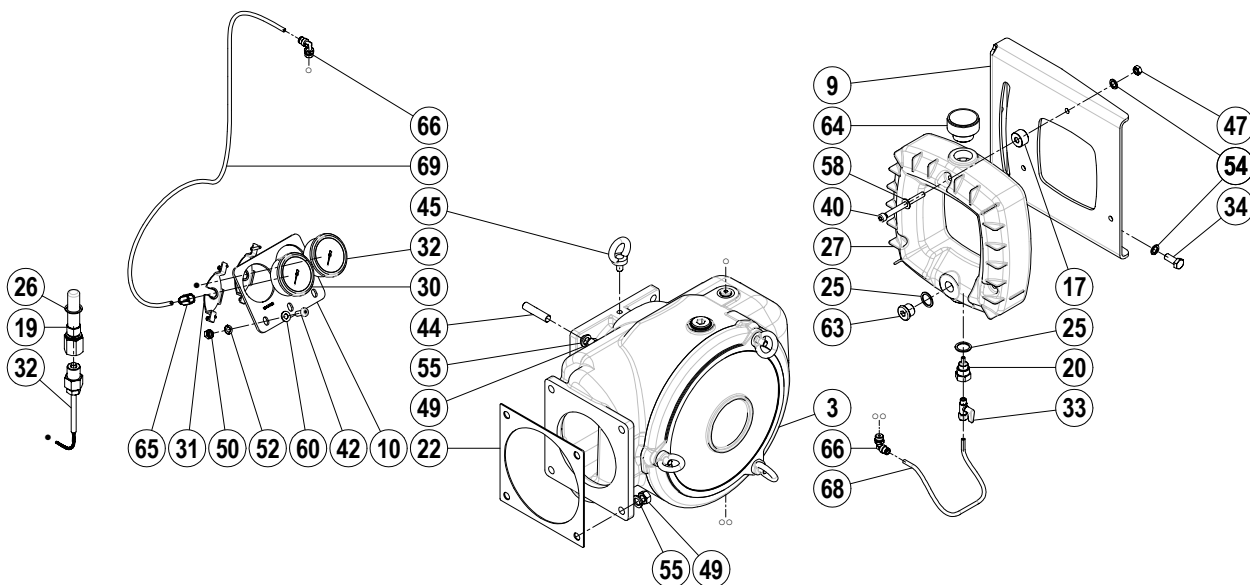
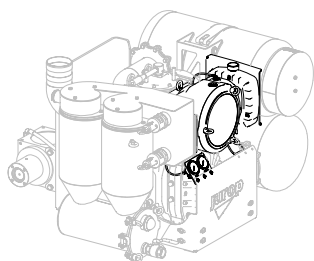
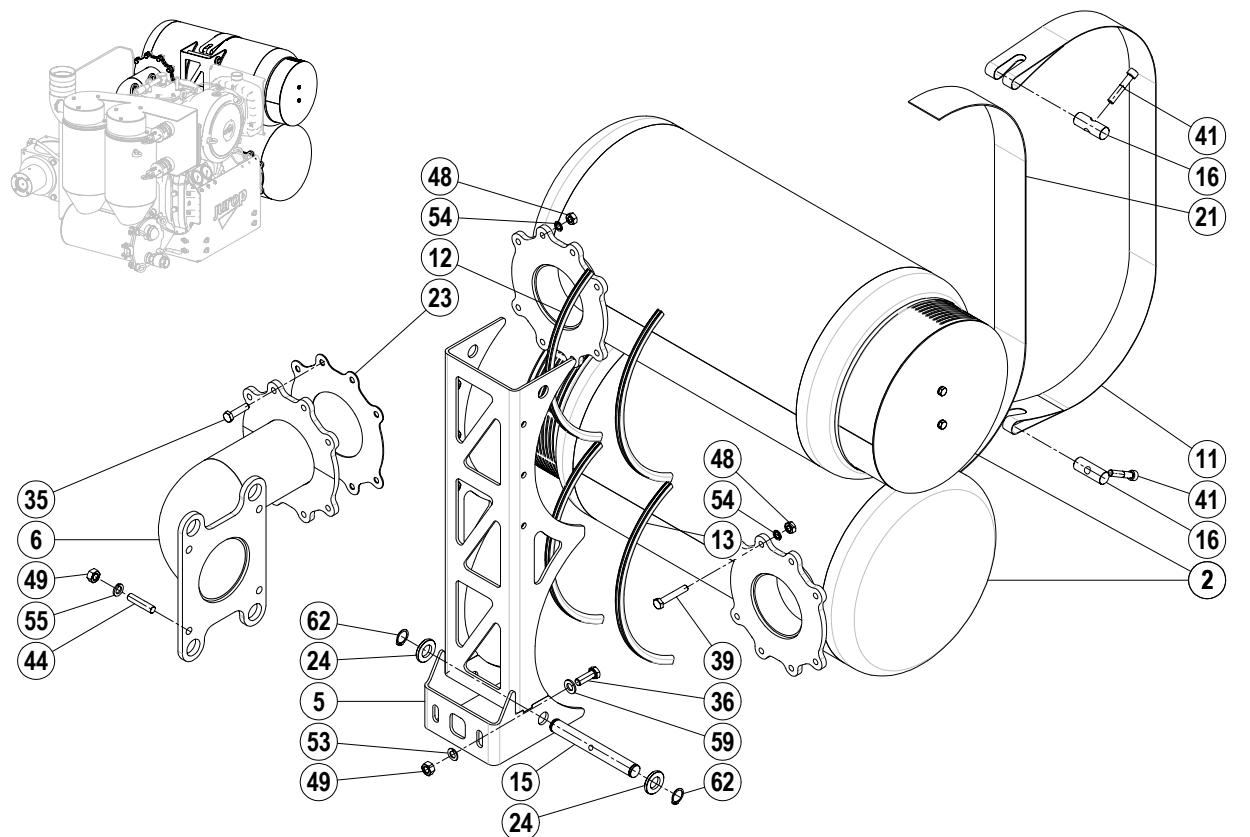
Pos.	Code	Description	Qty	Pos.	Code	Description	Qty
1	13630058E0	HELIX 140 PUMP	1	54	4026350708	GALV. FLAT SECT. GROWER WASHER 10	6
	13630059E0	HELIX 180 PUMP	1	55	4026350709	GALV. FLAT SECT. GROWER WASHER 12	8
	13630060E0	HELIX 220 PUMP	1	56	4026350710	GALV. GROWER WASHER 14	4
2	14140087E0	SILENCER	2	57	4026350807	STAINLESS STEEL GROWER WASHER 12	8
3	14450064E0	AIR FILTER	1	58	4026357005	GALV. FLAT WASHER M8	3
4	14450066E0	CYCLONE PURIFIER	1	59	4026357007	GALV. FLAT WASHER M12	4
5	15130979E0	SILENCER SUPPORT	1	60	4026358005	STAINLESS STEEL FLAT WASHER M8	3
6	15260231E0	SILENCER MANIFOLD	1	61	4026358007	STAINLESS STEEL FLAT WASHER M12	8
7	16100764E0	4-WAY FILTER-VALVE FLANGE	1	62	4026510020	SNAP RING E 22	4
8	16110059E0	CARDAN SHAFT HUB	1	63	4026904503	M20X1.5 PLUG	1
9	16120211P0	PRESSURE GAUGE SUPPORT BRACKET	1	64	4026910103	VENT PLUG TMDF 1"	1
10	16120972M0	SUPPORT BRACKET	1	65	4027410022	90° ELBOW FITTING 6-1/4	1
11	16130112J0	SILENCER STRAP	1	66	4027420605	QUICK FITTING 6-1/4	1
12	16180346E0	FRAME SHELF	1	67	4027421207	90° QUICK FITTING 6-1/4	2
13	16220192E0	PIN	2	68	40283DYC01	OPTICAL OIL LEVEL ELECT.SENSOR	2
14	16220193E0	PIN	2	69	-	PROFILE GASKET 10X13.6 (1)	2
15	16246060E0	SUPPORT SPACER	3	70	-	PROFILE GASKET 10X13.6 (2)	2
16	16400845L0	FRONT PANEL	1	71	-	PRESSURE GAUGE RILSAN HOSE	1
17	16630186F0	REMOTE THERMOMETER SUMP HOSE	1	72	-	RILSAN HOSE FLUSHING KIT	1
18	1673001000	FILTER FITTING	1				
19	16806064E0	SILENCER STRAP GASKET	1				
20	1680609600	6" 4-WAY VALVE GASKET	1				
21	1680710300	SILENCER MANIFOLD GASKET	1				
22	16850026E0	DI22 WASHER (INNER DIAMETER)	4				
23	1685100300	DI20 WASHER (INNER DIAMETER)	2				
24	16876001E0	OIL TANK	1				
25	18521187E0	MANUAL SUCTION UNIT HELIX 140	1				
	18521188E0	MANUAL SUCTION UNIT HELIX 180	1				
	18521189E0	MANUAL SUCTION UNIT HELIX 220	1				
26	18920264E0	OIL EXPANSION TANK	1				
27	4020100008	VACUUM GAUGE -1+3 BAR	1				
28	4020110B33	FIXING BRACKET	1				
29	4020210050	REMOTE THERMOMETER 0-200°C	1				
30	4024405400	G1/8 MALE BALL VALVE	1				
31	4026102808	GALV. HEX HEAD SCREW 8.8 M8X30	8				
32	4026102843	GALV. HEX HEAD SCREW 8.8 M8X55	8				
33	4026102907	GALV. HEX HEAD SCREW 8.8 M10X25	3				
34	4026103003	GALV. HEX HEAD SCREW 8.8 M12X35	4				
35	4026103109	GALV. HEX HEAD SCREW 8.8 M14X35	4				
36	4026121407	GALV. HEX HEAD SCREW 8.8 M8X25	4				
37	4026121413	GALV. TCEI* SCREW 8.8 M8X90	3				
38	4026121713	GALV. TCEI* SCREW 8.8 M12X50	4				
39	4026121810	GALV. TCEI* SCREW 8.8 M10X55	2				
40	4026122509	STA. STEEL HEX SOCKET SCREW M8X20	3				
41	4026135505	GALV. HEADLESS SCREW 14.9 M10X12	2				
42	4026171602	GALV. STUD BOLT M8X25	4				
43	4026171704	GALV. STUD BOLT M12X35	4				
44	4026190100	GALV. MALE EYEBOLT M10	1				
45	40261AQR03	HEX SOCKET SCREW M12X35	8				
46	4026308005	GALV. HEX NUT M8	20				
47	4026308007	GALV. HEX NUT M12	12				
48	4026310007	STAINLESS STEEL HEX NUT M8	3				
49	4026310009	STAINLESS STEEL HEX NUT M12	8				
50	4026350405	STAINLESS STEEL GROWER WASHER M8	3				
51	4026350505	GALV. FLAT SECT. GROWER WASHER 8	4				
52	4026350609	GROWER WASHER 12	4				
53	4026350706	GALV. FLAT SECT. GROWER WASHER 8	20				

\* HEXAGON SOCKET HEAD CAP SCREW

**HELIX 300 SYSTEM**

IN FIGURE  
HELIX 300 SYSTEM CODE 18140084E0





**HELIX 300 SYSTEM**

Pos.	Code	Description	Qty	Pos.	Code	Description	Qty
1	13630057E0	HELIX 300 PUMP	1	59	4026357007	GALV. FLAT WASHER M12	9
2	14140077E0	SILENCER	2	60	4026358005	STAINLESS STEEL FLAT WASHER M8	3
3	14450064E0	AIR FILTER	1	61	4026358007	STAINLESS STEEL FLAT WASHER M12	8
4	14450065E0	CYCLONE PURIFIER	1	62	4026510020	SNAP RING E 22	4
5	15130953E0	SILENCER SUPPORT	1	63	4026904503	M20X1.5 PLUG	1
6	15260226E0	SILENCER MANIFOLD	1	64	4026910103	VENT PLUG TMDF 1"	1
7	16110057E0	CARDAN SHAFT HUB	1	65	4027420605	QUICK FITTING 6-1/4	1
8	16120858N0	TRANSMISSION SUPPORT BRACKET	2	66	4027421207	90° QUICK FITTING 6-1/4	2
9	16120972M0	SUPPORT BRACKET	1	67	40283DYC01	OPTICAL OIL LEVEL ELECT.SENSOR	2
10	16120975M0	PRESSURE GAUGE SUPPORT BRACKET	1	68	-	RILSAN HOSE FLUSHING KIT	1
11	16130074J0	SILENCER STRAP	1	69	-	PRESSURE GAUGE RILSAN HOSE	1
12	16136024E0	PROFILE 10X13.6 SILENCER 1	2				
13	16136025E0	PROFILE 10X13.6 SILENCER 2	2				
14	16180334E0	FRAME SHELF	1				
15	16220192E0	PIN	2				
16	16220193E0	PIN	2				
17	16246060E0	SUPPORT SPACER	3				
18	16400671L0	FRONT PANEL	1				
19	16630186F0	REMOTE THERMOMETER SUMP HOSE	1				
20	1673001000	FILTER FITTING	1				
21	16806061E0	SILENCER STRAP GASKET	1				
22	1680609600	6" 4-WAY VALVE GASKET	1				
23	16807085E0	SILENCER MANIFOLD GASKET	1				
24	16850026E0	DI22 WASHER (INNER DIAMETER)	4				
25	1685100300	DI20 WASHER (INNER DIAMETER)	2				
26	16851ABUB0	COPPER FLAT WASHER 28X22.5X1.5	1				
27	16876001E0	OIL TANK	1				
28	18521186E0	MANUAL SUCTION UNIT	1				
29	18920264E0	OIL EXPANSION TANK	1				
30	4020100008	VACUUM GAUGE -1+3 BAR	1				
31	4020110B33	FIXING BRACKET	1				
32	4020210050	REMOTE THERMOMETER 0-200°C	1				
33	4024405400	G1/8 MALE BALL VALVE	1				
34	4026102907	GALV. HEX HEAD SCREW 8.8 M10X25	3				
35	4026102910	GALV. HEX HEAD SCREW 8.8 M10X40	8				
36	4026103003	GALV. HEX HEAD SCREW 8.8 M12X35	9				
37	4026103107	GALV. HEX HEAD SCREW 8.8 M14X25	4				
38	4026103109	GALV. HEX HEAD SCREW 8.8 M14X35	4				
39	4026108608	GALV. HEX HEAD SCREW 8.8 M10X60	8				
40	4026121413	GALV. TCEI* SCREW 8.8 M8X90	3				
41	4026121810	GALV. TCEI* SCREW 8.8 M8X90	2				
42	4026122509	GALV. TCEI* SCREW 8.8 M10X55	3				
43	4026136110	ST. STEEL HEX SOCKET SCREW M8X20	2				
44	4026171704	GALV. STUD BOLT 8.8 M12X35	8				
45	4026190100	GALV. MALE EYEBOLT M10	1				
46	40261AQR03	HEX SOCKET SCREW M12X35	8				
47	4026308005	GALV. HEX NUT M8	3				
48	4026308006	GALV. HEX NUT M10	16				
49	4026308007	GALV. HEX NUT M12	21				
50	4026310007	STAINLESS STEEL HEX NUT M8	3				
51	4026310009	STAINLESS STEEL HEX NUT M12	8				
52	4026350405	STAINLESS STEEL GROWER WASHER M8	3				
53	4026350609	GROWER WASHER 12	9				
54	4026350708	GALV. FLAT SECT. GROWER WASHER 10	30				
55	4026350709	GALV. FLAT SECT. GROWER WASHER 12	12				
56	4026350710	GALV. GROWER WASHER 14	8				
57	4026350807	STAINLESS STEEL GROWER WASHER 12	8				
58	4026357005	GALV. FLAT WASHER M8	3				

\* HEXAGON SOCKET HEAD CAP SCREW







Model	Issue date	Revision No.	Revision date	Drawn up by	Viewed by
HELIX SYSTEM	09-11-2023	00	-	U.T.	A.T.

## **Juop SpA**

Via Crosera, 50  
33082 Azzano Decimo, PN (ITALY)

Tel. +39 0434 636811  
Fax. +39 0434 636812

<http://www.juop.it>  
e-mail: [info@juop.it](mailto:info@juop.it)

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