



BREVINI[®]

Motion Systems

Installation and Maintenance Manual

PS-065

IMM-0013EN
January 2022

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1 TRACKING VERSION

Table 1:

File name	Revision	Date	Changes description
IMM-0013EN_Rev.00 PS-065	00	27/01/2022	First issue

1.1 SUPPORTED MODELS AND COMPATIBILITY LIST

Table 2:

Modelli
PS-065

2 INTRODUCTION

2.1 CONSULTING THE MANUAL

Consulting this manual is facilitated by the table of contents given on the first page, which allows the subject of interest to be located at a glance. The chapters are arranged in a progressive way that facilitates finding the required information.

2.2 WARRANTY / LIABILITY

Upon delivery, Products shall be free from defects in material and workmanship and comply with agreed technical specifications. The warranty period shall be (i) 12 months or 2000 operating hours (whichever occurs earlier) for Spicer® branded driveline Products, or (ii) 12 months for all other Products, starting in each case from the date of Customer's invoice to the end user or dealer, provided that the warranty period ends in any case latest 18 months after the date of Dana's invoice to Customer. In case of defects, Dana will either (i) if the repair is performed by Customer with Dana's prior written consent, reimburse Customer for costs of spare parts as per Dana's official spare parts list, including the applied discount, and within the limit of the purchase price of the Product in question, or (ii) repair the Product free of charge at its own premises or authorized service center, provided that Customer shall send the defective Product, at its own expense, to the repair location chosen by Dana in its sole discretion. The handling of warranty claims will follow Dana's Standard Warranty Conditions, as updated from time to time, which are available upon request by contacting dana_oh_product_service_support@dana.com. All further claims and remedies with regard to defects of Products, regardless of their nature, amount or legal basis, are hereby expressly excluded unless in case of gross negligence and willful misconduct by Dana. Except as stated herein, there are no representations or warranties, express or implied, with regard to the Products.

The warranty does not cover (a) Products or components thereof not purchased directly from Dana; (b) products supplied as prior to production approval; or (c) Products that have experienced (i) maintenance and/or repairs which are not executed in accordance with Dana's official service manual available upon request by contacting dana_oh_product_service_support@dana.com, (ii) storage or transport conditions which are not in accordance with Dana's requirements available upon request by contacting dana_oh_product_service_support@dana.com, (iii) non-professional installation of the Products or of ancillaries, (iv) damage caused by normal wear and tear, (v) damage caused during reassembly or installation, (vi) operation of the Product or application which is not in accordance with agreed application requirements or agreed Product specifications and/or (vii) the use of components, lubricants or ancillary products that are not approved by Dana.

To the extent permitted by law, neither party shall under any circumstances whatever be liable to the other, whether in contract, tort or restitution, or for breach of statutory duty or misrepresentation, or otherwise, for any loss of profit, loss of goodwill, loss of business, loss of business opportunity, loss of anticipated saving, special, indirect or consequential damage suffered by the other party that arises under or in connection with the contractual relationship between the parties. Nothing herein shall limit or exclude the liability of either party for death or personal injury, or for damages resulting from gross negligence, intentional breach or willful misconduct.

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2.3 REVISIONS

Dana Motion Systems Italia S.r.l. is not responsible for any kind of printing error in the manual. This manual is deemed valid at the invoicing date of the product to which it refers. The manual refers to the revision level printed on it. In case of a new revision of this manual, in the parts regarding regulations and spare parts, Dana Motion Systems Italia S.r.l. will update it and indicate a new revision index for the manual, pointing out its non-liability (direct or indirect) for improper use of the manual with revision index not matching in serial number, invoicing date and date of revision.

NOTE:

Images, documents and drawings are introduced for the purpose of instruction, for safe and proper handling of the products and maintenance operations. There may be minor differences between the drawings in this manual and the delivered product.

However, these differences are not significant for the main features of the product, or maintenance instructions.

3 SUPPLY CONDITION:

The exterior of the gear units are painted with a synthetic epoxy primer ("RAL 5021" water blue), unless otherwise indicated in the contracts. Such protection can withstand normal industrial environments, including outdoor sites, while additional synthetic top coats can also be applied. If the machine will be used under particularly aggressive environmental conditions, special types of paints can also be applied.

The machined external parts of the gear unit, such as the ends of the hollow and non-hollow shafts, support surfaces, spigots, etc. are protected with rust-inhibitor oil (tectyl). The internal parts of the gear unit casings and drives are also protected with rust-inhibitor oil.

NOTE:

All the gear units, unless otherwise indicated in the contracts, are supplied without lubrication (as indicated by a special adhesive sticker attached to the gear unit to notify the user of such a supply condition).

4 PACKAGING, HANDLING, RECEPTION, STORAGE

4.1 PACKING

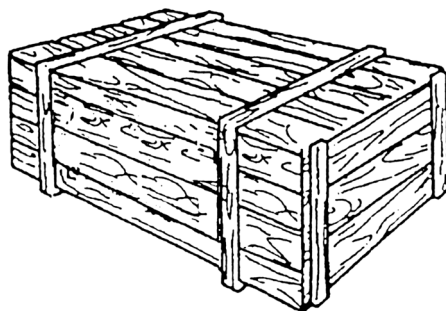


Fig. 1

NOTE:

Depending on the arrangements with the customer at the time of sale, the product can be packed in a wooden box, in completely closed cardboard packing, or on pallets.

To ensure that no part inside the packing can be damaged in any way during transport, the mobile parts are blocked and the more delicate parts are specially protected.

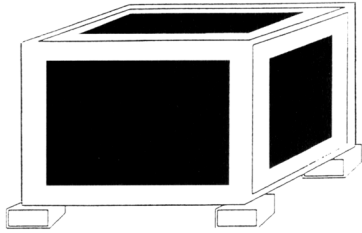
For transport, the product can be protected (in its most exposed parts) with impermeable materials or placed on a wooden pallet and fixed to it by straps or fastenings in order to obtain a single rigid body.

PACKAGING, HANDLING, RECEPTION, STORAGE

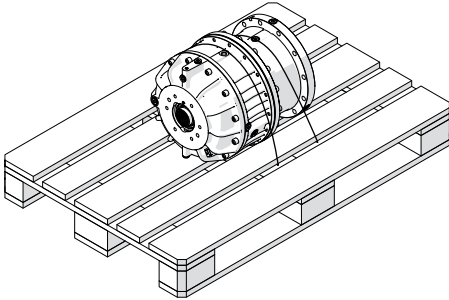
4.2 HANDLING

NOTE:

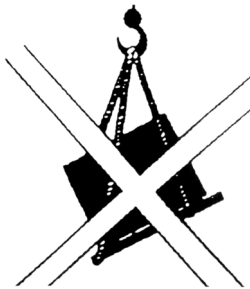
The weight of the packed products is given in the Transport Documents or Packing List.



If necessary, place wooden wedges of wood under the package to facilitate lifting.



To move the packed gearbox, use lifting equipment that is suitable for the type of packing and having adequate lifting capacity, which must be indicated on the equipment, in relation to the weight of the load.



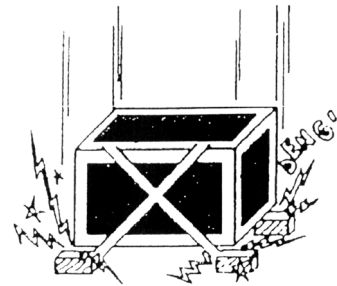
Never tilt or turn over the packing during transport.



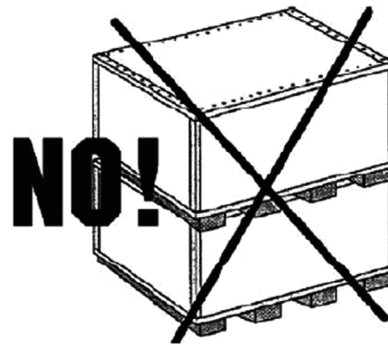
If the packages are unloaded by a lift truck, make sure the weight is balanced on the forks.



If the packages are unloaded with a hoist or hook, make sure the load is balanced and use approved lifting accessories for the sling. For packages shipped on pallets, make sure the lifting accessories do not damage the products.



When lifting and positioning of the package, be careful to avoid violent impacts.



IMPORTANT:

The packages are not stackable.

PACKAGING, HANDLING, RECEPTION, STORAGE

4.3 RECEPTION



Fig. 2

NOTE:

On arrival of the packages, check the good condition of their contents in the presence of the carrier. Check the supply by means of the packing list enclosed with the product (transport documents), making sure the supply matches the order specifications.

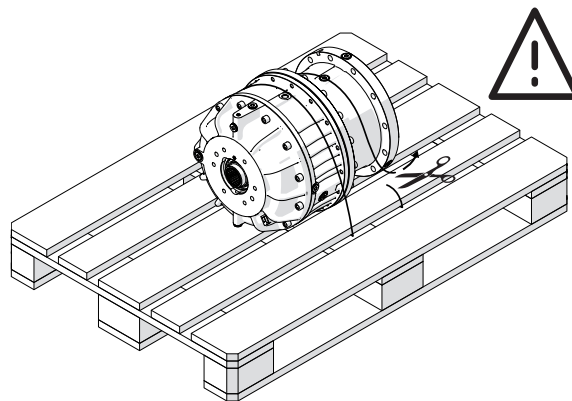


Fig. 3

CAUTION

The strap securing the product to its packaging has sharp edges; when unpacking the product, the strap may strike the operator. The packaging materials should be removed as follows:

- Use a pair of shears to cut the straps (take care as the ends could hit the Operator).
- Cut or slide off the external packing.
- Cut the internal strap (take care as the ends could hit the operator).
- Remove the gearbox from the pallets.

If the product has been damaged or shows

signs of defects or missing parts, notify Dana Motion System Italia S.r.l. immediately.

PACKAGING, HANDLING, RECEPTION, STORAGE

4.4 HANDLING THE UNPACKED GEARBOX

IMPORTANT:

The weight of gearboxes to be handled may be given on Dimensional Drawing SI referred to in the Conformity Declaration Certificate.

CAUTION

Lifting, transport and handling operations must only be carried out by the maintenance technician and trained personnel (slingers, crane operators, etc.) coordinated by a qualified person on the ground, able to give the necessary signals.

CAUTION

Make sure the lifting device to be used for transport and handling is adequate for the total weight of the gearbox, given on Dimensional Drawing SI referred to in the Conformity Declaration Certificate.

Any other system used for lifting, transport and handling of the gearbox, not included among those recommended by the manufacturer, invalidates the insurance guarantee for damage to the gearbox and/or optional units linked to it.

If the size of the gearbox obstructs the operator's view during lifting, transport and handling operations, use two operators on the ground who check for possible hazards or hindrances. Also make sure there are no unauthorised personnel in the transport area and that any accessories connected to the gearbox do not hinder movements or make transport manoeuvres dangerous.

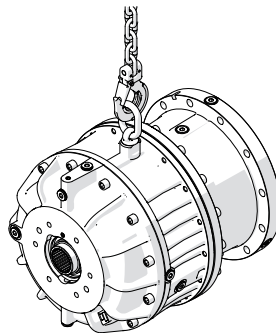


Fig. 4

CAUTION

The gearboxes are components that are not perfectly balanced and must be lifted with suitable devices.

Before removing the gearbox from its packing, secure it with the lifting accessories so that it cannot slip or tip over. Before handling the gearbox, remove the wooden chocks placed in the packing to ensure its stability during shipping.

- Proceed with caution during handling, avoiding sudden movements and violent impacts.
- Lift the machine, being careful not to unbalance the load during manoeuvres. In this phase, two operators must guide the gearbox at the sides during lifting, to avoid sudden movements or swaying which could create extremely dangerous situations.
- In case of excessive swaying, it is advisable to stop and repeat the gearbox lifting operations.
- After lifting the gearbox, take it to the place intended for positioning.

Transport

Always make sure the transported product is balanced, securing it firmly to the means of transport by means of slings, ropes and/or hooks complying with the current standards. During transport, avoid dangerous swaying of the load which could become unbalanced and fall.

Do not place anything on top of the gearbox during transport, as some parts could get permanently damaged.

5 STORAGE

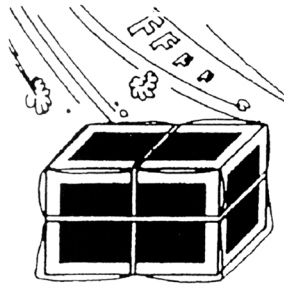
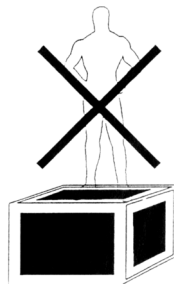


Fig. 5

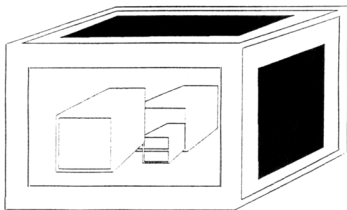
If the product must be stored for more than two months, proceed as follows:

- Protect the shafts and pilots with a film of grease and/or rust-inhibitor liquids.
- Completely fill the gearbox with suitable oil "Gearbox lubrication" page 14, and orientate the gearbox so that the oil breather plug is in the highest position.
- Store the gearbox in a dry place at a temperature of between - 5°C and + 30°C.
- Protect the packs from dirt and dust.
- Avoid moist environments and exposed to the weather (no outdoor areas).
- Make sure that the gearbox does not come into direct contact with the ground.
- Place the gearbox on a stable base and make sure there is no risk of unexpected movements.

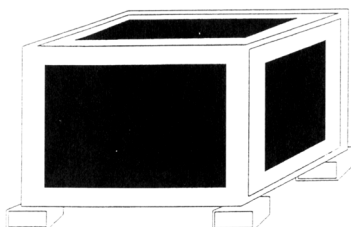


Do not stack the parts.

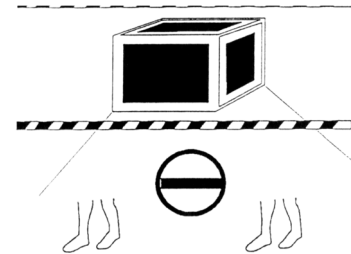
Do not walk on or place parts on top of the pack.



Do not store any material inside the pack



If possible, insert wooden chocks between the pack and the floor.



Keep the pack away from transit areas.

NOTE:

Rotating seals may lose their efficiency after extended storage of more than 6 months. We recommend checking rotating seals periodically by rotating the input shaft by hand.

6 IDENTIFICATION NAMEPLATE

Each gearbox is supplied with an Identification Nameplate and a EC Declaration of Conformity in compliance with EU Directive 2014/34.

The identification nameplate contains the main technical data regarding the functional and construction features of the gearbox; it must therefore be visible and undamaged, and periodically cleaned.

Refer to the data on the nameplate for contacting Dana Motion Systems Italia S.r.l. Service Centres.




 <i>Via L. Brevini 1 / A</i> <i>42124 Reggio Emilia / Italy</i>		1		 2	
	S.N.	3	<i>n1 max(rpm)</i>	4	
	Family	5	<i>P max(kW)</i>	6	
	<i>i=</i>	7	<i>Input</i>	8	

Fig. 6

- 1 - Bar code
- 2 - Date of manufacture
- 3 - Serial number
- 4 - Max input revolutions (with Duty cycle see drawing SI)
- 5 - Gearbox family
- 6 - Max operating power (with Duty Cycle see drawing SI)
- 7 - Total ratio
- 8 - Type input

6.1 CONDITIONS OF USE AND OPERATING LIMITS

The permissible ambient operating temperature is between -20°C and +40°C

WARNING

The rating plate values relevant to maximum surface temperatures refer to measurements in normal ambient conditions and normal and proper installation. Operation of the gearbox in a small compartment considerably reduces the ability to dissipate the thermal power, and therefore has significant effects on the generation of heat.

7 GEARBOX LUBRICATION

The important parameters to consider when selecting the type of oil are:

- viscosity at nominal operating conditions
- additives
- flash temperature

The same oil must lubricate both bearings and gears and all these components are in the same housing, under different operating conditions. Let us consider each parameter.

Viscosity

The nominal viscosity refers to a temperature of 40° C, but rapidly decreases as the temperature increases. Considering an operating temperature close to 100° C, a nominal viscosity can be chosen according to ISO VG150 or SAE 80W/90.

Additives

In addition to normal antifoam and antioxidant additives, it is important to use lubricating oils with additives that can provide EP (extreme-pressure) and wear-resistant properties.

CAUTION

These are general conditions that may vary according to use and environmental conditions. In case of doubts contact the customer service.

NOTE:

The user can chose oils from other producers with equivalent lubricating characteristics, making sure that the oil selected has a flash point over 200°C.

8 INPUT NOMENCLATURE

8.1 MOUNTING POSITION V5

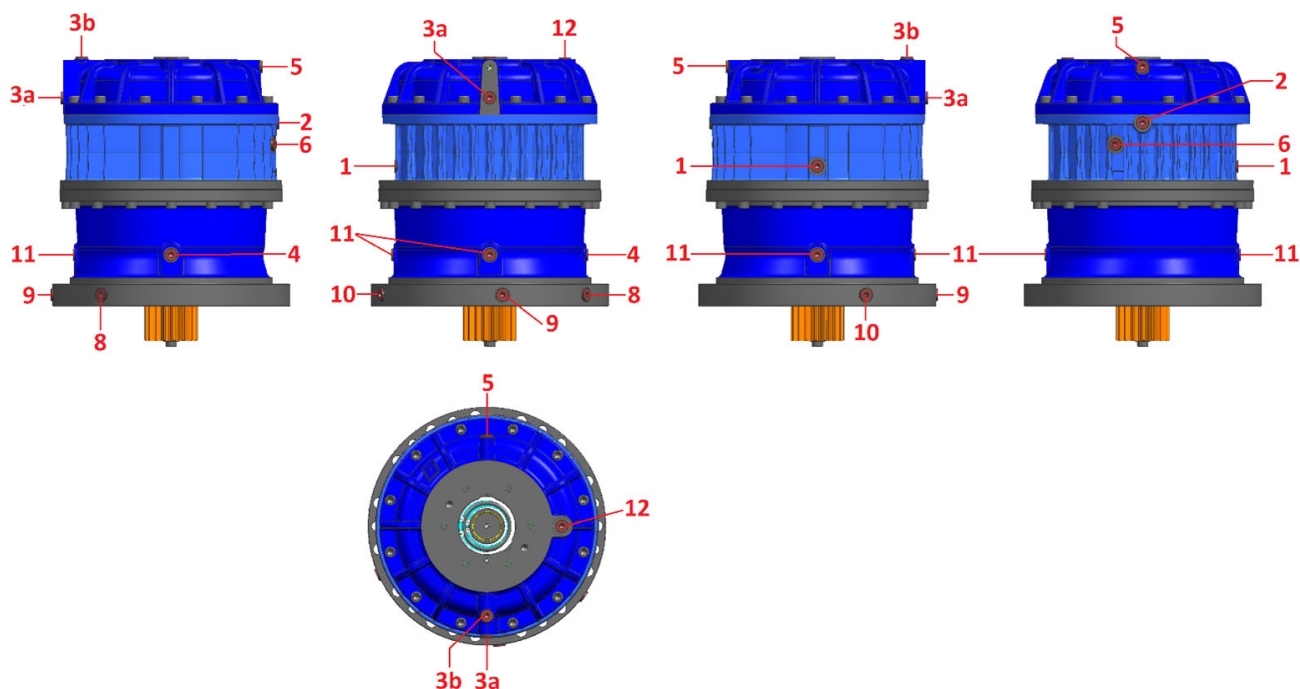






Fig. 7

Table 3:

POSITION OF OIL HOLES			
Pos.	Sizes	MOUNTING POSITION 'V5'	
1	M16X1,5	Gearbox oil inlet always connected with (5)	
2	M16x1,5	Oil drain hole (low tank) gearbox, filling and level	
3	M16x1,5	Clutch and gearbox operation	
4	M16x1,5		Gearbox oil outlet (only with direct recirculation) and oil draining
5	M16x1,5	Gearbox oil inlet always connected with (1) [max. 2 l/min]	
6	M16x1,5		/
8	M16x1,5		Filling and draining, gearbox oil level
9	M16X1,5		
10	M16x1,5		
			
11	M16x1,5		/
12	M16x1,5		Gearbox oil draining (only with direct recirculation)

INPUT NOMENCLATURE

8.2 MOUNTING POSITION B3

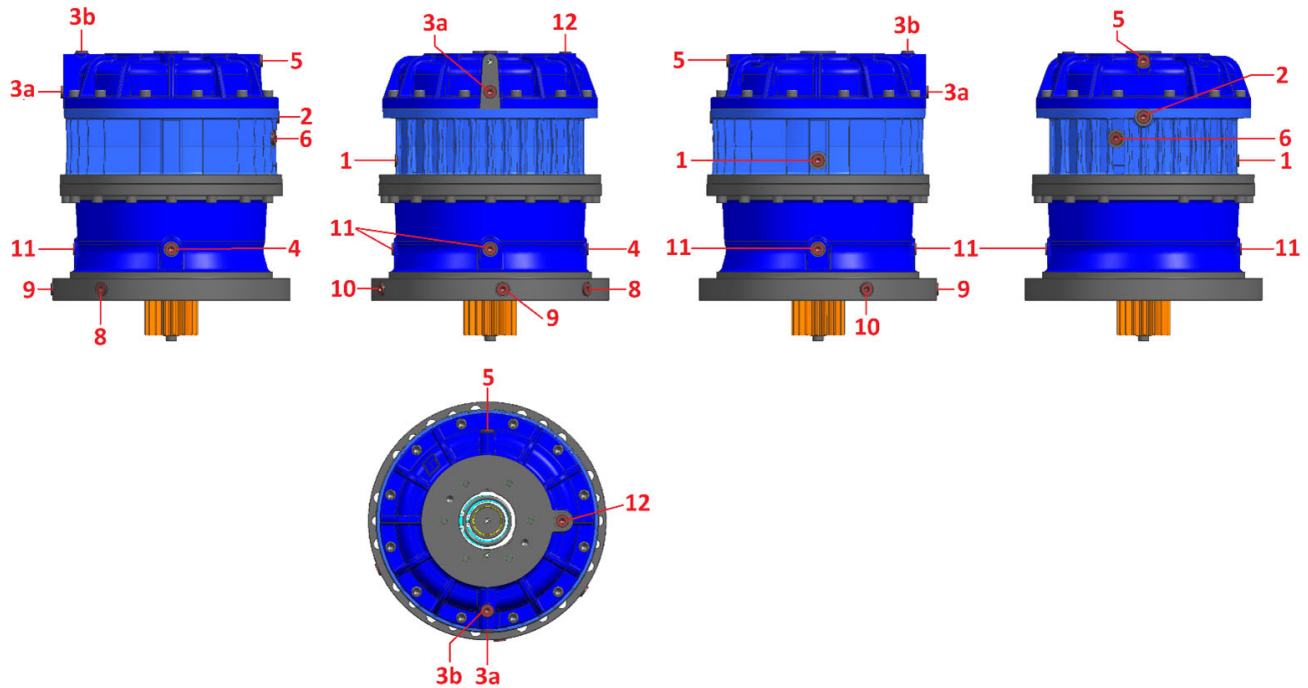


Fig. 8

Table 4:

POSITION OF OIL HOLES			
Pos.	Sizes	MOUNTING POSITION 'B3'	
1	M16x1,5	Gearbox oil inlet always connected with (5)	
2	M16x1,5	Gearbox oil level	
3	M16x1,5	Clutch and gearbox operation	
4	M16x1,5	Gearbox oil outlet (only with direct recirculation) and oil draining	
5	M16x1,5	Gearbox oil inlet always connected with (1) [max. 2 l/min]	
6	M16x1,5	Gearbox oil induction (low external tank)	
8	M16x1,5		/
9	M16x1,5		Gearbox oil level
10	M16x1,5		Gearbox oil filling and draining
11	M16x1,5		Gearbox oil filling and draining
12	M16x1,5		/

9 SPEED SELECTION

PS065 is a hydraulically driven gearbox. In accordance with the diagram in "Figure 8" page 16, by suitably powering the inputs 3a and 3b it is possible to block or not the rotation of a planetary gearbox crown and thus change the total reduction ratio of the unit.

Kinematic diagram PS065

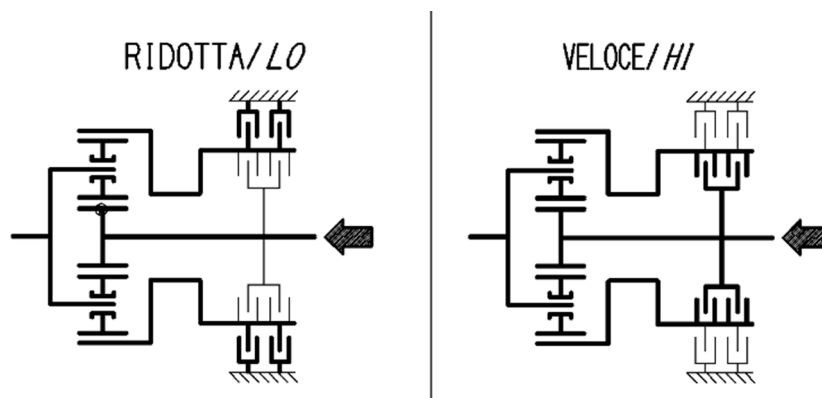


Fig. 9

When pressure is applied to 3a and 3b inside PS065 a high gear (HI) is selected and the crown rotation of the planetary gearbox stage is free, when no pressure is applied (discharge) a low gear (LO) is selected and the crown rotation of the planetary gearbox stage is stopped.

The ratios available for the PS065 gearbox are:

Table 5:

High gear ratio HI	Low gear ratio LO
1:1	1: 4.33
1:1	1:5
1:1	1:6

These ratios must obviously be multiplied by the ratio of the gearbox mounted upstream of the gearbox.

10 INSTALLATION WITHOUT SEQUENTIAL VALVE

Wiring diagram without sequential valve

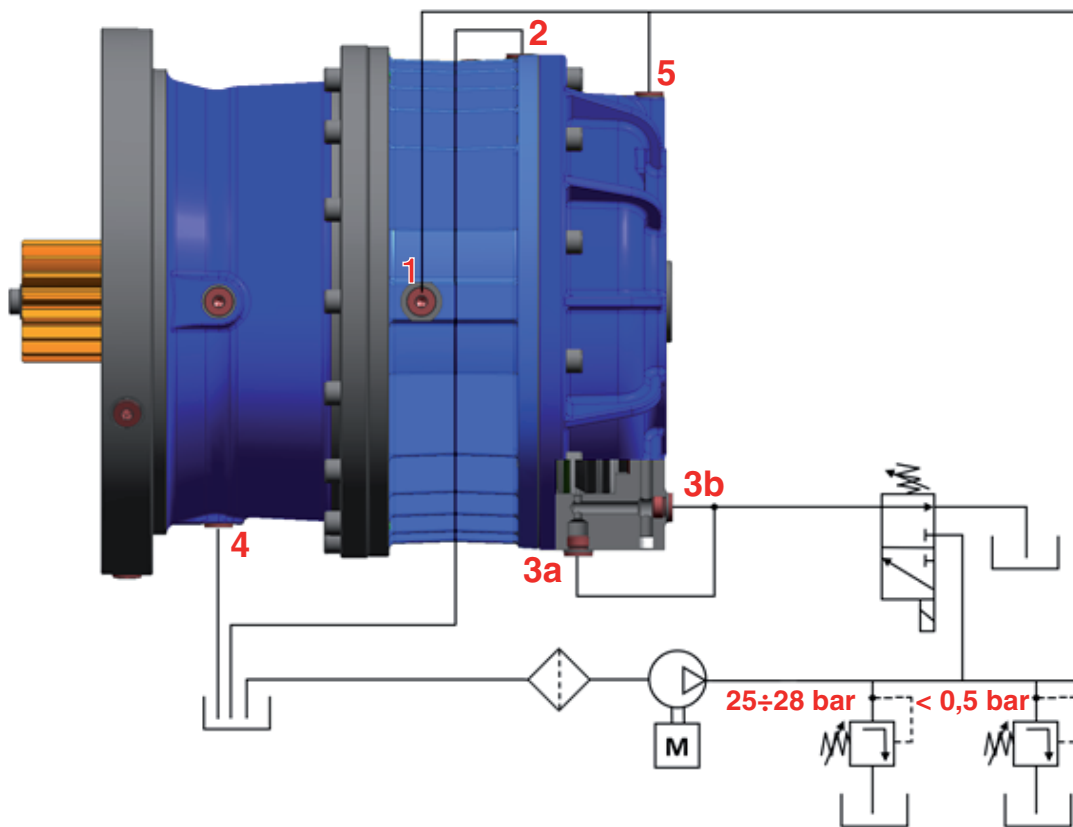


Fig. 10

For operation without sequential valve you should remove, if present, the screw “G” M10x1,25x10 ISO 4026 (see "Figure 12" page 18) which separates the oil flows from the control inputs 3a and 3b.

Installation without screw

Installation with screw

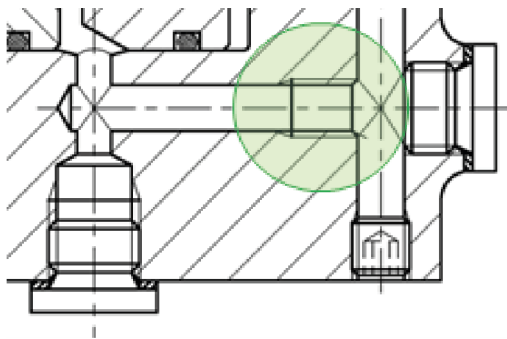


Fig. 11

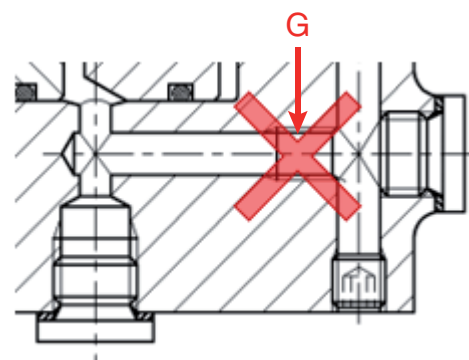


Fig. 12

In this way the two inputs are communicating and you should control only one of them (3a or 3b).

Using the brake and clutch simultaneously, the operator must absolutely stop the motor rotation to shift gear of PS965. When pressure is applied to 3a or 3b inside PS065, a high gear (HI) is selected, when no pressure is applied (discharge) a low gear (LO) is selected.

CAUTION

without sequential valve, shifting gear while the motor is rotating causes the planetary gearbox to break.

11 INSTALLATION WITH SEQUENTIAL VALVE

Wiring diagram with sequential valve

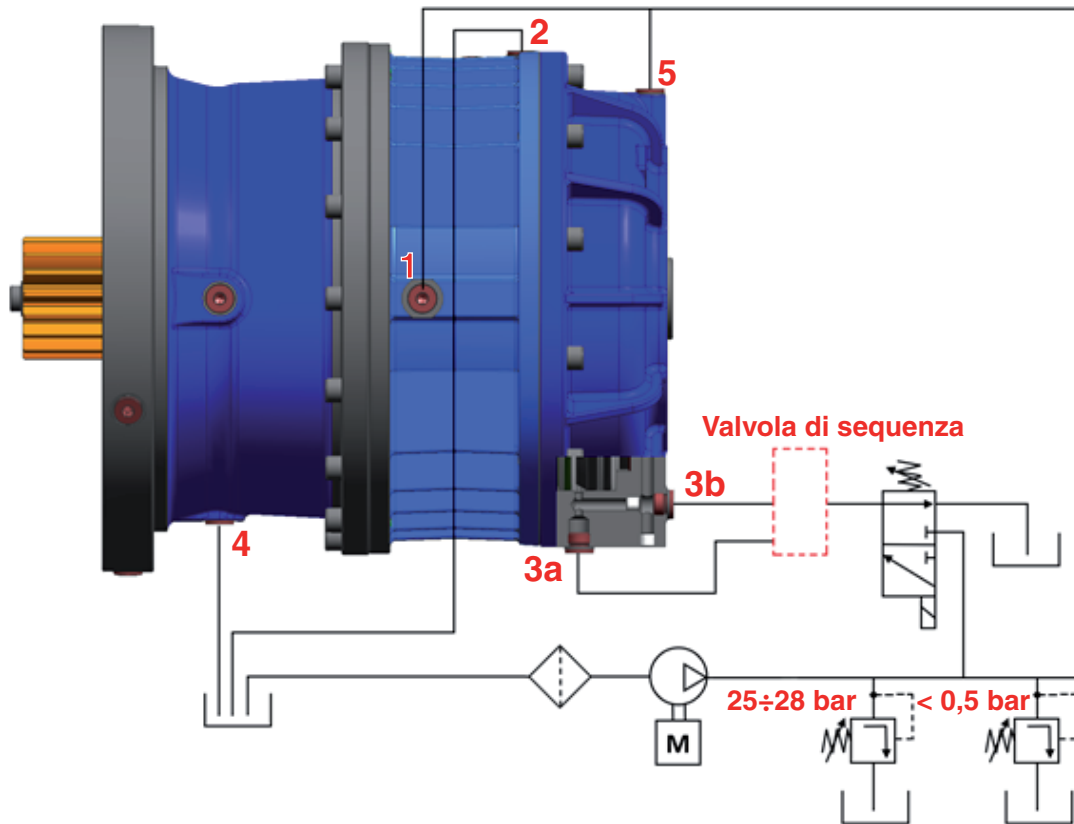


Fig. 13

For operation with sequential valve you should mount, if not present, the screw “G” M10x1,25x10 ISO 4026 (see "Figure 15" page 19) which separates the oil flows from the control inputs 3a and 3b.

Installation without screw

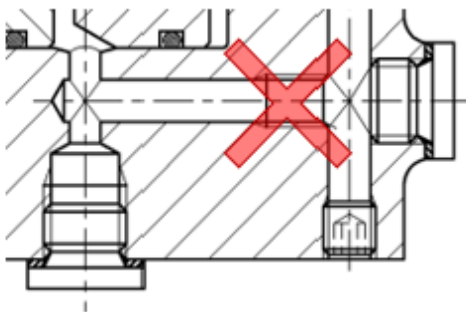


Fig. 14

Installation with screw

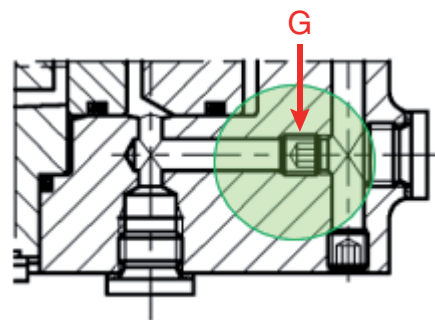


Fig. 15

In this configuration, the sequential valve allows you to apply the brake (through 3a) and to engage the clutch (through 3b) without stopping the hydraulic (or electric) motor since the transient action of brake opening and clutch engagement does not occur simultaneously but in sequence. Without the sequential valve the simultaneous action of brake and clutch with the rotating components causes the planetary gearbox to brake. Therefore this valve acts as a delaying device on the action of clutch and that's why it is not necessary to stop the motor rotation; the operator can control the HI or LO gear automatically without worrying about the motor rotation.

12 EXAMPLE OF SEQUENTIAL VALVE

Example of sequential valve

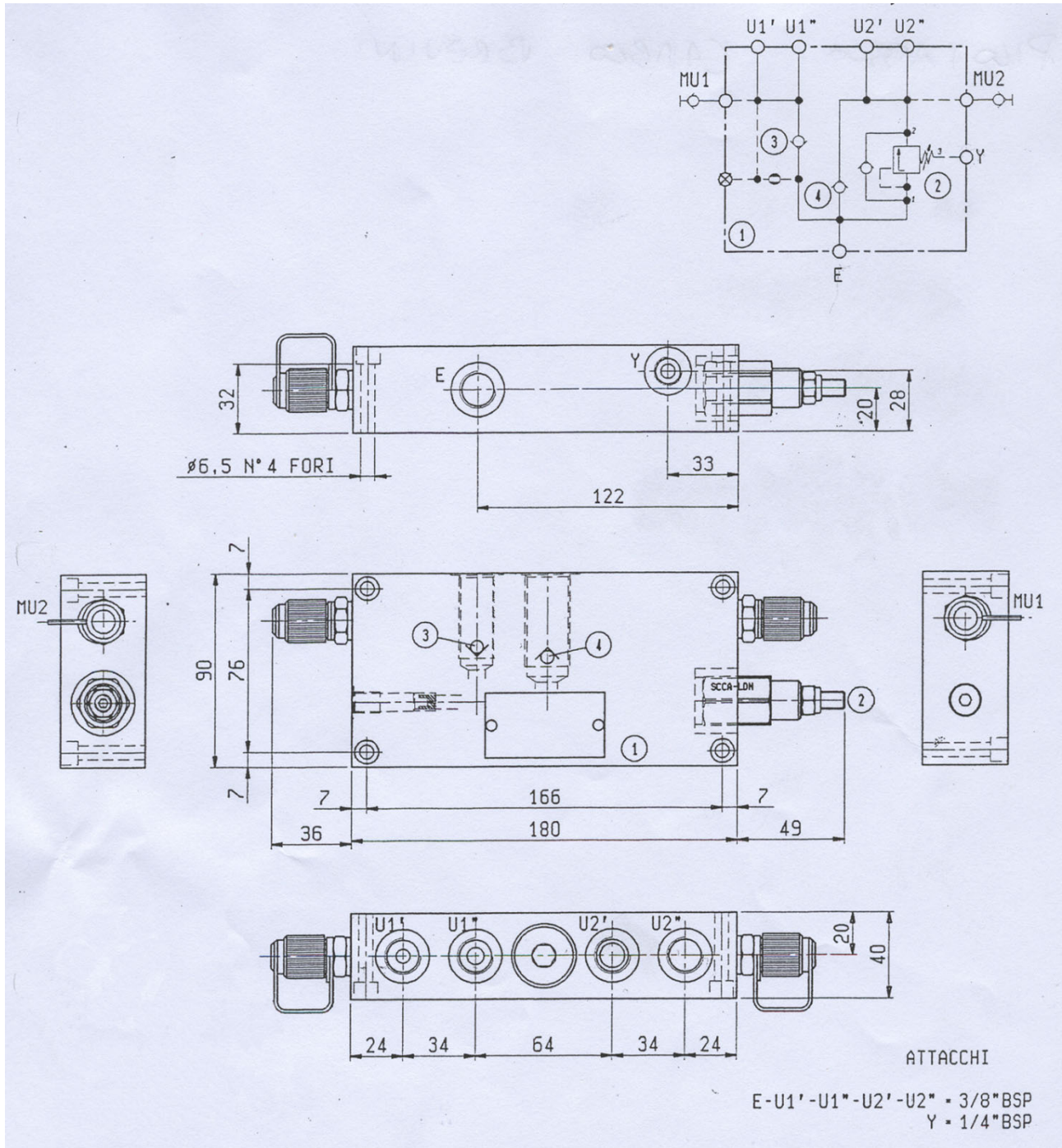


Fig. 16

13 GEARBOX LUBRICATION

The clutch is engaged by means of a rotating joint whose seals (segments) release a controlled slight oil leak. This leakage is quite natural for this type of seals which allow very high PxV (pressure for speed) products.

Segment detail

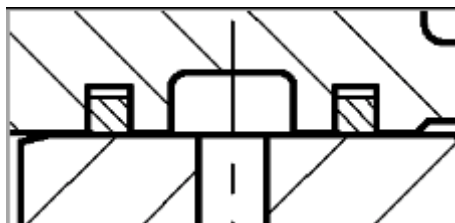


Fig. 17

The oil leaks are collected inside the Power Shift, so during installation you should foresee that the pump of the control hydraulic circuit sucks up oil from the Power Shift casing.

As per indications on the dimensional drawing the gearbox lubrication must meet the following requirements:

- The lubrication is a "closed" oil recirculating lubrication.
- The circulation oil flow-rate must be of 8÷15 l/min
- Fill the circulation oil by means of the inputs 1 and 5
- Using a flow switch, only 10% of the circulation flow-rate (maximum 2 l/min) must be sent to input 5
- Drain the circulation oil by means of the input 4 and 2 (4 if in case of horizontal mounting).
- The pressure in the gearbox casing must be kept below 0.5 bars to avoid damaging the rotating seals. To facilitate everything, you can drain the circulation oil by means of other inputs underneath 4.
- The lubricant to be used must be "ATF" type according to "DEXRON II" specifications or equivalent
- If an EP gear oil mixed with an additive is used also in the gearbox area, the performances (transmissible torque) must be reduced by 25%CR}When starting a new machine for the first time or after any maintenance operation that may have caused a reduction in the oil level, the power shift must be filled with oil, manually or by flushing.
 - Manually: Using the plug located at the top (No.12 in V5 and No.10 in B3 see "Figure 1" page 8) until the oil comes out of the plug. Be sure to tighten the plug after filling.
 - By flushing: Using the plug located at the top (No.12 in V5 and No.10 in B3 see "Figure 1" page 8) and start the machine, without motor rotation, until the oil comes out of the plug. Be sure to tighten the plug after filling.

Correct oil flow

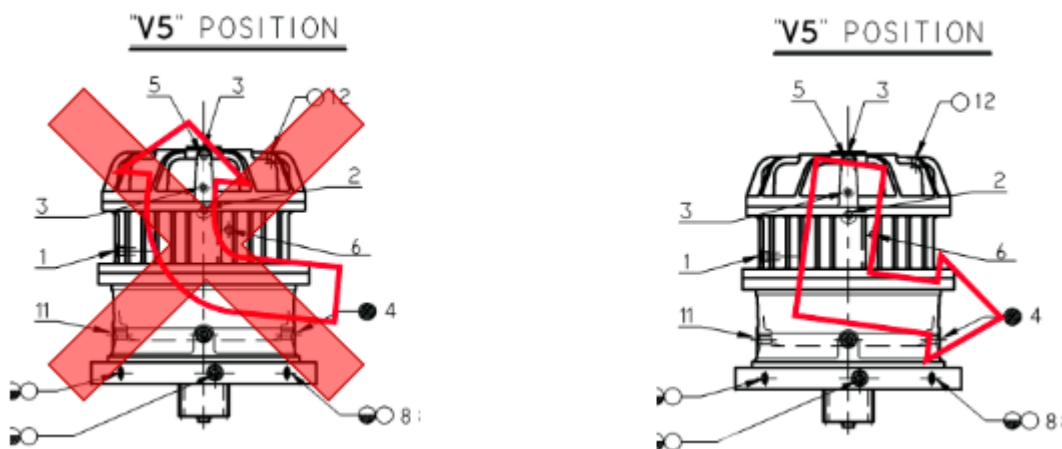


Fig. 18

GEARBOX LUBRICATION

13.1 RECOMMENDATIONS

- In order to prevent the gearbox from being completely free of oil due to different machine set-ups during handling, it is advisable to take some precautions to avoid emptying.

For example, it may be useful to create a siphon in the oil drain pipe to prevent oil from flowing out of the gearbox, see "Figure 19" page 22.

Siphon effect drain pipe in transport position

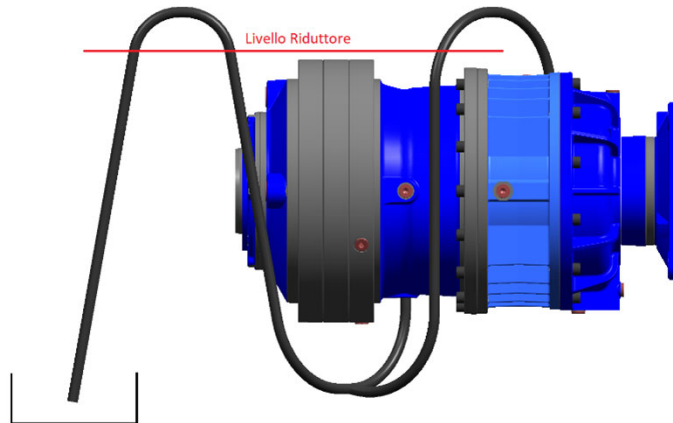


Fig. 19

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