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ORDINARY MAINTENANCE MANUAL FOR

PGA series VERTICAL MOUNTING POSITION



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SYMBOLS USED IN THIS MANUAL



MANDATORY

For the worker's safety it is MANDATORY to strictly abide by what is indicated



DANGER

Risks for the worker. Pay attention to the danger signs.



PROHIBITION

It is forbidden to operate on the unit while it is moving



PROTECTIVE CLOTHING

Protective clothing must always be worn by those persons authorised to work on the reduction gears



PROTECTIVE GLASSES

Protective glasses must always be worn by those persons authorised to work on the reduction gears



PROTECTIVE GLOVES

Protective gloves must always be worn by those persons authorised to work on the reduction gears



ACCIDENT PREVENTION FOOTWEAR

Accident prevention footwear must always be worn by those persons authorised to work on the reduction gears



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GENERAL INFORMATION

PURPOSE OF THE MANUAL

This manual:

- provide information about **ordinary maintenance** for gearboxes PGA series installed in vertical position (uscita rivolta verso l'alto),
- must be read by the workers and authorised people/operators before any kind of intervention, in order to guarantee a positive reply and must be kept handy, in a safe place and must always be clear and legible for future reference if and whenever needed.

ORDINARY MAINTENANCE

Ordinary maintenance predict controls and activity to carry out at regular and defined intervals (see page 4).

Ordinary maintenance guarantee unit long life and excellent performance.

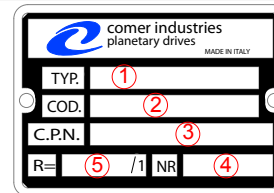
EXTRAORDINARY MAINTENANCE

Extraordinary maintenance is necessary:

- when the gearboxes present malfunctioning,
- after **5000 working hours** (see page 4).

UNIT IDENTIFICATION

All the data which characterize the gear unit are reported on the name plate that can be seen next



- 1) Type
- 2) Comer code
- 3) Customer code
- 4) Serial number
- 5) Ratio

SAFETY

Always take the necessary precautions to guarantee the safety of the people authorised to work on the gearbox.

Individual Protective Devices (IPG) must be supplied by the employer who must also inform the workers on how to use them correctly.



LUBRICANT AND LUBRICATION

Gearboxes PGA series are normally supplied with:

- lubrication with oil lubricant of the internal components;
- lubrication with grease of the upper bearing of the unit.

LUBRICANT INFORMATION

Viscosity	Oil Type	Ambient temperature t°C (min / max)					
		Mineral		Synthetic			
				PAO		PG	
	ISO VG 150	- 10°C	+ 30°C				
	ISO VG 220	+ 10°C	+ 45°C	- 20°C	+ 60°C	- 20°C	+ 60°C
	ISO VG 320	+ 30°C	+ 60°C				

Producer	Lubricants			
	Mineral	Synthetic		
		PAO	PG	
SHELL	Omala S2G	Omala S4GX	Omala S4 WE	
EXXON MOBIL	Mobilgear XMP	Mobil SHC Gear	Glygoyle	
KLÜBER	Kluberoil GEM1	Klubersynth EG4	Klubersynth GH6	
AGIP	Blasia	Blasia SX	Blasia S	
BP	Energol GR-XP	Enersyn EPX	Enersyn SG XP	
CASTROL	Alpha SP	Aphasyn EP	Alphasyn PG	
CHEVRON	Ultra Gear	Tegra Synthetic Gear	HiPerSYN	
TOTAL	Carter EP	Carter SH	Carter SY	



ORDINARY MAINTENANCE

Maintenance must be carried out by personnel who are qualified, authorised and appropriately trained



Before to operate on the unit:

- the system functioning must be interrupted,
- verify that there are no hazardous atmosphere in the work area.

During maintenance operations:

- self-starting of the unit must be avoided.

After maintenance operations:

- verify that the gearboxes respect technical specification requested,
- restore safety system functioning.
- carry out functional tests to guarantee correct functioning.

LUBRICANT REPLACEMENT

Oil lubricant replacement operation:

- drain the gearboxes from internal oil lubricant;
- filling with new oil lubricant until correct oil level is reached.

Correct oil lubricant type and quantity are indicated in the specific drawings and technical documentation.

When new oil lubricant is not specified, new oil lubricant must have:

- equivalent characteristic of oil lubricant already used in the gearboxes,
- compatible characteristic with oil lubricant already used in the gearboxes.

When the new oil lubricant have different characteristic from oil lubricant previously used in the gearboxes, the unit should be flushed through with a liquid detergent recommended by the lubricant supplier.

LUBRICANT TOPPING UP

Topping up is necessary when oil level lubricant is lower than MIN as indicated in the specific drawings or documents.



Warning:

if the quantity of oil for topping up is greater than 10 % of the oil capacity: check again for leaks

Characteristics of the lubricant used for topping up:

- equivalent to the oil lubricant already used in the gearboxes,
- compatible with oil lubricant already used in the gearboxes.

MAINTENANCE INTERVALS

Activity	After the first 100 working hours
Lubricant / lubrication control	Oil level, oil and grease leakage
Functional control	Vibration, noise level, temperature, performance
Ordinary maintenance	Once a year or every 2000 working hours
OIL replacement	page 5
Grease topping up	page 7
Visual inspection	Oxidation, oil/grease leakage, damage, cleaning, excessive dirty
Tightening control	Screws, plugs, elbow, extensions
Breather plug control	Functional test
After maintenance	During functioning
Verifiche funzionali	Vibration, noise level, temperature, performance, oil level and oil/grease leakage
Oil topping up	Carry out when oil level is lower than MIN (page 6)
Extraordinary maintenance (not included in this manual)	Every 5000 working hours or in case of malfunctioning

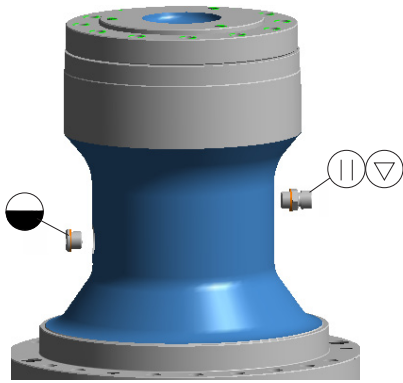


Warning:

Do not mix synthetic lubricants with mineral lubricants



OIL LUBRICANT REPLACEMENT

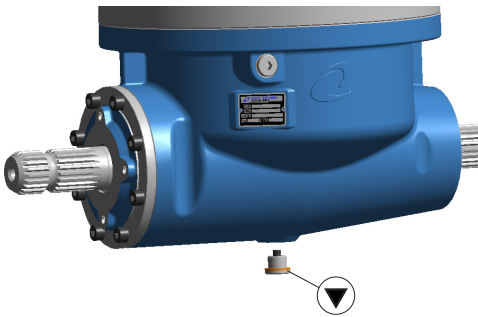
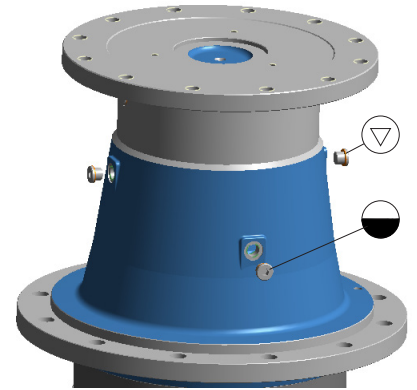


01 - BEFORE STARTING

Verify correct configuration on the specific drawings and documentations.

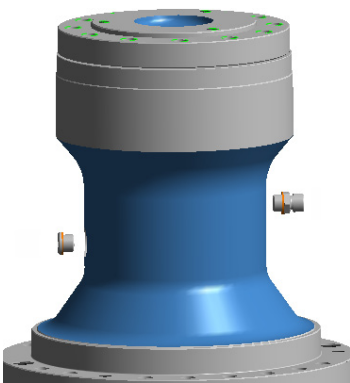
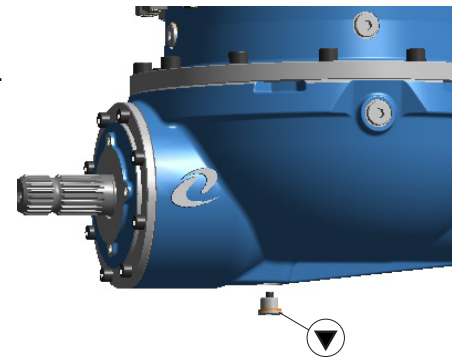
Remove the plug installed on the output unit:

- level plug ●
- breather plug Ⓜ
- filling plug ▽



02 - EMPTYING

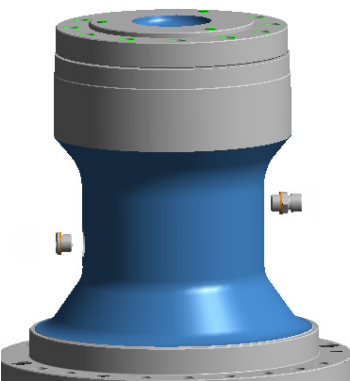
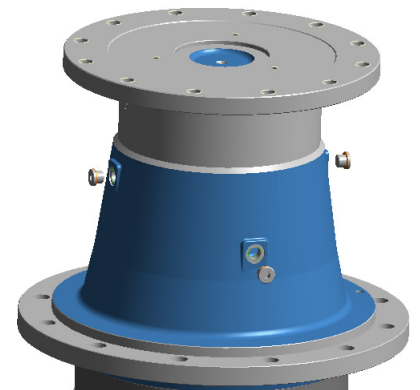
Remove magnetic/drain plug ▽.
 Collect oil in adequate container.
 Restore and tighten magnetic/drain plug with relative washer.



03 - FILLING

Filling with new oil in compliance with specific technical documentations.

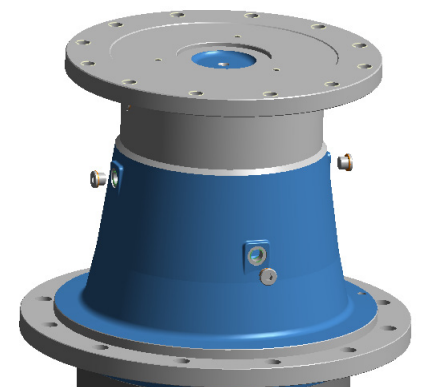
Alternatively: topping up until oil flow out from level plug holes ● and respect correct oil level ●.
 (See page 7 and 8)



04 - AFTER FILLING

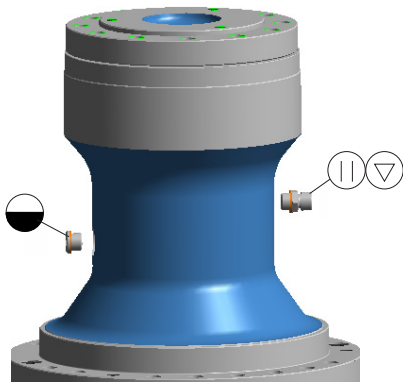
Restore all plugs, elbows, extensions, etc.

Verify correct oil level after the first **50 hours** of functioning and topping up with oil if necessary.





OIL LUBRICANT TOPPING UP

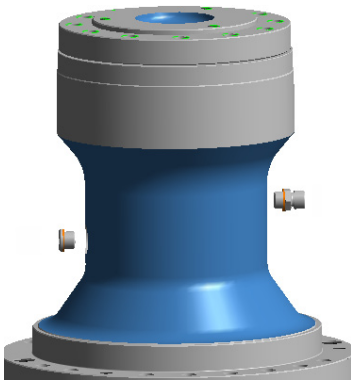
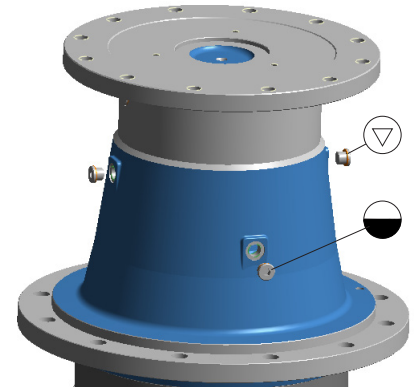


01 - BEFORE STARTING

Verify correct configuration on the specific drawings and documentations.

Remove the plug installed on the output unit:

- level plug ●
- breather plug ①
- filling plug ▼

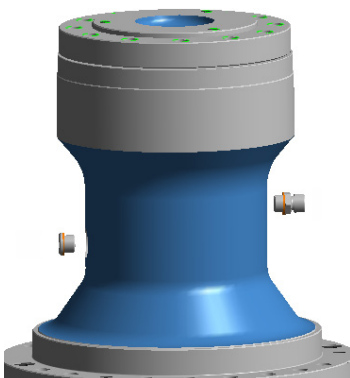
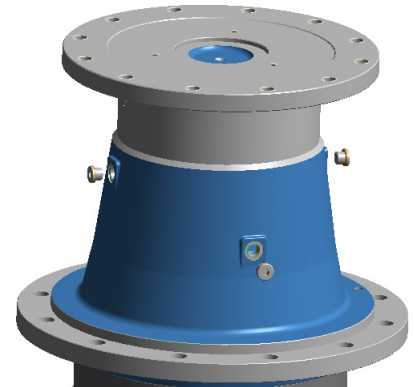


02 - TOPPING UP

Topping up with new oil in compliance with specific technical documentations.

Alternatively: topping up until oil flow out from level plug holes ● and respect correct oil level ●.

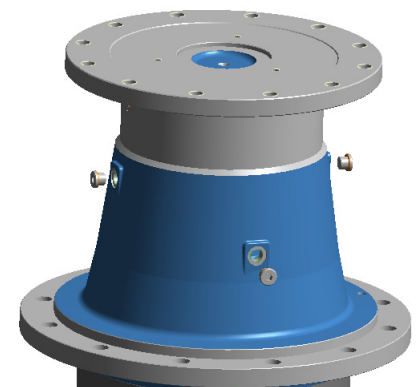
(See page 7 and 8)



03 - AFTER TOPPING UP

Restore all plugs, elbows, extensions, etc.

Verify correct oil level after the first **50 hours** of functioning and topping up with oil if necessary.

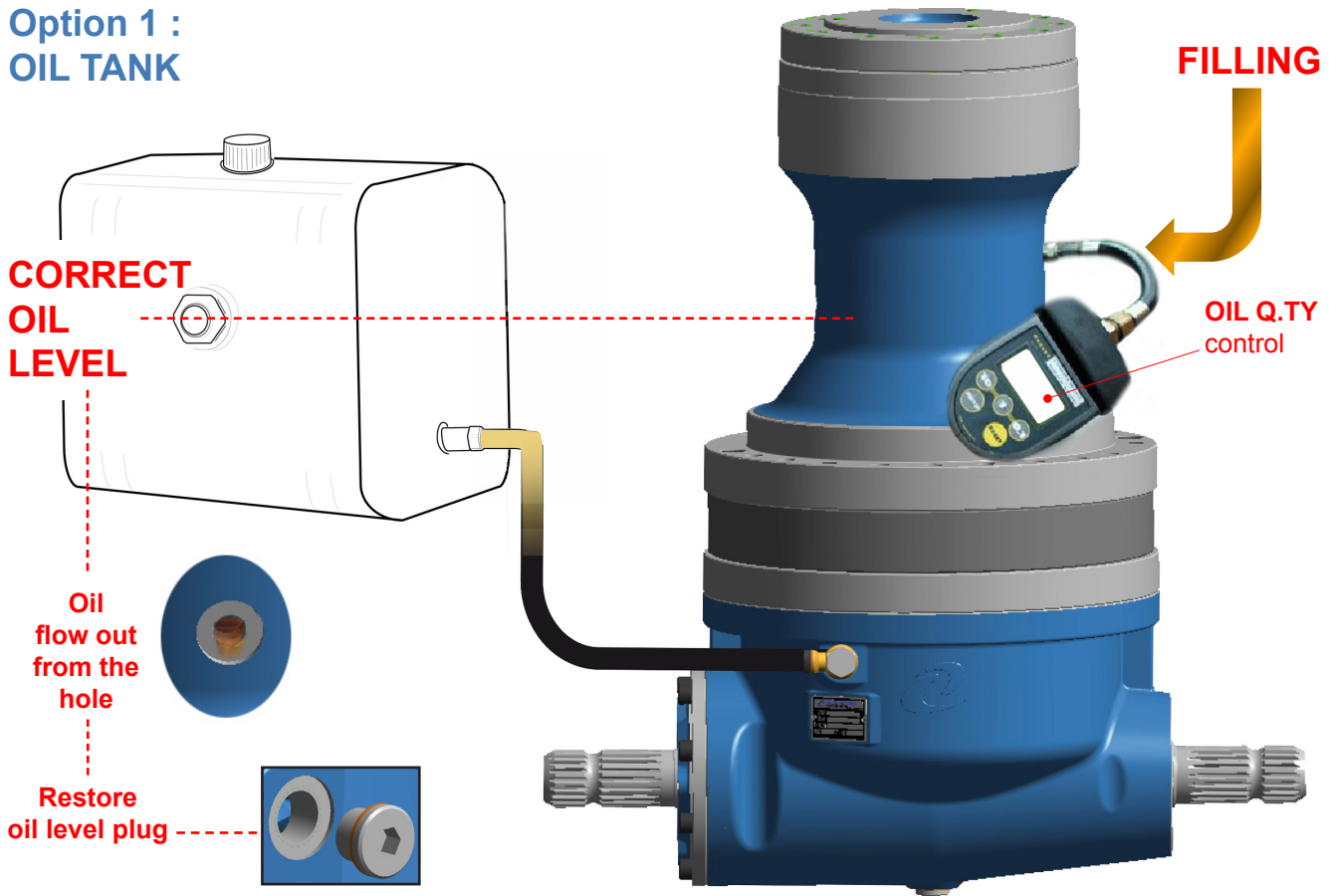




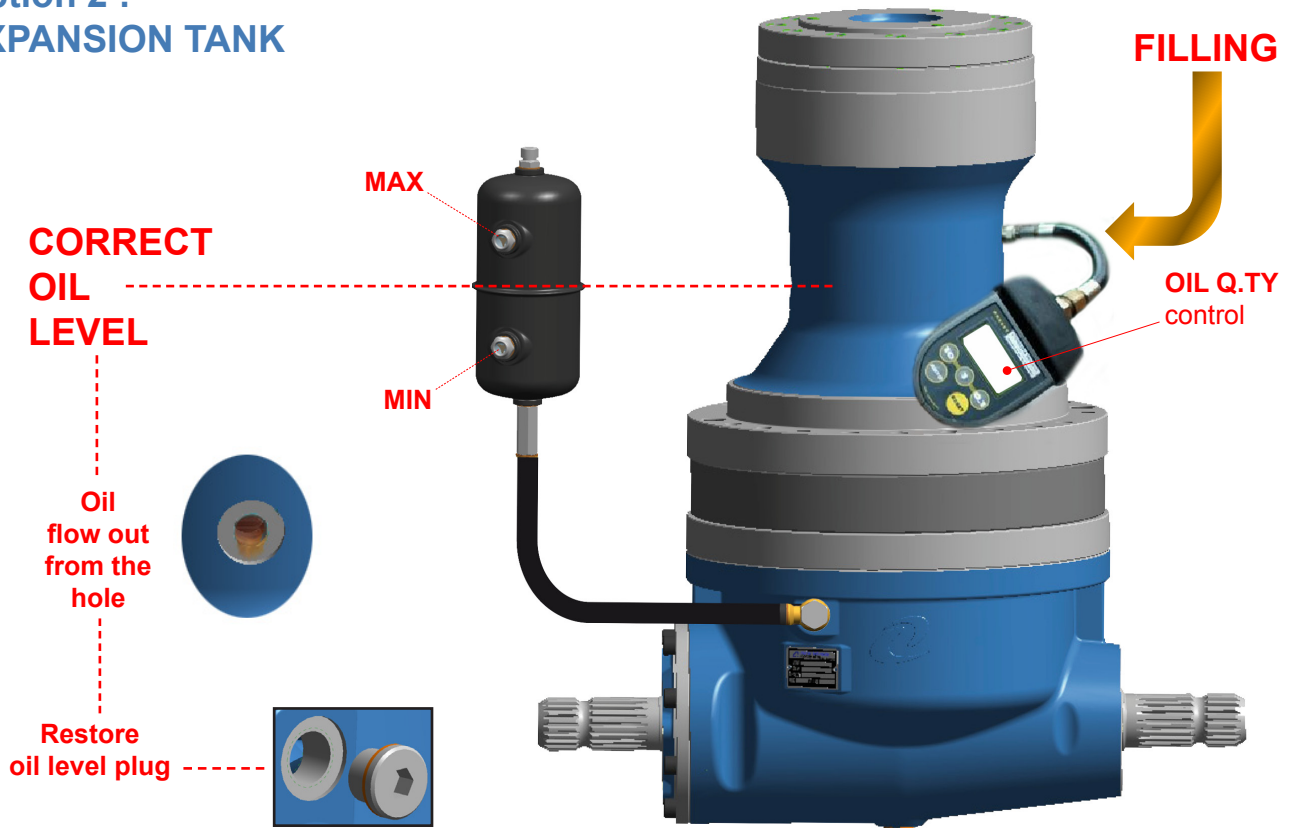
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PGA 1202 SERIES OIL LUBRICATION

Option 1 : OIL TANK



Option 2 : EXPANSION TANK

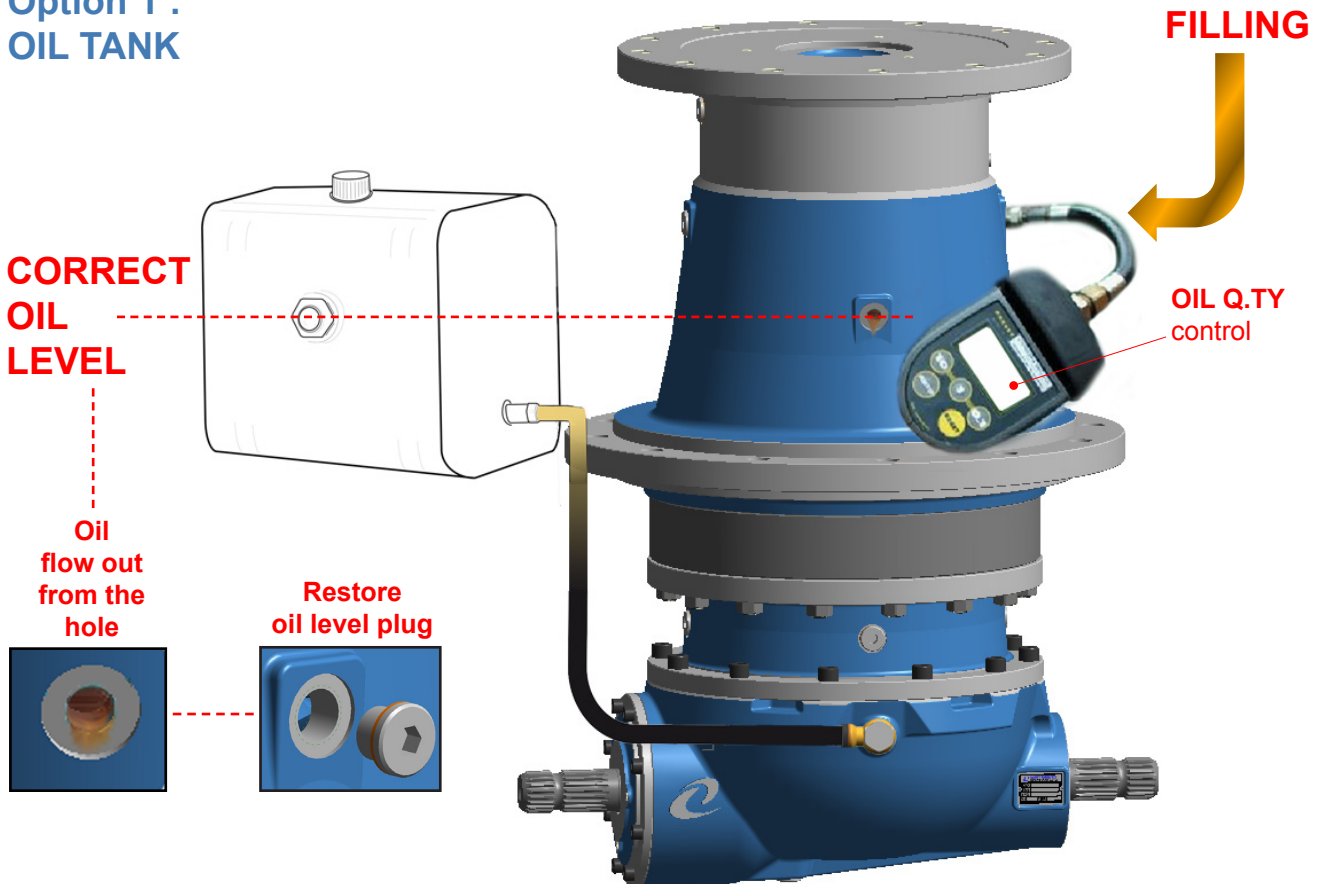




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PGA 1602/2502 SERIES OIL LUBRICATION

Option 1 : OIL TANK



Option 2 : EXPANSION TANK





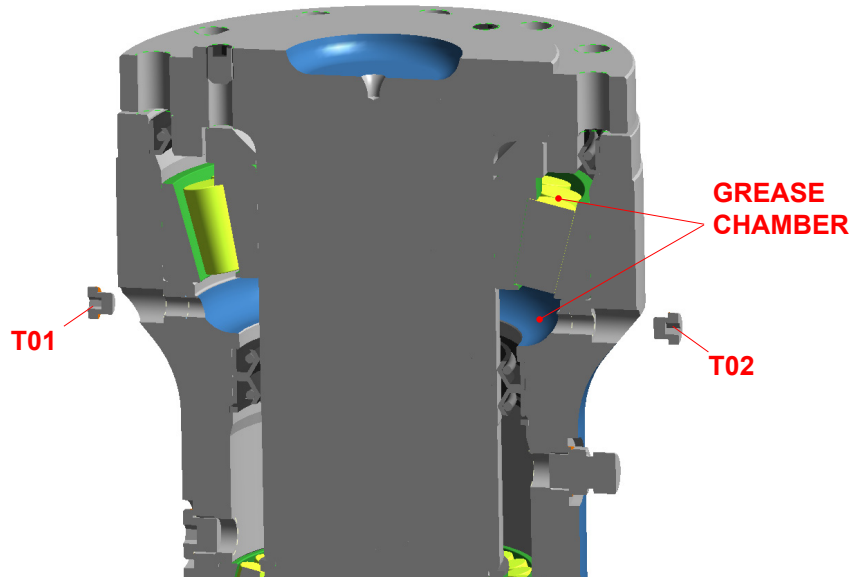
GREASE TOPPING UP

EXAMPLE PGA1202

! Grease topping up must be done during ordinary maintenance operation

! Topping up with the same type of grease already used inside the grease chamber

Remove two plugs.
 Pump new grease from one plug hole (T01 or T02).
 Stop to pump when grease flow out from the other plug hole.
 Restore all the plugs (with their washers) previously removed and tightening.

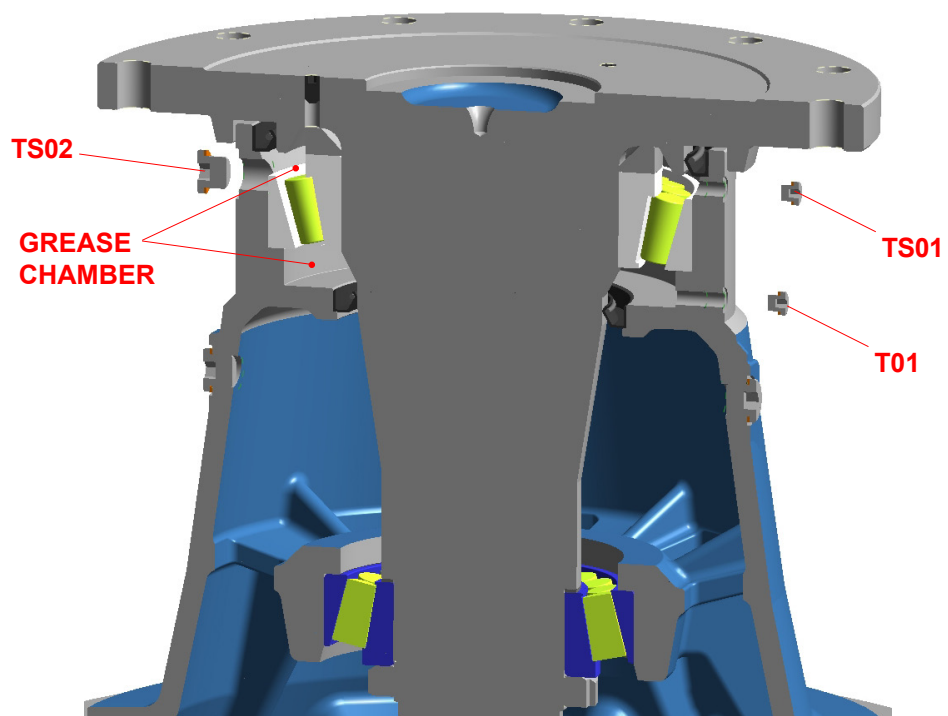


EXAMPLE PGA1602/2502

! Grease topping up must be done during ordinary maintenance operation

! Topping up with the same type of grease already used inside the grease chamber

Remove one lower plugs (T01) and one upper plug (TS01 or TS02).
 Pump new grease from lower plug hole (T01).
 Stop to pump when grease flow out from the upper plug hole (TS01 or TS02).
 Restore all the plugs (with their washers) previously removed and tightening.





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PRELIMINARY CHECK AND START UP

PRELIMINARY CHECK



Before start up the unit:

- verify correct oil level;
- topping up the unit and restore correct oil level if necessary;
- carry out a general inspection of the unit;
- verify that the gearboxes can functioning safety.

START UP

After start up the unit:

- verify correct functioning;
- verify that technical data of functioning are respected;
- verify that there are no obstacles or impediments that can influence the correct operation of the units.

NB: In case of malfunctioning, interrupt and disabled the functioning of the machine and restore safety condition of functioning.

FUNCTIONING INTERRUPTION



It is forbidden to work with machines in movement.

Disconnect electrical supply and avoid accidental run of the unit. Interrupt and disabled the functioning of the machine during maintenance/revision procedures to avoid hurting operators and other people.

PRODUCT DISPOSAL



All the parts must be disposed of by the relative centres in full compliance with the laws in force on the matter of dismantling and demolishing industrial waste.

Waste oil/grease: to dispose of waste oil abide by the laws for protecting the environment and the laws in force in the Country where the machine is used.

TROUBLESHOOTING

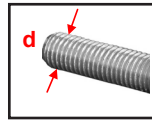
Problems	Possible cause	Remedies
Oil leaks	1) Damaged or worn seals; 2) Breather plug clogged;	1) Contact Comer Industries; 2) Clean or substitute the plug
Excessive overheating	1) There isn't oil inside the unit; 2) Incorrect level of lubricant; 3) Excessive layer of dust; 5) Inadequate ventilation; 6) Internal problem	1) Filling the unit with oil; 2) Restore correct level of lubricant (oil/grease); 3) Clean the unit; 5) Contact Comer Industries; 6) Contact Comer Industries;
Excessive noise 1	Internal problem	Restore correct oil level. Restore correct grease q.ty. Contact Comer Industries.
Excessive noise 2	External problem	Verify correct pinon/yaw bearing backlash. Verify screws/connection. Verify unit installation.
Excessive vibration	1) Incorrect installation; 2) Internal problem;	1) Verify installation and screws tightening; 2) Contact Comer Industries;
The unit fail to run or rotation unit direction is wrong	1) Incorrect installation; 2) Internal problem	1) Verify installation and connection; 2) Contact Comer Industries;

In case of different problems from this table contact a Comer Technical-Commercial Service



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TORQUE WRENCH SETTING (Nxm)



**Tab.1) screw torques (Nxm)
screwed on cast iron or steel**

d _{xp} (mm)	4.8		6.8		8.8		10.9		12.9	
	min	max	min	max	min	max	min	max	min	max
4x0,7	1,5	1,9	2,3	2,8	3,1	3,8	4,4	5,3	5,2	6,3
5x0,8	3,0	3,7	4,5	5,5	6,0	7,3	8,5	10,3	10,2	12,4
6x1	5,2	6,3	7,8	9,5	10,4	12,7	14,7	17,8	17,6	21,4
8x1,25	12,5	15,2	18,7	22,7	25,0	30,3	35,1	42,6	42,1	51,1
10x1,5	25,0	30,3	37,4	45,5	49,9	60,6	70,2	85,2	84,2	102,3
12x1,75	42,5	51,6	63,7	77,4	85,0	103,2	119,5	145,1	143,4	174,2
14x2	67,6	82,1	101,5	123,2	135,3	164,3	190,2	231,0	228,3	277,2
16x2	102,4	124,3	153,6	186,5	204,8	248,6	287,9	349,6	345,5	419,6
18x2,5	142,7	173,3	214,1	259,9	285,4	346,6	401,4	487,4	481,7	584,9
20x2,5	200	243	300	364	400	486	562	683	675	819
22x2,5	268	326	402	489	537	652	755	916	906	1.100
24x3	346	420	518	629	691	839	972	1.180	1.166	1.416
27x3	504	612	756	918	1.008	1.224	1.418	1.721	1.701	2.066
30x3,5	688	835	1.032	1.253	1.375	1.670	1.934	2.349	2.321	2.818

**Tab. 3) screw torques (Nxm)
screwed on alluminum**

d _{xp} (mm)	4.8		6.8		8.8		10.9		12.9	
	min	max	min	max	min	max	min	max	min	max
4x0,7	1,5	1,9	2,3	2,8	2,7	3,1	2,7	3,1	2,7	3,1
5x0,8	3,0	3,7	4,5	5,5	5,2	6,0	5,2	6,0	5,2	6,0
6x1	5,2	6,3	7,8	9,5	8,9	10,4	8,9	10,4	8,9	10,4
8x1,25	12,5	15,2	18,7	22,7	21,4	25,0	21,4	25,0	21,4	25,0
10x1,5	25,0	30,3	37,4	45,5	42,8	49,9	42,8	49,9	42,8	49,9
12x1,75	42,5	51,6	63,7	77,4	72,8	85,0	72,8	85,0	72,8	85,0
14x2	67,6	82,1	101,5	123,2	116,0	135,3	116,0	135,3	116,0	135,3
16x2	102,4	124,3	153,6	186,5	175,5	204,8	175,5	204,8	175,5	204,8
18x2,5	142,7	173,3	214,1	259,9	244,7	285,4	244,7	285,4	244,7	285,4
20x2,5	200	243	300	364	343	400	343	400	343	400
22x2,5	268	326	402	489	460	537	460	537	460	537
24x3	346	420	518	629	592	691	592	691	592	691
27x3	504	612	756	918	864	1.008	864	1.008	864	1.008
30x3,5	688	835	1.032	1.253	1.179	1.375	1.179	1.375	1.179	1.375

d _{xp} (mm)	4.8		6.8		8.8		10.9		12.9	
	min	max	min	max	min	max	min	max	min	max
8x1	13,1	15,9	19,7	23,9	26,2	31,8	36,9	44,8	44,2	53,7
10x1,25	26,0	31,5	38,9	47,3	51,9	63,0	73,0	88,6	87,6	106,4
12x1,25	45,3	55,0	67,9	82,4	90,5	109,9	127,3	154,6	152,8	185,5
12x1,5	43,9	53,3	65,8	79,9	87,8	106,6	123,4	149,9	148,1	179,8
14x1,5	71,4	86,7	107,1	130,0	142,8	173,4	200,8	243,8	241,0	292,6
16x1,5	107,2	130,1	160,8	195,2	214,3	260,3	301,4	366,0	361,7	439,2
18x1,5	154,9	188,0	232,3	282,1	309,7	376,1	435,6	528,9	522,7	634,7
20x1,5	215	261	322	391	430	522	604	734	725	881
22x1,5	286	347	429	521	572	695	805	977	966	1.173
24x2	367	446	551	669	734	891	1.032	1.254	1.239	1.504
27x2	531	645	797	968	1.063	1.291	1.495	1.815	1.793	2.178
30x2	739	897	1.108	1.345	1.477	1.794	2.077	2.522	2.493	3.027

d _{xp} (mm)	4.8		6.8		8.8		10.9		12.9	
	min	max	min	max	min	max	min	max	min	max
8x1	13,1	15,9	19,7	23,9	22,5	26,2	22,5	26,2	22,5	26,2
10x1,25	26,0	31,5	38,9	47,3	44,5	51,9	44,5	51,9	44,5	51,9
12x1,25	45,3	55,0	67,9	82,4	77,6	90,5	77,6	90,5	77,6	90,5
12x1,5	43,9	53,3	65,8	79,9	75,2	87,8	75,2	87,8	75,2	87,8
14x1,5	71,4	86,7	107,1	130,0	122,4	142,8	122,4	142,8	122,4	142,8
16x1,5	107,2	130,1	160,8	195,2	183,7	214,3	183,7	214,3	183,7	214,3
18x1,5	154,9	188,0	232,3	282,1	265,5	309,7	265,5	309,7	265,5	309,7
20x1,5	215	261	322	391	368	430	368	430	368	430
22x1,5	286	347	429	521	491	572	491	572	491	572
24x2	367	446	551	669	629	734	629	734	629	734
27x2	531	645	797	968	911	1.063	911	1.063	911	1.063
30x2	739	897	1.108	1.345	1.266	1.477	1.266	1.477	1.266	1.477