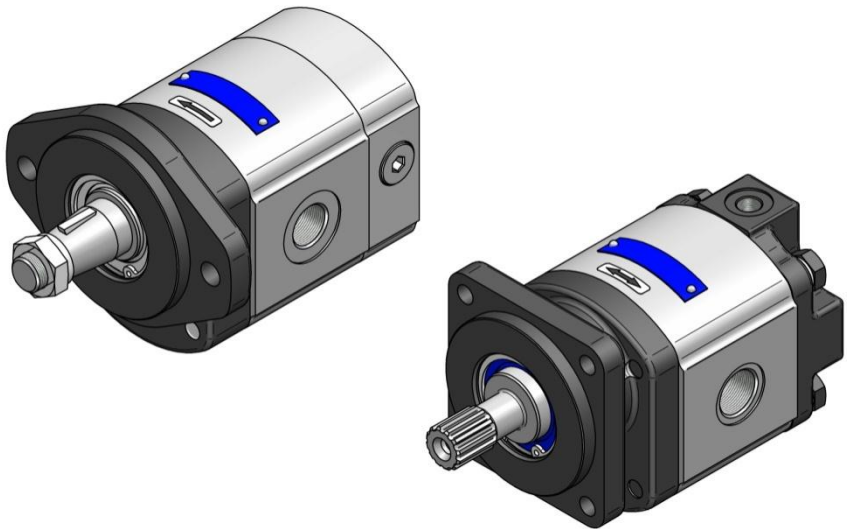


Service manual

Gear motors - series TM



juhostroj
AERO TECHNOLOGY & HYDRAULICS

1. Basic description

Gear motors are used for transformation of liquid pressure head in mechanical energy. The TM line motors with external teeth are due to their simple construction, compact dimensions and a wide range of types applicable in modern hydraulic systems, handling equipment as well as mobile hydraulic systems. The basic version consists of several parts. The crankcase is made of a heavy duty aluminium alloy, engine cover and flange of grey iron or eventually aluminium alloy, and gear wheels of heavy duty steel. Axle pins with a high surface duality are imbedded in sliding sleeves, continuously lubricated and cooled by a stream of working liquid. TM motors are equipped with a hydraulic axial play compensation ensuring stable performance and torsion moment within the entire range of speeds and temperatures. Flange types used as well as the form of working liquid inlet and outlet comply with all worldwide standards. TM line motors can be delivered in one-way design as clockwise or anti-clockwise rotating engines; they are also available in reversible version.

2. Table of parameters

Unidirectional motors

Nominal Size Parameters		Symb.	Unit	TM-4	TM-6	TM-8	TM-12	TM-16	TM-20	TM-25	TM-31
Nominal displacement		V_g	[cm ³]	4,00	6,00	8,00	12,00	16,00	20,00	25,00	31,00
Rotation speed	nominal	n_n	[min ⁻¹]	1500							
	minimum	n_{min}	[min ⁻¹]	500							
	maximum	n_{max}	[min ⁻¹]	4000	4000	3600	3600	3200	3200	2800	2200
Pressure at the outlet port	minimum	p_{1min}	[bar]	-0,3							
	maximum	p_{1max}	[bar]	0,5							
Pressure at the inlet port	maximum continuous	p_{2n}	[bar]	270	270	270	250	250	200	180	150
	maximum	p_{2max}	[bar]	290	290	290	270	270	240	200	170
	peak	p_3	[bar]	310	310	310	290	290	260	220	190
Nominal flow rate (max.) at n_n and p_{2n}		Q_n	[dm ³ .min ⁻¹]	7,06	10,59	13,64	20,45	26,67	33,33	41,67	51,67
Maximum flow rate at n_{max} and p_{2max}		Q_{max}	[dm ³ .min ⁻¹]	17,02	25,53	30,64	45,96	54,47	68,09	74,47	72,55
Nominal power (max.) at n_n and p_{2n}		P_n	[kW]	2,19	3,28	4,47	6,21	8,46	8,46	9,52	9,83
Max. power at n_{max} and p_{2max}		P_{max}	[kW]	6,82	10,23	12,28	17,15	20,32	22,58	20,58	17,04
Nominal torque at n_n and p_{2n}		M	[Nm]	15,47	23,20	30,94	42,97	57,30	57,30	64,46	66,61
Weight		m	[kg]	2,60	2,65	2,75	2,95	3,10	3,35	3,50	3,80

Reversible motors

Nominal Size Parameters			Symb.	Unit	TM-4	TM-6	TM-8	TM-12	TM-16	TM-20	TM-25	TM-31
Nominal displacement			V_g	[cm ³]	4,00	6,00	8,00	12,00	16,00	20,00	25,00	31,00
Rotation speed	nominal	n_n	[min ⁻¹]	1500								
	minimum	n_{min}	[min ⁻¹]	500								
	maximum	n_{max}	[min ⁻¹]	4000	4000	3600	3600	3200	3200	2800	2200	
Pressure at the outlet port	minimum	p_{1min}	[bar]	-0,3								
	maximum	p_{1max}	[bar]	210	210	210	210	200	160	140	100	
Pressure at the inlet port	maximum continuous	p_{2n}	[bar]	270	270	270	250	250	200	180	150	
	maximum	p_{2max}	[bar]	290	290	290	270	270	240	200	170	
	peak	p_3	[bar]	310	310	310	290	290	260	220	190	
Nominal flow rate (max.) at n_n and p_{2n}			Q_n	[dm ³ .min ⁻¹]	7,06	10,59	13,64	20,45	26,67	33,33	41,67	51,67
Maximum flow rate at n_{max} and p_{2max}			Q_{max}	[dm ³ .min ⁻¹]	17,02	25,53	30,64	45,96	54,47	68,09	74,47	72,55
Nominal power (max.) at n_n and p_{2n}			P_n	[kW]	2,19	3,28	4,47	6,21	8,46	8,46	9,52	9,83
Max. power at n_{max} and p_{2max}			P_{max}	[kW]	6,82	10,23	12,28	17,15	20,32	22,58	20,58	17,04
Nominal torque at n_n and p_{2n}			M	[Nm]	15,47	23,20	30,94	42,97	57,30	57,30	64,46	66,61
Weight			m	[kg]	2,60	2,65	2,75	2,95	3,10	3,35	3,50	3,80

3. Working liquid

- Mineral oils for hydraulic drives (NBR seal)
- Hydraulic liquids based on vegetable oils, suitable for hydrostatic drives (NBR seal)

3.1. Liquid temperature

- $t = -20 \div +80$ [°C] (NBR seal)
- 20 \div +120 [°C] (FKM seal)

3.2. Kinematic viscosity of liquid [$m^2 \cdot s^{-1}$]

- recommended (for continuous operation) $20 \cdot 10^{-6}$ to $100 \cdot 10^{-6}$
- maximum when put in operation (at kinematic viscosity >1000 allowed service pressure is <10 bar speed <1500 RPM) $1200 \cdot 10^{-6}$
- minimum (operating mode at $10 \cdot 10^{-6}$ to $20 \cdot 10^{-6}$ has to be consulted with the producer) $10 \cdot 10^{-6}$

3.3. Filtration coefficient β_α

$\beta_{25} 75 \geq$ (for pressure $p_2 < 200$ bar)

$\beta_{10} 75 \geq$ (for pressure $p_2 > 200$ bar)

3.4. Contamination level – class of liquid ISO 4406

19/16 (for pressure $p_2 < 200$ bar)

17/14 (for pressure $p_2 > 200$ bar)

3.5. Contamination level – class of liquid NAS 1638

10 (for pressure $p_2 < 200$ bar)

8 (for pressure $p_2 > 200$ bar)

4. Pump drive

Driving mechanism must cause neither the axial nor radial load of the pump shaft. The driving mechanism must meet the specified tolerances of the position, see the Figure No. 1. The usage of flexible coupling is recommended.

In case of the operation with the load of the driving shaft, the pump must be equipped with the front-end Bering, see the Figure No. 2.

The tolerance of the driving mechanism position:

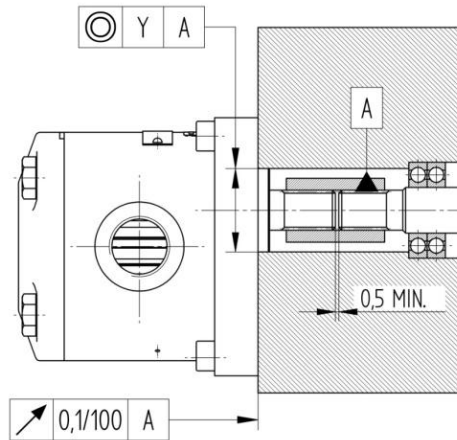


Figure No. 1

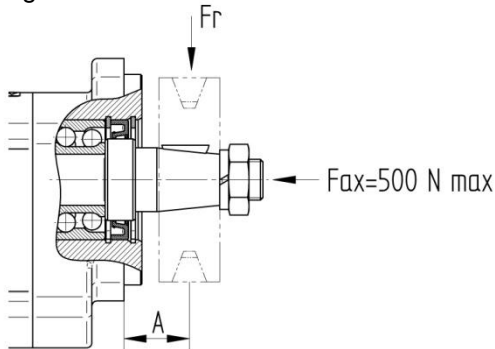
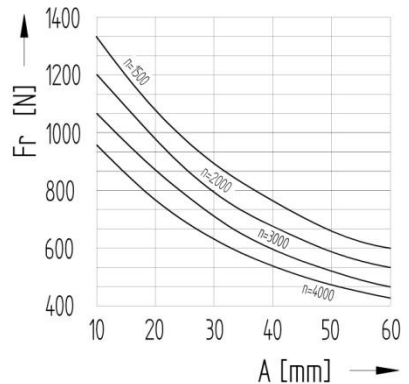


Figure No. 2



Coupling used for the of the torque transmission	flexible	solid
Y (mm)	0,1	0,04

5. Assembly / disassembly and service instructions

The gear motor can be installed on the final product in the arbitrary position. The external check of the motor must be done before its installation on the driving unit.

During handling, it is necessary to avoid damage of the flange seating face, of the spigot, of the end of driving shaft, possibly of the sealing faces at inlet and outlet.

The end of the driving shaft can be easily put into the catch cam until the motor flange face seats on the counterpart. If the motor's shaft has the spline end or claw where the permanent lubrication is not secured during operation, we recommend to lubricate it by the suitable grease on the assembly occasion.

Fix the pump to the counterpart by tightening the screws (nuts) after the pump's flange face has seated completely on the seating face of the counterpart (casing).

Remove the safety plugs of the inlet and outlet holes of all sections before connecting the motor to the hydraulic circuit. Check, whether the threads for connecting the hydraulic line are not damaged. During assembly, please, avoid the entering of impurities into the motor.

The seal on the flange face must be such arranged to prevent the oil leakage from the driving mechanism area through the motor's binder screws.

After connection, let the motor run at least 2 minutes without pressure at minimum speed and monitor whether it runs smoothly, without excessive heating. When hot oil enters the cold motor, do not load it before the whole unit is warmed up completely.

When dismantling the final product, protect the internal area by covering the connecting holes immediately.

The safety valve must be installed in the motor hydraulic circuit. The valve must be protected against incompetent manipulation. The valve is adjusted at the most on maximal permanent motor pressure. The peak pressure in the circuit must not exceed the allowed value. In case of multiple motors, the safety valve must be installed in the circuit of each section.

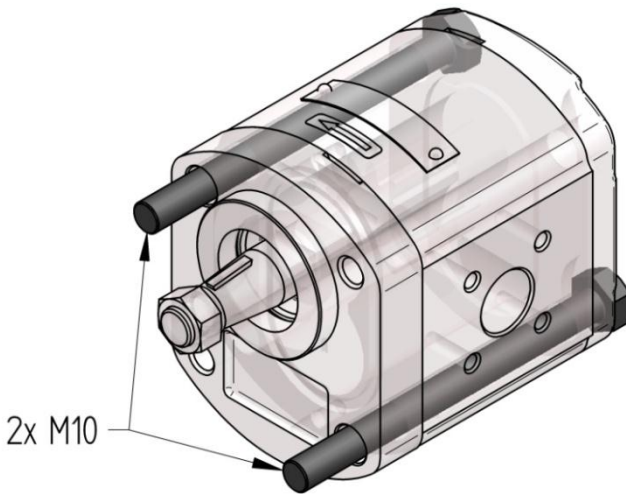
The used oil quality must meet the relevant oil standard for the whole operation period and its specified cleaning must be ensured.

It must be ensured that the oil quantity in the hydraulic circuit will not drop under the value when, in the inlet branch area, the oil turbulence appears as well as the air intake and the temperature increase above the allowed limit. After motor installation into hydraulic circuit, and after any circuit dismantling, it is necessary to vent the whole system perfectly.

The inlet and outlet lines should have such nominal diameter that the liquid speed does not exceed $8 \text{ m}\cdot\text{s}^{-1}$.

Operation – the gear motors do not need, during the operation, the special maintenance or service except the care of the working liquid and the regular inspections for detecting the possible leakage in joints and the checks of the motor binder screws (nuts) tightening. The oil change must be done with regard on the correct functioning of the whole hydraulic circuit. The working liquid change interval will be specified by the finalist on the base of the operation test.

At the motor assembly, with the help of two screws M10 coming through the motor, the screws tightening torque $45 \pm 2 \text{ Nm}$ is specified.



6. Warehousing warranty period - (applicable to sales representatives only)

The manufacturer provides to Jihostroj sales representatives a 1 year warranty to sale the product to an operator. This period is not included in the service life of the product and is covered by the manufacturer's warranty.

Sales representatives are required to comply with the following conditions of warehousing:

Temperature: from -20°C to +40 °C

Humidity: from 40% to 80%

7. Service warranty period

The manufacturer provides to its customers a service warranty for the product in the range of 3000 hours for 2 years from the date of sale, whichever occurs earlier.

8. Validity of the commercial warranty

The manufacturer grants the commercial warranty and guarantees the quality of the product provided the operating conditions listed in the service manual are complied with.

The customer is required to present the "Complaint report" to make a claim, containing at least the following information: Type designation, serial number, description of the defect, number of service hours.

The product that is subject to a complaint must be sent to the factory complete, clean, with blinded sockets and with flange and drive protection installed. The pump conversion or other modifications are not allowed.

The claim will be rejected and the product will be repaired at the costs of the customer unless the above conditions will be met.

The manufacturer disclaims responsibility for any damage resulting from the incorrect installation and exploitation.

