

PLEIGER HYDRAULICS

PERFORMANCE IN DESIGN

Swivel Gears



PLEIGER



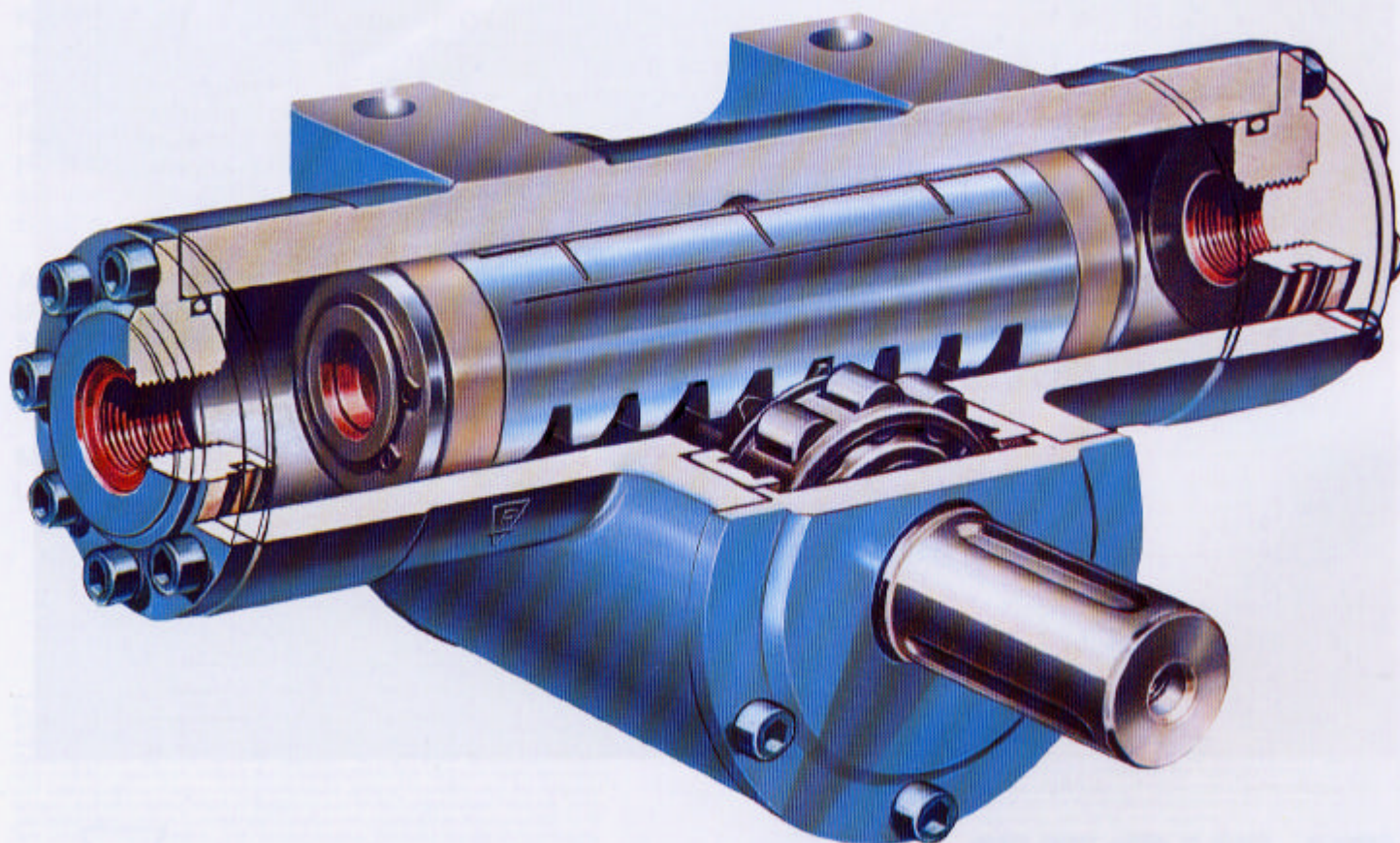
SWIVEL GEARS

Characteristics

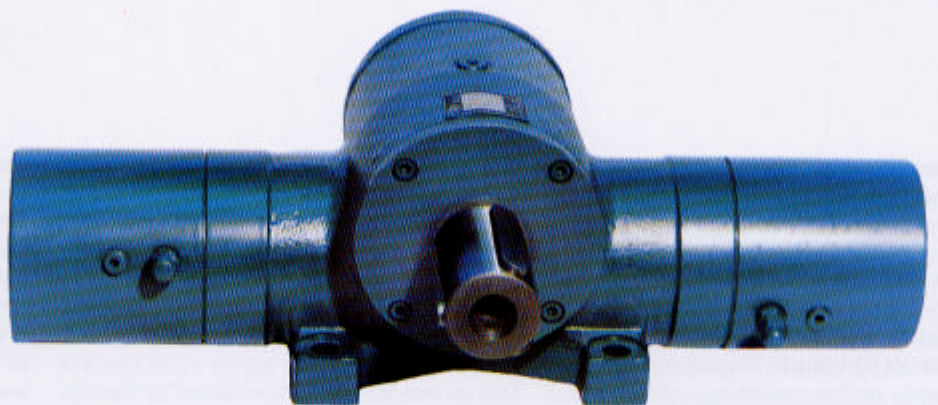
- high torque with small dimensions
- robust and compact construction
- constant torque in both rotation directions over the whole swivel range
- ideal as a crank assembly with sinusoidal sequence of operations
- loads can be held precisely in intermediate positions
- low internal friction and good start-up performance through hydrostatic pressure compensation
- instant change of direction
- long life
- maintenance free

Models

- | | |
|-------------|---|
| ST | Standard swivel gear – foot mounting – |
| STD | Swivel gear with adjustable end stop cushioning |
| STE | Swivel gear with adjustable end stop limitation |
| STED | Swivel gear with adjustable end stop limitation and end stop cushioning |



PERFORMANCE TABLE



Model	Nominal size	Torque at max. pressure*		Theoretical capacity for 360° in litres	Shortest time for 360° in seconds	Max. permitted loading at shaft centre (N)		* Peak pressure included. Recommended for short time run only, f.i. when starting or stopping.
		Nm	bar			radial	axial	
ST STE STD STED (F with flange added)	01	110	180	0,045	0,85	2 000	2 000	Drive shaft 1 = on one side 2 = on two sides
	02	220	180	0,09	0,85	3 500	3 500	
	04	450	180	0,18	1,0	5 000	5 000	
	08	800	180	0,31	1,0	7 500	7 500	
	1	1 750	180	0,7	1,5	10 000	10 000	
	3	3 300	180	1,3	1,5	13 000	13 000	
	4	4 600	180	1,8	3,0	15 000	15 000	Pressure compensation A = interior B = exterior
	6	6 100	135	3,2	3,0	20 000	20 000	
	9	9 200	135	4,8	3,0	20 000	20 000	
	12	12 500	135	6,5	3,0	20 000	20 000	
	18	18 500	135	9,6	6,0	30 000	30 000	
	24	25 000	135	13,0	6,0	40 000	40 000	
	36	37 500	135	19,5	6,0	50 000	50 000	Swivel angle Normal swivel angles 90°, 140°, 180°, 240°, 300° and 360°. For intermediate swivel angles please use model STE or STED
	50	53 500	135	28,0	12,0	60 000	60 000	
	75	78 500	135	41,0	12,0	70 000	70 000	
	100	103 000	135	54,0	15,0	80 000	80 000	
	150	155 000	135	81,0	15,0	100 000	100 000	
	220	230 000	135	120,0	30,0	120 000	120 000	
	300	300 000	135	157,0	30,0	150 000	150 000	

Order example

STED

9

-

180°

-

B

-

1

The order example STED 9-180°-B-1 indicates a swivel gear with:

Swivel angle limitation on both sides up to minus 30° per end stop, end stop cushioning on both sides, maximum torque 9 200 Nm at 135 bar. Swivel angle 180° with external pressure compensation connection, and drive shaft on one side.

TECHNICAL DESCRIPTION

Construction and Operating Mode

A racked piston rod (1), a pinion shaft (2) and a housing (3) are the significant components of the swivel gear ST. If hydraulic oil is admitted at one side of the swivel gear a linear movement of the piston rod (1) and rotation of the pinion shaft (2) result. The lateral forces resulting from the toothing, which act on the rear of the piston rod, are virtually equalized through hydraulic pressure compensation. The pressure compensation leakage oil lubricates the toothing and the sliding parts and is led back through the leakage oil lines to the container. All maintenance is thus eliminated. The torque is constant over the full swivel angle in both directions. If, in accordance with the illustration below, hydraulic oil is admitted to the left hand cylinder, the drive shaft turns to the left (i.e. in the anticlockwise direction).

The starting efficiency amounts to approximately 95% of the table values. The backlash in the direction of the pitch circle of the toothing of the standard models is about 0.7° depending on the size of the swivel gear. Less backlash is attainable by employing special methods. The swivel time is proportional to the rate of oil admission. The swivel times given in the table should not be reduced. Swivel gears are manufactured in series for normal swivel angles of 90° , 140° , 180° , 240° , 300° and 360° . (Tolerance up to $+3^\circ$) Larger swivel angles upon request. If intermediate swivel angles, e.g. 160° , are required, the 180° swivel gear is modified to 160° by means of end stop limitation. The end stop covers of the swivel gears are designed for acceptance of the maximum torque. The static and dynamic forces acting on the end stop covers may not exceed those resulting from the maximum permitted working pressure. The end stop cushioning with models STD and STED serves to brake the kinetic force during the last 12° before the end stop.

If forces are expected, for the braking of which (under maximum permitted working pressure), more than 12° is necessary, please make an enquiry.

Cushioning

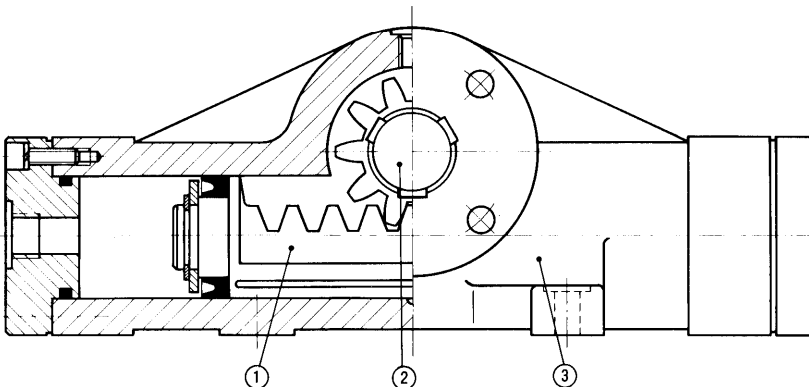
When the swivel gear piston rod impinges on the cushioning piston (1) this is pressed against a spring (2) in the cushioning housing (5). The braking pressure increases and the speed is accordingly steadily reduced until the piston rod ceases to move. The characteristic of the cushioning can be adjusted by means of the screw (4).

During commissioning the braking pressure must be monitored through the gauge connection (3).

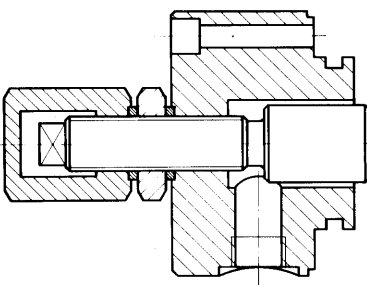
This braking pressure may not exceed the maximum permitted working pressure.

Adjustment of the cushioning by means of the screw (4) must also be carried out in such a way that the maximum working pressure is not exceeded.

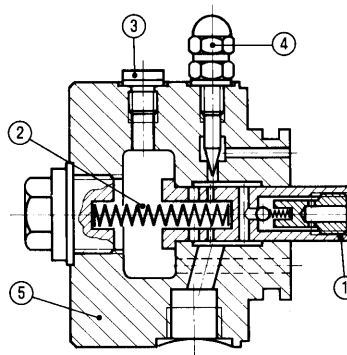
ST – Standard Model



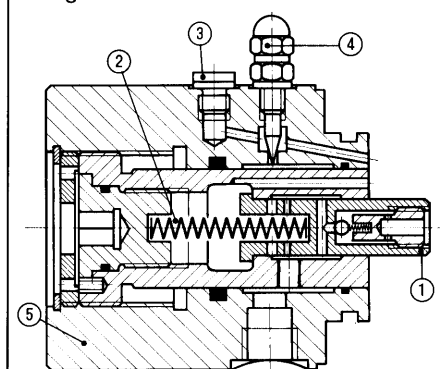
STE – with adjustable end stop limitation on one or both sides by which the normal swivel angle can be reduced by up to minus 30° per end stop.



STD – with adjustable end stop cushioning on one or both sides each 12° ahead of the respective end stop. Moving out is uncushioned.



STED – This model combines the features of models STE and STD. In every position of the end stop limitation sleeve the cushioning remains effective over the whole 12° range.



TECHNICAL GUIDANCE

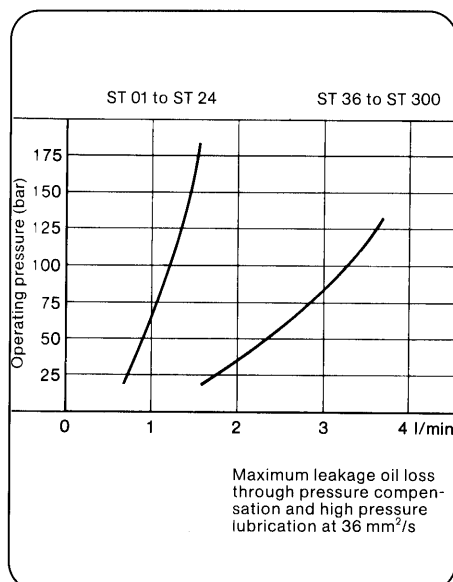
When using rigid transmission elements care must be taken to ensure that the permitted radial loading is not exceeded through deformation or misalignment. If the torque transmission occurs by means of a pinion or connecting rod the maximum permitted loading must also be observed. Series connection of swivel gears is possible. With this, both sides of the swivel gear can be submitted to the maximum permitted nominal pressure.

The swivel gears are to be mounted with their bolting plate facing downwards. A different mounting arrangement may necessitate re-arranging the leakage oil connection. In such cases the mounting position of the drive shaft must be noted. To maintain lubrication of all moving parts the leakage oil lines must be so re-arranged as to ensure that the interior of the swivel gear cannot run dry. Pre-stressing of the leakage oil chamber up to a maximum of 2 bar is recommended, for example by means of a spring-loaded non-return valve.

Pressure compensation

The swivel gears are manufactured in two types, A and B, with identical dimensions.

With type A the pressure compensation takes place internally through the respective pressurized swivel gear side; with type B externally through a separate pressure line, which must be connected ahead of the way-valve, see switch-plan sketch.



Hydraulic fluid, temperature, filtering

The use of mineral oil based hydraulic fluids of the group HLP in accordance with DIN 51 525 is recommended.

Virtually non-inflammable fluids of the groups HFC and HFD are also suitable. In this case please supply details.

The viscosity range should lie between 20 and 150 mm²/s, may, however, briefly reach 700 mm²/s at start-up. The ideal viscosity after reaching operating temperature is approximately 40 mm²/s. Having regard to the permitted viscosity the hydraulic fluid temperature should lie between -25° and +70° C.

Filter units with a filter fineness of 24µm are to be used.

With swivel gears type B the cleanliness of the fluid is a pre-requisite of faultless pressure compensation. In appropriate instances a high pressure filter should be included in the B connection line, in particular with larger swivel gears.

Middle position of the swivel gears

The swivel gear is in its middle position when one of the keys is at right-angle to the bolting plate.

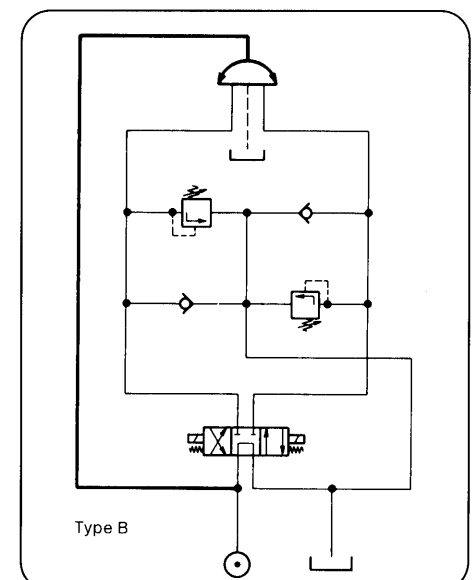
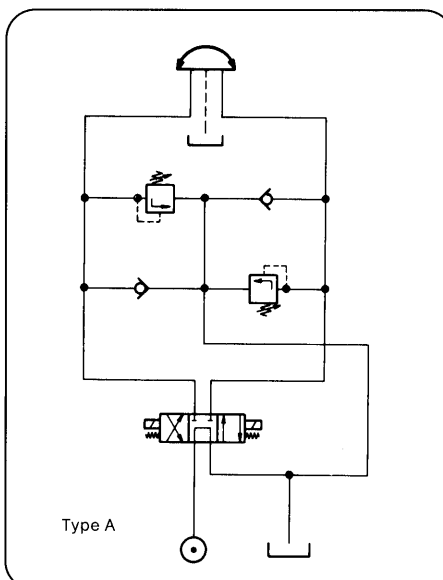
Open circuit operation

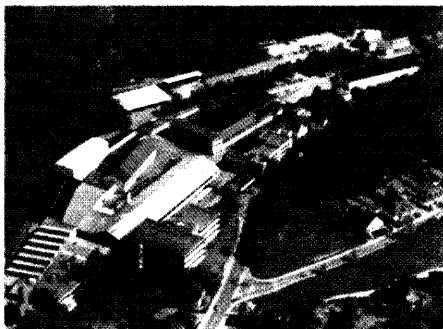
In open circuit operation regard is to be paid to ensuring that a load can only be lowered by appropriate brake valves, if necessary a choke non-return valve. If the swivel gear is mounted higher than the pumping equipment the return flow line must be fitted with a non-return valve (opening pressure 1-2 bar) ahead of the return flow filter.

Type A is selected when at standstill in intermediate positions no torque acts on the drive shaft.

Due to the leakage losses of the pressure compensation the swivel gear would yield to an external torque and move to an end stop.

With **type B** external torques can be taken up in intermediate positions without yielding to the load, if the installed hydraulic components such as way-valves, pressure limitation valves, etc. are free of leakage oil losses.





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