Technical data Part-turn gearboxes for open-close duty

General information

For motor or manual operation of valves (e.g. butterfly valves, ball and plug valves).

For special applications, e.g. dampers, gas diverters, flue gas dampers, toggle arm driven diverters and guillotine isolators, specific sizing is required. Specific technical data applies.

Duty class 1[1]

Motor operation in accordance with EN 15714-2.

Valve			Gearbox								
Max. valve torque [2]	Valve attachment		Type	Reduction ratio	Factor[3]	Turns for 90°	Input shaft	Input mounting flange for multi-turn actuator	Max. input torques	Weight[4]	Additional weight Extension flange
to [Nm]	Flange according to EN ISO 5211	Max. shaft diameter [mm]					[mm]		[Nm]	[kg]	
500	F07 F10	38	GS 50.3	51:1	16.7	12.75	16	F07 F10	30	7.0	–
1,000	F10 F12	50	GS 63.3	51:1	16.7	12.75	20	F07 F10	60	12	–
750[5]				82:1	17.0	20.5			44		
2,000	F12 F14	60	GS 80.3	53:1	18.2	13.25	20	F07 F10	110	16	–
1,500[5]				82:1	17.0	20.5			88		
4,000	F14 F16	80	GS 100.3	52:1	18.7	13	30/(20)	F14 (F10)	214	33	–
2,800[5]				107:1	22.6	26.8		F14 (F10)	124		
4,000				126:1[6]	42.8	31.5	20	F10	93	39	
				160:1[6]	54.0	40		F10	74		
				208:1[6]	71.0	52		F10	57		
8,000	F16 F25 F30[7]	90	GS 125.3	52:1	19.2	13	30	F14 (F10)	417	40	F30: 18 kg
				126:1[6]	44.0	31.5	30/(20)	F14 (F10)	182	46	
				160:1[6]	56.0	40		F14 (F10)	143		
				208:1[6]	72.7	52	20/(30)	F10 (F14)	110		
14,000	F25 F30 F35[7]	100	GS 160.3	54:1	21.0	13.5	30	F16 (F14)	667	80	F35: 33 kg
				218:1[6]	76.0	54.5	30/(20)	F14 (F10)	184	91	
				442:1[6]	155	110.5	20	F10	90		
				880:1[6]	276	220			51		
28,000	F30 F35 F40[7]	135	GS 200.3	53:1	21.0	13.25	40	F25 (F16)	1,333	140	F40: 48 kg
				214:1[6]	75.0	53.5	30	F14	373	160	
				434:1[6]	152	108.5	30/(20)	F14 (F10)	184		
				864:1[6]	268	216	20	F10	104	170	
				1,752:1[6]	552	438	20	F10	51		
56,000	F35 F40 F48[7]	160	GS 250.3	52:1	20.3	13	50	F30 (F25)	2,759	273	F48: 75 kg
				210:1[6]	74.0	52.5	40/(30)	F16 (F14)	757	296	
				411:1[6]	144	103	30	F14	389		
				848:1[6]	263	212	30/(20)	F14 (F10)	213	308	
				1,718:1[6]	533	430	20/(30)	F10	105		

1) For further information on lifetime, refer to "Lifetime for motor operation" and "Lifetime for manual operation"
2) For a swing angle up to max. 90°.
3) Conversion factor from output torque to input torque for actuator size definition When new, the factor can fall short of the indicated value by up to 10 %.
4) Indicated weight includes unfinished coupling and grease filling in the gear housing.
5) Toothing does not allow for higher loads.
6) Equipped with primary reduction gearing or planetary gearing to reduce input torques.
7) Screwed and doweled to housing by means of extension flange.

Technical data Part-turn gearboxes for open-close duty

Duty class 2[1)]

Motor operation for infrequently operated valves (max. 1,000 cycles)

Valve			Gearbox								
Max. valve torque [2)]	Valve attachment		Type	Reduction ratio	Factor[3)]	Turns for 90°	Input shaft	Input mounting flange for multi-turn actuator	Max. input torques	Weight[4)]	Additional weight Extension flange
to [Nm]	Flange according to EN ISO 5211	Max. shaft diameter [mm]					[mm]		[Nm]	[kg]	
625	F07 F10	38	GS 50.3	51:1	16.7	12.75	16	F07 F10	37	7.0	–
1,250	F10 F12	50	GS 63.3	51:1	16.7	12.75	20	F07 F10	75	12	–
2,200	F12 F14	60	GS 80.3	53:1	18.2	13.25	20	F07 F10	120	16	–
5,000	F14 F16	80	GS 100.3	52:1	18.7	13	30/(20)	F14 (F10)	267	33	–
				126:1[5)]	42.8	31.5	20	F10	117	39	
				160:1[5)]	54.0	40			93		
				208:1[5)]	71.0	52			71		
10,000	F16 F25 F30[6)]	90	GS 125.3	52:1	19.2	13	30	F16	521	40	F30: 18 kg
				126:1[5)]	44.0	31.5	30/(20)	F14 (F10)	227	46	
				160:1[5)]	56.0	40			179		
				208:1[5)]	72.7	52	20	F10 (F14)	138		
17,500	F25 F30 F35[6)]	100	GS 160.3	54:1	21.0	13.5	30	F16 (F14)	833	80	F35: 33 kg
				218:1[5)]	76.0	54	30/(20)	F14 (F10)	230	91	
				442:1[5)]	155	110.5	20	F10	113		
				880:1[5)]	276	220					
35,000	F30 F35 F40[6)]	135	GS 200.3	53:1	21.0	13.25	40	F25 (F16)	1,691	140	F40: 48 kg
				214:1[5)]	75.0	53.5	30	F14	467	160	
				434:1[5)]	152	108.5	30/(20)	F14 (F10)	230		
				864:1[5)]	268	216	30	F14	131	170	
				1,752:1[5)]	552	438	20	F10	63		
70,000	F35 F40 F48[6)]	160	GS 250.3	52:1	20.3	13	50	F30 (F25)	3,448	273	F48: 75 kg
				210:1[5)]	74.0	52.5	40/(30)	F16 (F14)	946	296	
				411:1[5)]	144	103	30	F14	486		
				848:1[5)]	263	212	30/(20)	F14 (F10)	266	308	
				1,718:1[5)]	533	430	20	F14	131		

1) For further information on lifetime, refer to "Lifetime for motor operation" and "Lifetime for manual operation"
2) For a swing angle up to max. 90°.
3) Conversion factor from output torque to input torque for actuator size definition When new, the factor can fall short of the indicated value by up to 10 %.
4) Indicated weight includes unfinished coupling and grease filling in the gear housing.
5) Equipped with primary reduction gearing or planetary gearing to reduce input torques.
6) Screwed and doweled to housing by means of extension flange.

Technical data Part-turn gearboxes for open-close duty

Duty class 3[1)]

Manual operation in accordance with EN 1074-2 (max. 250 cycles)

Valve			Gearbox								
Max. output torque [2)]	Valve attachment		Type	Reduction ratio	Factor[3)]	Input shaft	Max. input torques	Handwheel Ø[4)]	Manual force	Weight[5)]	Additional weight Extension flange
to [Nm]	Flange according to EN ISO 5211	Max. shaft diameter [mm]				[mm]	[Nm]	[mm]	[N]	[kg]	
750	F07 F10	38	GS 50.3	51:1	16.7	16	45	160	561	7.0	
								200	449		
								250	359		
1,500	F10 F12	50	GS 63.3	51:1	16.7	20	90	250	720	12	
								315	570		
750[6)]				82:1	17.0		44	200	441		
								250	353		
3,000	F12 F14	60	GS 80.3	53:1	18.2	20	165	400	824	16	
1,500[6)]				82:1	17.0		88	315	560		
								400	441		
6,000	F14 F16	80	GS 100.3	52:1	18.7	30/(20)	321	800	802	33	
2,800[6)]				107:1	22.6		124	400	619		
								500	496		
6,000				126:1[7)]	42.8	30	140	400	701	39	
				160:1[7)]	54.0		111	315	705		
								400	556		
				208:1[7)]	71.0		85	250	679		
								315	539		
								400	424		
12,000	F16 F25 F30[8)]	90	GS 125.3	126:1[7)]	44.0	30/(20)	273	630	866	46	F30: 18 kg
								800	682		
				160:1[7)]	56.0		214	500	857		
								630	680		
								800	535		
				208:1[7)]	72.7	20	165	400	825		
17,500	F25 F30 F35[8)]	100	GS 160:3	218:1[7)]	76.0	30/(20)	230	630	731	91	F35: 33 kg
								800	576		
				442:1[7)]	155	20	113	315	717		
								400	565		
				880:1[7)]	276		63	200	634		
								250	507		
								315	403		
35,000	F30 F35 F40[8)]	135	GS 200.3	434:1[7)]	152	30/(20)	230	630	731	160	F40: 48 kg
								800	576		
				864:1[7)]	268	30	131	400	653	170	
				1,752:1[7)]	552	20	63	315	403		
								400	317		
70,000	F35 F40 F48[8)]	160	GS 250.3	848:1[7)]	263	30/(20)	266	630	845	308	F48: 75 kg
								800	665		
				1,718:1[7)]	533	20	131	400	657		

1) For further information on lifetime, refer to "Lifetime for motor operation" and "Lifetime for manual operation" Duty class 3 is limited to manual operation only.
2) For a swing angle up to max. 90°.
3) Conversion factor from output torque to input torque for actuator size definition When new, the factor can fall short of the indicated value by up to 10 %.
4) Available handwheel diameters in accordance with EN 12570.
5) Indicated weight includes unfinished coupling and grease filling in the gear housing.
6) Toothing does not allow for higher loads.
7) Equipped with primary reduction gearing or planetary gearing to reduce input torques.
8) Screwed and doweled to housing by means of extension flange.

Technical data Part-turn gearboxes for open-close duty

Features and functions		
Worm wheel material	Spheroidal cast iron	
Version	Standard:	Clockwise rotation RR, counterclockwise rotation LL
	Option:	RL or LR
Housing material	Standard:	Cast iron (GJL-250)
	Option:	Spheroidal cast iron (GJS-400-15)
Self-locking	The gearboxes are self-locking when at standstill under normal service conditions; strong vibration may cancel the self-locking effect. While in motion, safe breaking is not guaranteed. If this is required, a separate brake must be used.	
End stops	Positive for both end positions by travelling nut, sensitive adjustment	
Strength of end stop	Guaranteed strength of end stop (in Nm) for input side operation	

Type	GS 50.3	GS 63.3	GS 80.3	GS 100.3			
Reduction ratio	51:1	51:1	53:1	52:1	126:1	160:1	208:1
[Nm]	250	450	450	1,350	625	500	250

Type	GS 125.3				GS 160.3			
Reduction ratio	52:1	126:1	160:1	208:1	54:1	218:1	442:1	880:1
[Nm]	1,350	625	500	250	3,200	900	450	250

Type	GS 200.3					
Reduction ratio	53:1	67:1	214:1	434:1	864:1	1752:1
[Nm]	8,000	250	2,000	1,000	500	250

Type	GS 250.3				
Reduction ratio	52:1	210:1	411:1	848:1	1718:1
[Nm]	8,000	2,000	1,000	500	250

Swing angle GS 50.3 – GS 125.3	Standard:	Fixed swing angle between 10° and max. 100°; set in the factory to 92° unless ordered otherwise.
	Options:	Adjustable in steps of: 10° – 35°, 35° – 60°, 60° – 80°, 80° – 100°, 100° – 125°, 125° – 150°, 150° – 170°,170° – 190° Swing angles > 190° are only possible with a worm wheel made of bronze and without end stops. For swing angles > 100°, we recommend a worm wheel made of bronze.
Swing angle GS 160.3 – GS 250.3	Standard:	Adjustable 80° – 100°; set in the factory to 92° unless ordered otherwise.
	Options:	Adjustable in steps of: 0° – 20°, 20° – 40°, 40° – 60°, 60° – 80°, 90° – 110°, 110° – 130°, 130° – 150°, 150° – 170°, 170° – 190° Swing angles > 190° are only possible with a worm wheel made of bronze and without end stops. For swing angles > 100°, we recommend a worm wheel made of bronze.
Mechanical position indicator	Standard:	Pointer cover for continuous position indication
	Options:	• Sealed pointer cover for horizontal outdoor installation with perpendicular valve shaft (not available for GS 50.3) • Protection cover for buried services instead of pointer cover (without mechanical position indicator) • Sealed pointer cover with air vent valve, not available for GS 50.3 Heed notes on Information sheet Enclosure protection IP68 for part-turn gearboxes.
Input shaft	Standard:	With corrosion protection, cylindrical with parallel key according to DIN 6885-1 (refer to table on pages 1 and 2).
	Option:	Cylindrical with parallel key according to DIN 6885-1 with square adapter for power tool emergency operation.

Technical data Part-turn gearboxes for open-close duty

Operation

Motor operation

- Via electric multi-turn actuator
- Input mounting flanges for multi-turn actuator (refer to table on pages 1 and 2)

Type of duty

Short-time duty S2 - 15 min
Class A according to EN 15714-2: OPEN-CLOSE
Class B according to EN 15714-2: Inching/positioning or positioning duty

Maximum permissible input speeds and operating times

Type	GS 50.3	GS 63.3		GS 80.3		GS 100.3				
Reduction ratio	51:1	51:1	82:1	53:1	82:1	52:1	107:1	126:1	160:1	208:1
Max. permissible input speed [rpm]	108	108		108		108		216		
Fastest operating time for 90° [s]	7	7	11	7	11	7	15	9	11	19

Type	GS 125.3				GS 160.3			
Reduction ratio	52:1	126:1	160:1	208:1	54:1	218:1	442:1	880:1
Max. permissible input speed [rpm]	108	216			108	216		
Fastest operating time for 90° [s]	7	9	11	19	8	15	31	61

Type	GS 200.3					GS 250.3				
Reduction ratio	53:1	214:1	434:1	864:1	1752:1	52:1	210:1	411:1	848:1	1718:1
Max. permissible input speed [rpm]	108	216				108	216			
Fastest operating time for 90° [s]	7	15	30	60	122	7	15	29	59	119

Shorter operating times can be achieved with worm wheels made of bronze, refer to Technical data GS 50.3 – GS 250.3 for modulating duty and shorter operating times.

Due to gear tooth geometry and the material characteristics of bronze, worm gearboxes with a worm wheel made of bronze can transmit lower torques.

Calculation of operating time for a 90° swivel movement

$$\text{Oper. time for } 90° \text{ [s]} = \frac{\text{Reduction ratio [i]}}{\text{n [input speed in rpm]}} \cdot 15$$

Calculation of the operating time for a swivel movement [°]:

$$\text{Oper. time for } \theta° \text{ [s]} = \frac{\text{Swing angle } \theta \text{ [°]} \cdot \text{Reduction ratio [i]}}{6 \cdot \text{n [input speed in rpm]}}$$

Manual operation

Standard:
- Handwheel made of aluminium with electrophoretic coating
- Handwheel with ball handle

Option:
- Handwheel made of GJL-200 with electrophoretic coating and painting
- Handwheel lockable
- WSH for signalling position and end positions
- Chainwheel (only available for torques according to duty class 1)

Deflection of the input shaft

90° deflection of the input shaft
Combination with GK bevel gearbox directly mounted on GS or on planetary stage possible, refer to Mounting positions Part-turn gearboxes with multi-turn actuators

Technical data Part-turn gearboxes for open-close duty

Base and lever		
Not suitable for load class 3.		
Base	Made of spheroidal cast iron; for mounting to base, 4 holes for fastening screws are available.	
Lever	Made of spheroidal cast iron; with 2 or 3 bores for fixing lever arrangement. Considering the environmental conditions, the lever may be mounted to the output shaft in any desired position.	
Ball joints	Two ball joints matching the lever, as an option including lock nuts and 2 welding nuts; suitable for pipe according to dimension sheet.	
Mechanical position indicator	Standard:	No position indicator (protection cover)
	Option:	Pointer cover instead of protection cover for continuous position indication

Valve attachment		
Valve attachment	Dimensions according to EN ISO 5211: The maximum torques of mounting flanges according to EN ISO 5211 are to be met.	
Spigot	Flanges with spigot. Up to GS 125.3, spigots are implemented by means of spigot rings (option). From GS 160.3 to GS 250.3, spigots are directly integrated into the housing.	
Plane flanges	Up to GS 125.3, plane flanges are implemented by means of recesses. From GS 160.3 to GS 250.3, the housing is plane machined (option).	
Bore for parallel pins (option)	Two bores for parallel pins shifted by 180°. The parallel pins are not included in the scope of delivery.	

Type	GS 80.3		GS 100.3		GS 125.3			GS 160.3		
Flange according to EN ISO 5211	F12	F14	F14	F16	F16	F25	F30	F25	F30	F35
Housing material	GJS	GJS	GJS	GJS	GJL	GJL	GJL	GJL	GJL	GJL

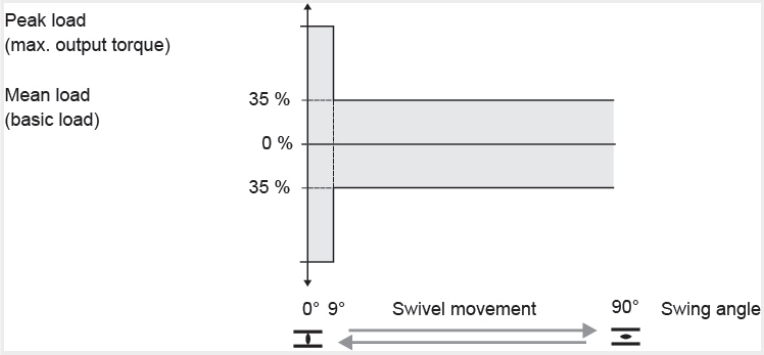
Type	GS 200.3			GS 250.3		
Flange according to EN ISO 5211	F30	F35	F40	F35	F40	F48
Housing material	GJL	GJL	GJL	GJL	GJL	GJL

Refer to Dimensions Output mounting flange GS 50.3 – GS 125.3 (Y000.854) and Dimensions Output mounting flange GS 160.3 – GS 250.3 (Y005.001). Further pitch circle diameters for locating pins on request.

Splined coupling for connection to the valve shaft	Standard:	• Without bore or pilot bore from GS 160.3 • Worm gearbox can be mounted on coupling
	Options:	Finish machining with bore and keyway, square bore or two-flat with grub screw for secure fixing to valve shaft.

Service conditions			
Mounting position	Any position		
Ambient temperature	Standard:	–40 °C to +80 °C	
	Options:	–60 °C to +60 °C 0 °C to +120 °C	
Enclosure protection according to EN 60529	Standard:	IP68, dust-tight and water-tight up to max. 8 m head of water	
	Options:	IP68-20, dust-tight and water-tight up to max. 20 m head of water	
Corrosion protection	Standard:	KS	Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX	Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Coating	Double layer powder coating		
Colour		AUMA silver-grey (similar to RAL 7037)	
	Option:	Available colours on request	

Technical data Part-turn gearboxes for open-close duty

Service conditions	
AUMA load spectrum	 AUMA worm gearboxes meet or exceed the lifetime requirements of EN 15714-2.
Lifetime for motor operation in accordance with AUMA load spectrum	Duty class 1: Lifetime for 90° swivel movement. Meets the lifetime requirement of EN 15714-2

Gearbox size	GS 50.3/GS 63.3	GS 80.3/GS100.3	GS 125.3 – GS 200.3	GS 250.3
Number of cycles for max. torque	10,000	5,000	2,500	1,200

Duty class 2: Lifetime for 90° swivel movement for valves which are infrquently operated.

Gearbox size	GS 50.3/GS 63.3	GS 80.3/GS100.3	GS 125.3 – GS 200.3	GS 250.3
Number of cycles for max. torque	1,000			

Lifetime for larger swing angle on request

Lifetime for manual operation	Duty class 3: Meets the lifetime requirement of EN 1074-2

Technical data Part-turn gearboxes for open-close duty

Special features for use in potentially explosive atmospheres in accordance with ATEX 2014/34 EU		
Explosion protection in accordance with ATEX 2014/34 EU	Standard:	II 2G Ex h IIC T4 Gb II 2D Ex h IIIC T130°C Db
	Option	II 2G Ex h IIC T3 Gb II 2D Ex h IIIC T190°C Db I M2 Ex h I Mb
Type of duty	Maximum 3 cycles (OPEN - CLOSE - OPEN) in accordance with AUMA load spectrum (90° swivel movement) and maximum permissible input speeds, or with mean constant output torques according to table:	

Type	GS 50.3	GS 63.3		GS 80.3		GS 100.3		GS 125.3
Reduction ratio	–	51:1	82:1	53:1	82:1	–	107:1	–
Average output torque [Nm]	250	500	375	1,000	750	2,000	1,400	4,000

Type	GS 160.3	GS 200.3	GS 250.3
Average output torque [Nm]	8,000	16,000	32,000

Ambient temperature	Duty classes 1 and 3	
	Standard:	–40 °C to +60 °C (II 2G Ex h IIC T4 Gb; II 2D Ex h IIIC T130°C Db)
	Options:	–60 °C to +60 °C (II 2G Ex h IIC T4 Gb; II 2D Ex h IIIC T130°C Db) –40 °C to +40 °C (II 2G Ex h IIC T4 Gb; II 2D Ex h IIIC T130°C Db) –40 °C to +80 °C (II 2G Ex h IIC T3 Gb; II 2D Ex h IIIC T190°C Db) 0 °C to +120 °C (II 2G Ex h IIC T3 Gb; II 2D Ex h IIIC T190°C Db) –20 °C to +40 °C (I M2 Ex h I Mb)
	Duty class 2	
	Standard:	–40 °C to +60 °C (II 2G c IIC T3; II 2D c T190 °C); T4 on request with individual test
	Options:	–60 °C to +40 °C (II 2G Ex h IIC T4; II 2D Ex h IIIC T130 °C Db) –60 °C to +60 °C (II 2G Ex h IIC T3; II 2D Ex h IIIC T190 °C Db); T4 on request with individual test –40 °C to +40 °C (II 2G Ex h IIC T4; II 2D Ex h IIIC T130 °C Db) –40 °C to +80 °C (II 2G Ex h IIC T3; II 2D Ex h IIIC T190 °C Db) –20 °C to +40 °C (I M2 Ex h I Mb)
	Further temperature classes or loads exceeding the average torque of the AUMA load spectrum on request.	

Further information	
EU Directives	Machinery Directive: (2006/42/EC)