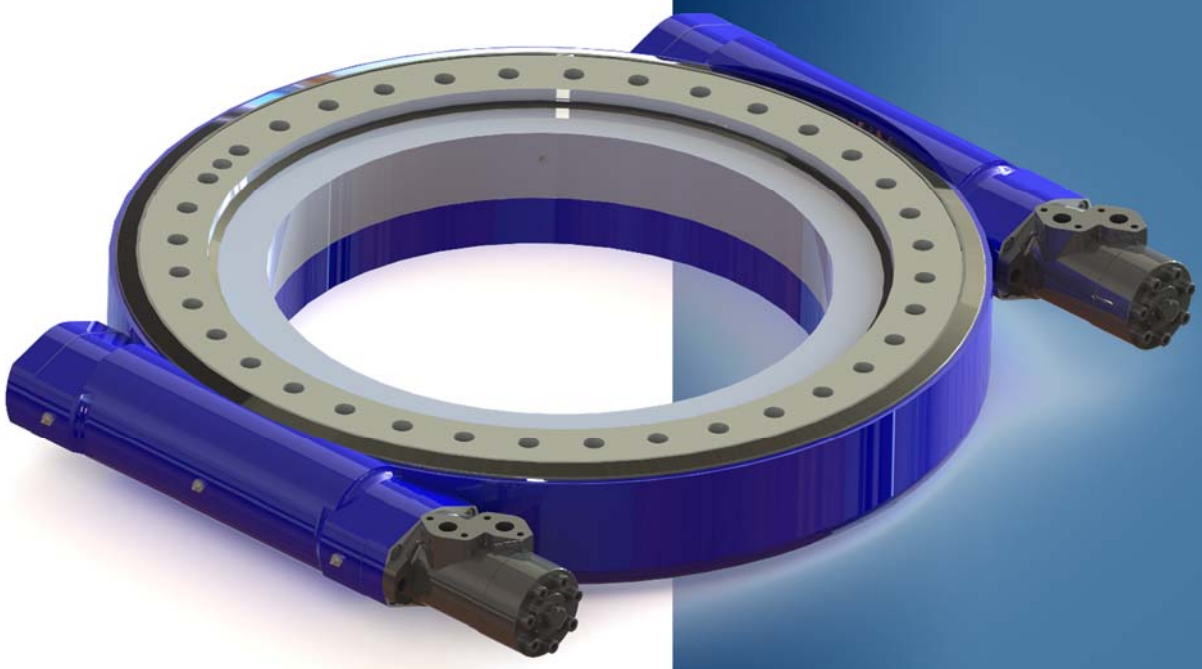
QCB Bearings

SLEWING RINGS & DRIVES

Slew Drives



NBC GROUP LTD

Cat RS 2017 10E/2

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Certificate Q081

QCB® SLEW DRIVES

NBC Group *offers one of the widest ranges of slewing rings, slew drives and ring gears available from any single supplier, and markets them under its own brand name of QCB® Slew Rings & Slew Drives*

The range includes:-

- *Single row ball bearings*
- *Double row ball bearings*
- *Single row crossed roller bearings*
- *Triple row roller bearings*
- *Ring gears and pinions*
- *Slew drives*
- *Trailer rings*

This catalogue presents the current range of ***QCB® SLEW DRIVES***

All manufacturers have been audited by NBC's engineering staff and are ISO registered. They operate some of the most modern machinery and manufacturing processes in the world, comparable with more traditional sources. Many have passed additional and separate audits from larger clients who operate safety critical equipment in the global market place.

The ***QCB ®*** *brand and* ***NBC Group*** *have become trusted names in slewing ring bearings and drives with a satisfied and international customer base in industries as diverse as mining, materials handling, offshore oil and gas, wind turbines, access platforms and process treatment plants (to name a few!)*

For more information visit our website www.nbcgroup.co.uk!

NBC Group Ltd

Orleton Lane, Wellington, Telford, TF1 2BG, Shropshire, England
Phone: +44 (0) 1952 222300
Fax: +44 (0) 1952 242938
e-mail: slewingrings@nbcgroup.co.uk

TYPICAL APPLICATIONS

BASIC SLEW DRIVES RANGE

QCB® Slew Drives are available in 3 basic styles, and feature an hour glass shaped worm shaft engaging either a helical gear or a true worm gear for a positive tooth engagement resulting in increased drive torque and smoother rotation compared to some alternatives

WGS Series

Sizes	9” – 17”
Load torque	6.5 – 10 KNm

WGS Dual Drive Series

Sizes	14” – 25”
Load torque	12 – 28 KNm

WGSE Series

Sizes	3” – 25”
Load torque	400 Nm – 18 KNm

WGSE Dual Drive Series

Sizes	14” – 25”
Load torque	12 – 28 KNm

WGWEA Series

Sizes	7” – 25”
Load torque	3.5 – 34.2 KNm

Special designs for **MODULAR TRANSPORTERS** or **HIGH PRECISION APPLICATIONS** can be offered and imported to order

WGR 72 Rotation drive

Reduction ratio 30:1

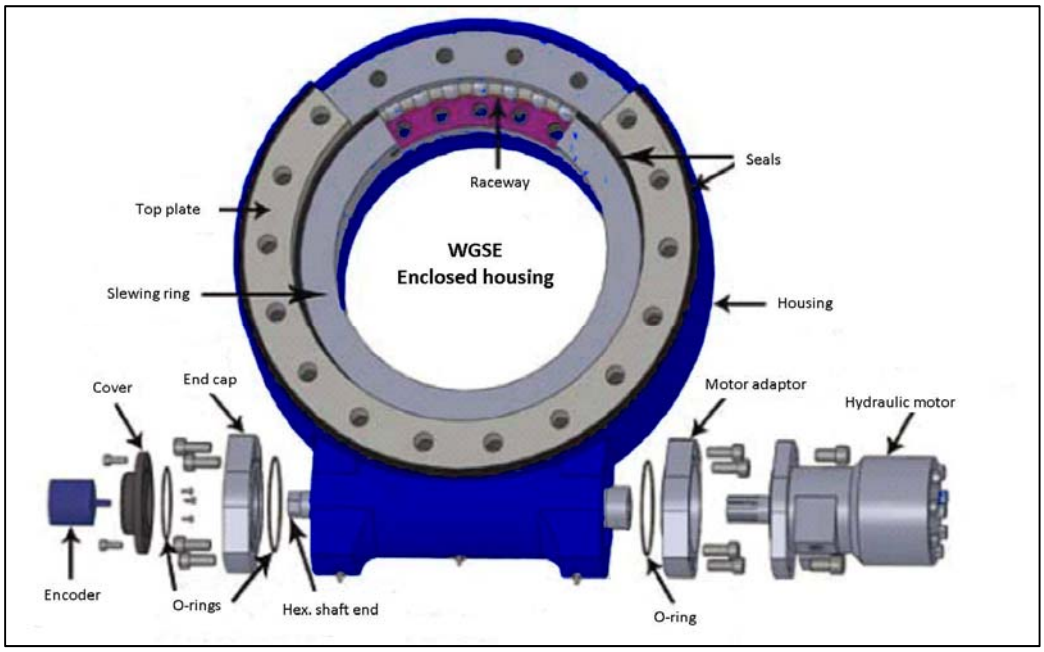
Output torque 900 Nm

WGR 114 Rotation drive

Reduction ratio 44:1

Output torque 2823 Nm

SLEW DRIVE NUMBERING SYSTEM



WGSE	14	-	85	-	B	H	-	2	R	-	160	-	A

A *Outside oil port (default)*
I *Inside oil port*
U *Upside oil port*
D *Downside oil port*

160 *Hydraulic motor displacement (cc)*

R *Hydraulic motor mounted to right side*
L *Hydraulic motor mounted to left side*

- *Single worm shaft*
2 *Dual worm shaft*

- *Capped end (opposite motor)*
H *Hexagon shaft end*
E *Encoder*

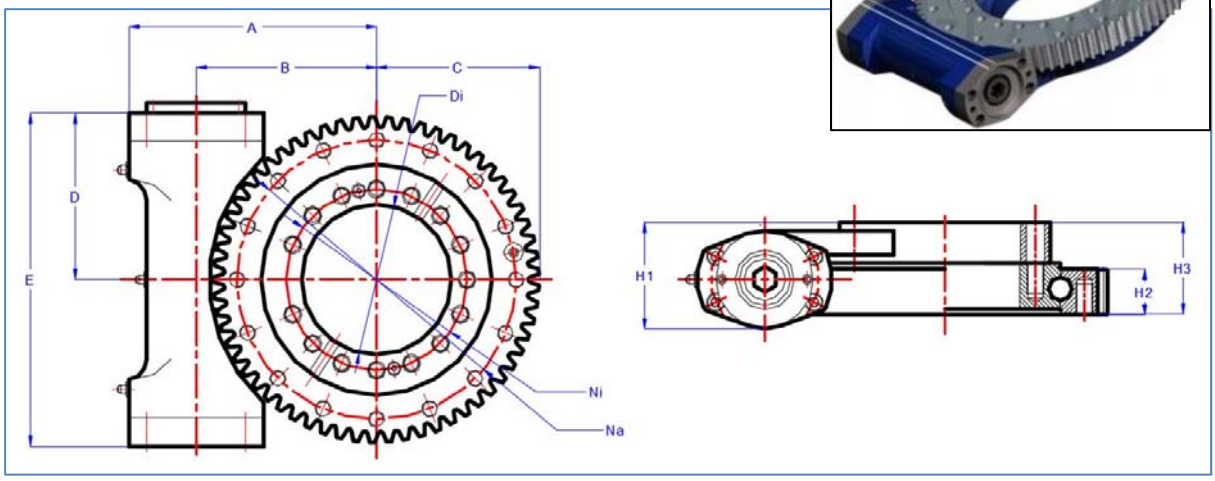
- *Omitted if hydraulic motor fitted*
B *SAE 6B spline*
12 *12mm keyed shaft*
16 *16mm keyed shaft*
25 *25mm keyed shaft*

85 *Reduction ratio*

14 *PCD of raceway in inches*

WGSE *Enclosed slew drive*
WGS *Open slew drive*

WGS Series



	A	B	C	D	E	Di	Ni		Na		H1	H2	H3	WT
	mm	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*mm*	*kg*
WGS 9	239	174.2	157	161	322	145	175	#16-1 M16 ϕ18	270	#16 M16	104	44	89.4	37
WGS 12	285	220	200	166	332	229	259	#20-1 M16 ϕ18	358	#18 M16	114	44	89.1	41
WGS 14	303	237.6	217.4	169	338	265	295	#24-1 M16 ϕ18	390	#18 M16	114	43	89.1	47
WGS 17	340	275.3	261.25	192.5	385	324	365.1	#20 M16 ϕ18	479.4	#20 M16	123	48	103	87

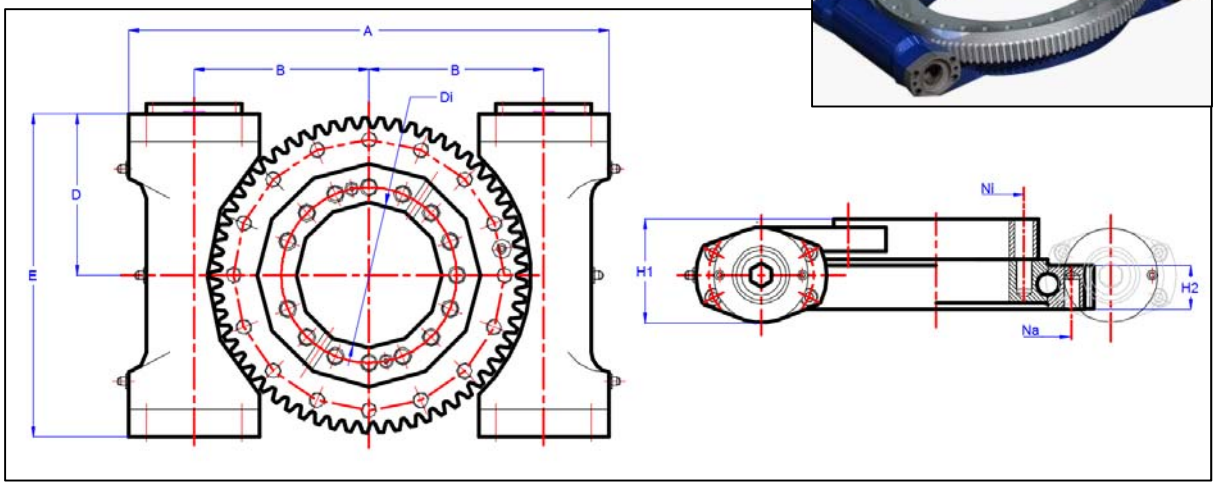
	Output torque	Static load ratings		Dynamic load ratings		Moment load	Gear ratio	Accuracy
		Axial	Radial	Axial	Radial			
	KNm	*KN*	*KN*			*KNm*		
WGS 9	6.5	338	135	81	71	33.9	63:1	< 0.17°
WGS 12	7.5	475	190	114	100	54.3	78:1	< 0.17°
WGS 14	8	555	222	133	117	67.8	85:1	< 0.17°
WGS 17	10	970	390	235	205	135.6	102:1	< 0.15°

Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input

UK stock usually Ø25mm input

Ask for the latest CAD drawings or 3D models

WGS - 2 Series



	A	B	D	E	Di	Ni		Na		H1	H2	WT
	mm	*mm*	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*kg*
WGS 14-2	604	237.6	169	338	265	295	#24-1 M16 D18	390	#18 M16 D17.5	110	59	62
WGS 17-2	693	282.55	193	385	324	365.1	#20 M16 D18	479.4	#20 M16 D17.5	126	66	102
WGS 21-2	797	333.5	235	469	431.8	466.7	#36-1 M20 D22	584.2	#36 M20	136.5	76.2	143
WGS 25-2	934	401.8	234.6	469	512	565	#36-1 M20 D22	675	#36 M20	133	76.2	202

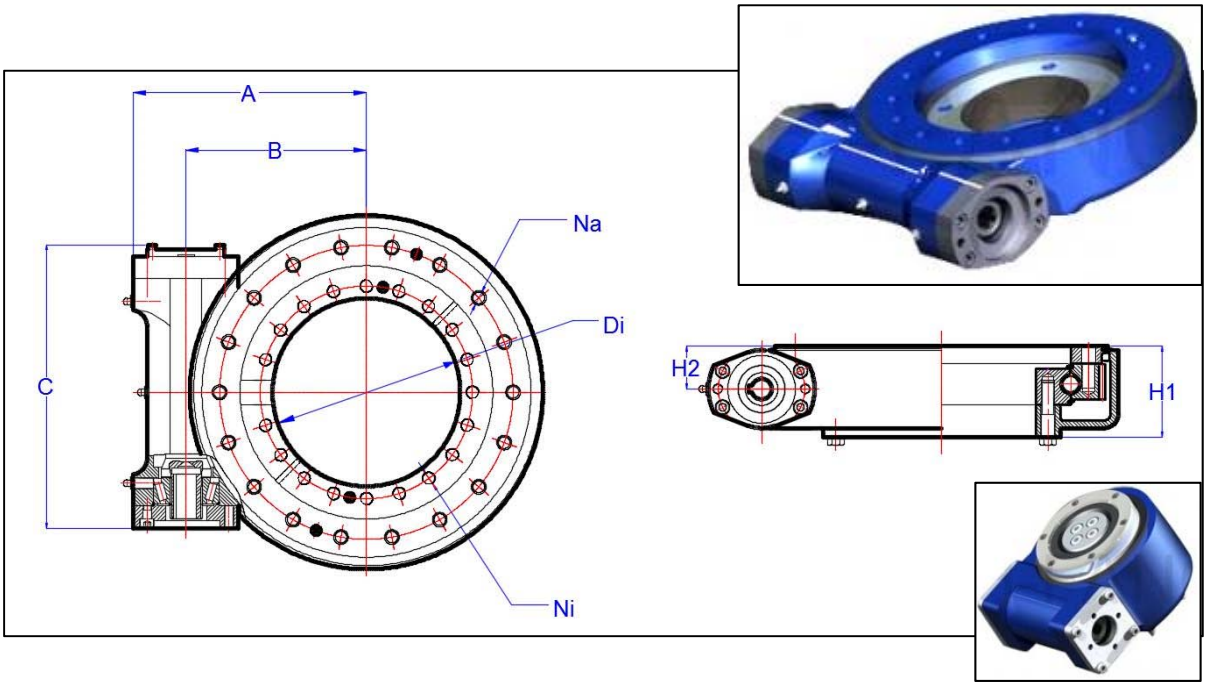
	Output torque	Static load ratings		Dynamic load ratings		Moment load	Gear ratio	Accuracy
		Axial	Radial	Axial	Radial			
	KNm	*KN*	*KN*			*KNm*		
WGS 14-2	12	81.6	555	222	133	117	85:1	< 0.17°
WGS 17-2	16.8	122.9	970	390	235	205	102:1	< 0.15°
WGS 21-2	20.6	179.9	1598	640	385	335	125:1	< 0.15°
WGS 25-2	28	269.1	2360	945	590	470	150:1	< 0.15°

Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input.

UK stock usually Ø25mm input

Ask for the latest CAD drawings or 3D models

WGSE Series



	A	B	C	Di	Ni		Na		H1	H2	WT
	mm	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*kg*
WGSE 3C	114	80	157	-	100	#6 M10 ϕ11.5	100	#6 M10	97.5	60.5	12
WGSE 5A	137.6	100.1	173	-	100	#6 M10 ϕ11.5	128	#6 M10	119	70	20
WGSE 7	166.7	132.7	189	98	120.6	#10 M12 ϕ14	203.2	#8 M12 ϕ14	80.8	42.5	21
WGSE 9	238	174.2	322	145	175	#16-1 M16 ϕ17.5	270	#16 M16 ϕ18	108	56.1	49
WGSE 12	285	220	331.7	229	259	#20-1 M16 ϕ18	328	#18 M16 ϕ18	110.5	58.4	61
WGSE 14	303	237.6	338	265	295	#24-1 M16 ϕ18	390	#18 M16 ϕ17.5	110	59	64
WGSE 17	348	282	378	324	365.1	#20 M16 ϕ18	479.4	#20 M16 ϕ17.5	126	66	105
WGSE 21	403	339.1	469	431.8	466.7	#36-1 M20 ϕ22	584.2	#36 M20 ϕ22	136.5	76.2	149
WGSE 25	467	401.8	462	512	565	#36-1 M20 ϕ22	675	#36 M20	133	76.2	204

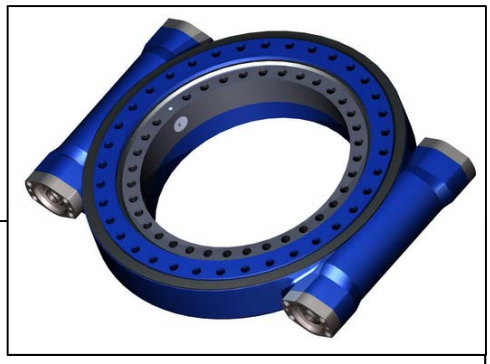
	Output torque *KNm*	Static load ratings Axial *KN*	Radial *KN*	Dynamic load ratings Axial	Radial	Moment load *KNm*	Gear ratio	Accuracy
WGSE 3C	0.4	30	16.6	9.6	8.4	1.1	62:1	< 0.2°
WGSE 5A	0.6	45	45	22	14.4	3	62:1	< 0.2
WGSE 7	1.5	133	53	32	28	13.5	73:1	< 0.2°
WGSE 9	6.5	338	135	81	71	33.9	61:1	< 0.17°
WGSE 12	7.5	475	190	114	100	54.3	78:1	< 0.17°
WGSE 14	8	555	222	133	117	67.8	85:1	< 0.17°
WGSE 17	10	970	390	235	205	135.6	102:1	< 0.15°
WGSE 21	15	1569	640	385	335	203	125:1	< 0.15°
WGSE 25	18	2360	945	590	470	271	150:1	< 0.15°

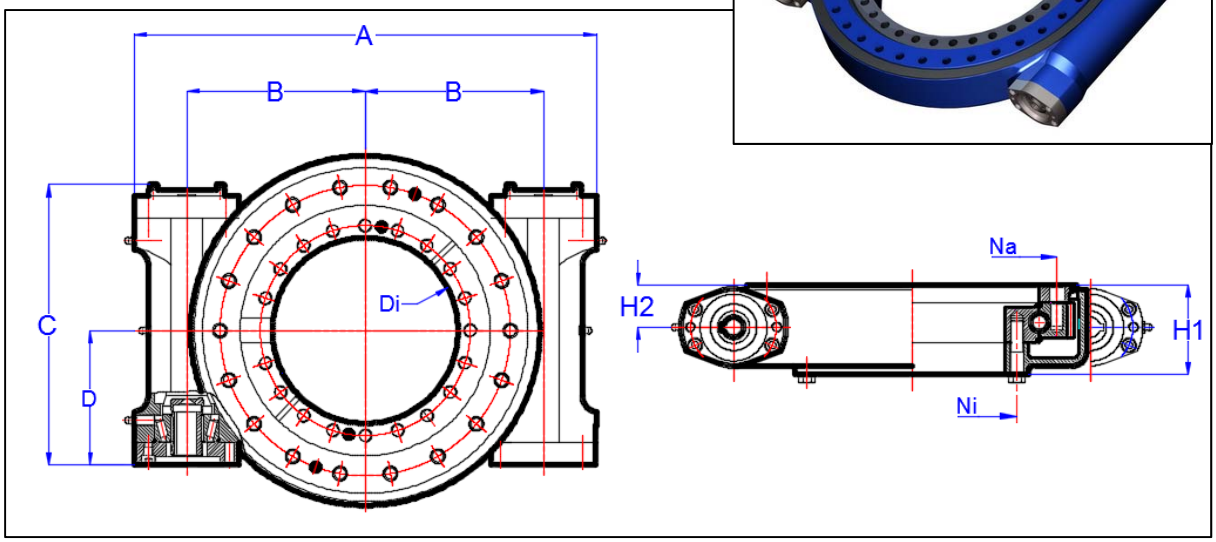
Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input.

UK stock usually Ø25mm input.

Ask for the latest CAD drawings or 3D models

WGSE-2 Series





	A	B	C	D	Di	Ni		Na		H1	H2	WT
	mm	*mm*	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*kg*
WGSE 14-2	604	237.6	338	169	265	295	#24-1 M16 D18	390	#18 M16 D17.5	110	59	76
WGSE 17-2	693	282.5	385	193	324	365.1	#20 M16 D18	479.4	#20 M16 D17.5	126	66	119
WGSE 21-2	797	333.5	469	235	431.8	466.7	#36-1 M20 D22	584.2	#36 M20	136.5	76.2	161
WGSE 25-2	937	401.8	469	234.6	512	565	#36-1 M20 D22	675	#36 M20	133	76.2	222

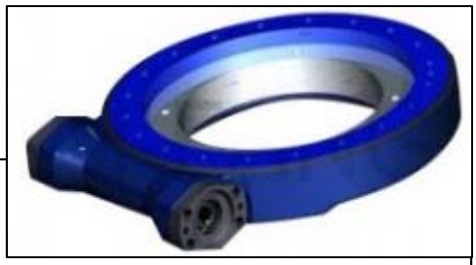
	Output torque	Static load ratings		Dynamic load ratings		Moment load	Gear ratio	Accuracy
		Axial	Radial	Axial	Radial			
	KNm	*KN*	*KN*	*KN*	*KN*	*KNm*		
WGSE 14-2	12	81.6	555	222	133	67.8	85:1	<0.17°
WGSE 17-2	16.8	122.9	970	390	235	205	102:1	<0.15°
WGSE 21-2	20.6	179.9	1598	640	385	335	125:1	<0.15°
WGSE 25-2	28	269.1	2360	945	590	470	150:1	<0.15°

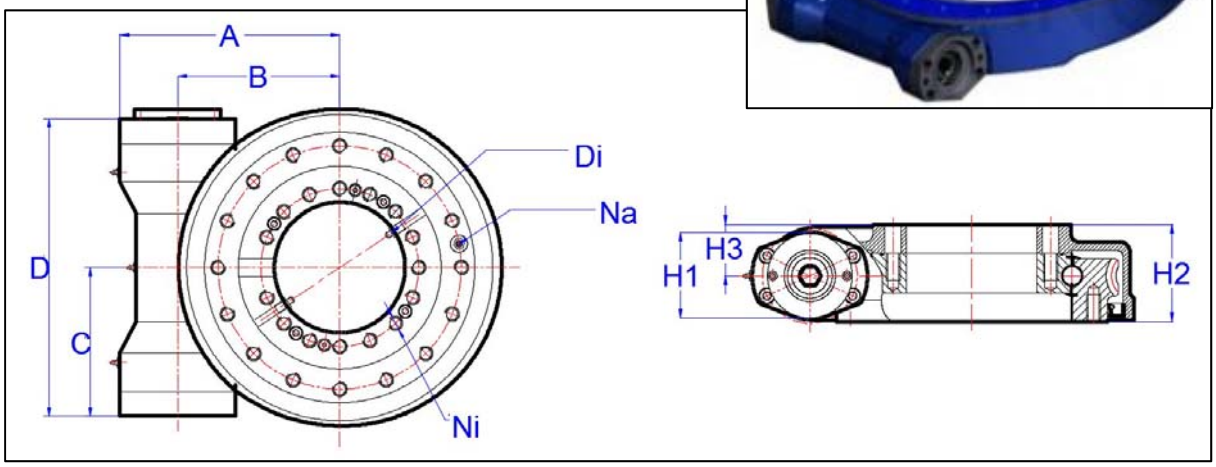
Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input.

UK stock usually Ø25mm input.

Ask for the latest CAD drawings or 3D models

WGWEA Series





	A	B	C	D	Ni		Na		H1	H2	H3	WT
	mm	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*mm*	*kg*
WGWEA 7	206.5	142.5	147.5	295	135	#12-1 M12 ϕ14	205	#10 M12	99.5	85	51	35
WGWEA 9	244	180	165	330	175	#16-1 M16 ϕ18	270	#16 M16	-	108	57	49
WGWEA 12	286.5	222.5	185	370	259	#20-1 M16 ϕ18	358	#18 M16	-	108	57	67
WGWEA 14	301.5	237.5	190	380	295	#24-1 M16 ϕ18	390	#18 M16	-	108	51	75
WGWEA 17	349	285	202.5	405	365.1	#20 M16 ϕ18	479.4	#20 M16	-	108	55	110
WGWEA 19B	377.5	312.5	217.5	435	420	#32-1 M16 ϕ18	520	#32 M16	-	108	53	158
WGWEA 21	415	350	245	482.5	466.7	#36-1 M20 ϕ22	584.2	#36 M20	120	130	65	172
WGWEA 25	464	399	260	512.5	565	#36-1 M20 ϕ22	675	#36 M20	120	130	65	202

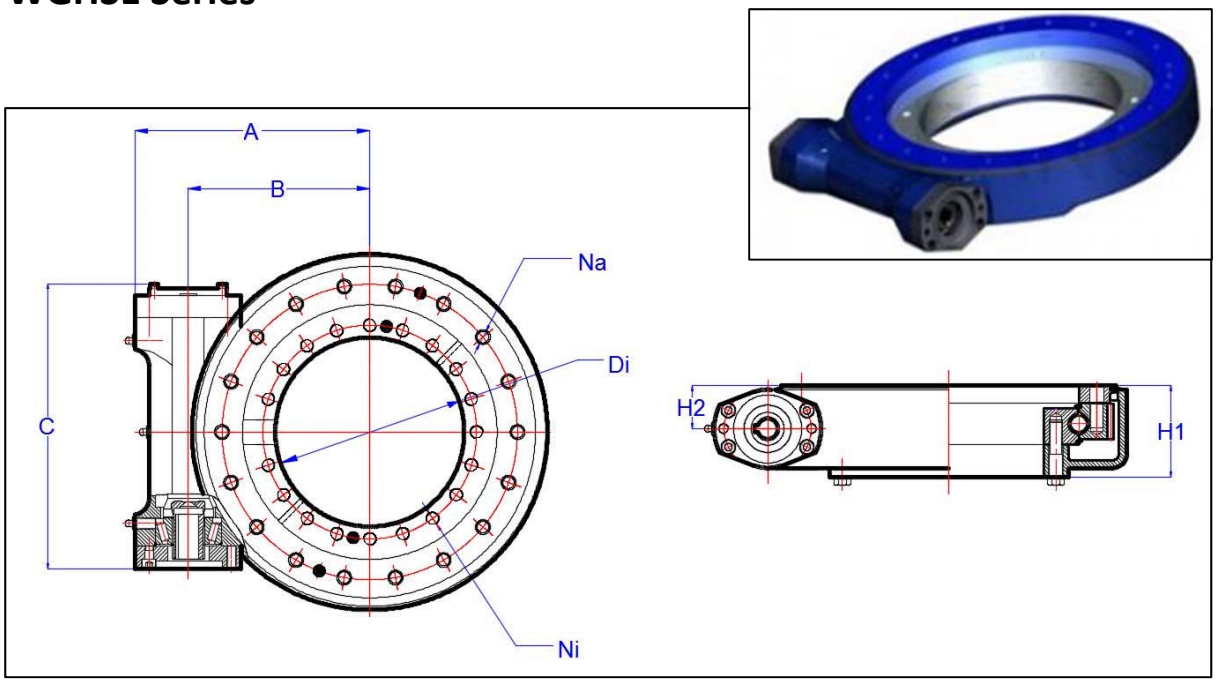
	Output torque	Static load ratings		Dynamic load ratings		Moment load	Gear ratio	Accuracy
		Axial	Radial	Axial	Radial			
	KNm	*KN*	*KN*			*KNm*		
WGWEA 7	3.5	220	90	63	48	14.2	47:1	< 0.15°
WGWEA 9	8	578	215	136	115	35.6	62:1	< 0.15°
WGWEA 12	9.5	760	280	190	148	57	79:1	< 0.15°
WGWEA 14	10.8	960	360	230	200	71.2	86:1	< 0.13°
WGWEA 17	12.96	1166	435	280	231	142.4	104:1	< 0.1°
WGWEA 19B	18.5	1800	675	290	250	196	94:1	< 0.1°
WGWEA 21	28.7	1598	640	385	335	203	90:1	< 0.1°
WGWEA 25	34.2	2360	945	590	470	34.2	104:1	< 0.1°

Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input

UK stock usually Ø25mm input; or Ø32mm 4 bolt flange (MTAP) – Sizes 21" & 25"

Ask for the latest CAD drawings or 3D models

WGHSE Series

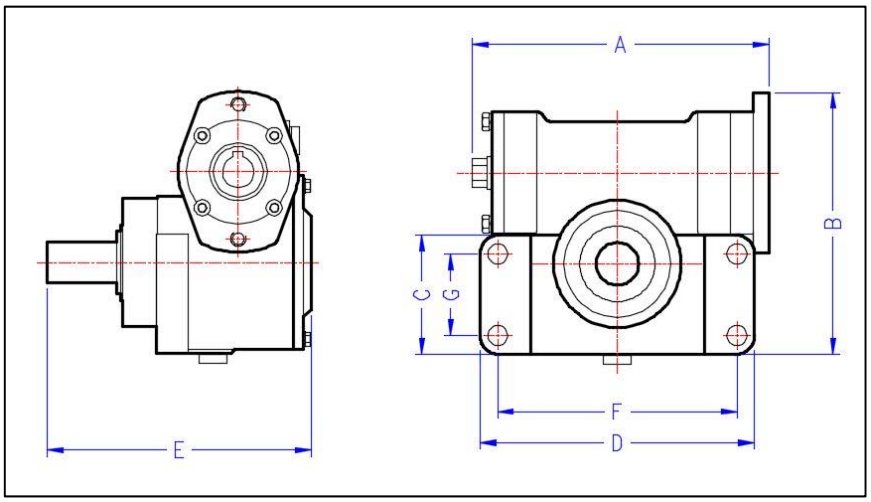


Designed specifically for straddle and modular carriers with an expanding range of single and dual drive versions available. Ask for details.

	A	B	C	D	Di	Ni		Na		H1	H2	WT
	mm	*mm*	*mm*	*mm*	*mm*	*mm*		*mm*		*mm*	*mm*	*kg*
WGHSE 9	244	180	330	165	138	175	#16-1 M16 ϕ18	270	#16 M16	108	57	53
WGHSE 14	301.5	237.5	380	190	256	295	#24-1 M16 ϕ18	390	#18 M16	108	51	79.5
WGHSE 21	438	368	487		425	465	#24-1 ϕ18	584	#24 M16	145	70	186
WGHSE 25	486	416	511		512	560	#30-1 ϕ18	685	#30 M16	148		255

	Output torque	Static load ratings		Dynamic load ratings		Moment load	Gear ratio	Accuracy
		Axial	Radial	Axial	Radial			
	KNm	*KN*	*KN*			*KNm*		
WGHSE 9	9	487	215	136	114	35.6	62:1	< 0.15°
WGHSE 14	12	960	360	230	200	71.2	86:1	< 0.13°
WGHSE 21	21.8	1058	421	265	216	167	82:1	< 0.15°
WGHSE 25	25	2360	945	590	470	271	94:1	< 0.15°

WGR Rotation drives



	Overall dimensions						Mounting holes		Output torque	Gear ratio	Weight
	A *mm*	B *mm*	C *mm*	D *mm*	E *mm*	F *mm*	G *mm*		*KNm*		*kg*
WGR 72	236	208.2	95	218.5	210	190.5	65	#4 Ø16	0.9	30:1	23
WGR 110	226	287.7	112.5	262	244.5	232	82.5	#4 Ø16	1.6	39:1	38
WGR 114	255	282.8	141	293.4	322	254	101.6	#4 Ø19	2.82	44:1	52

WGR 72 available with M5 Z12 and M6 Z12 integrated pinion or Ø32mm stub shaft output

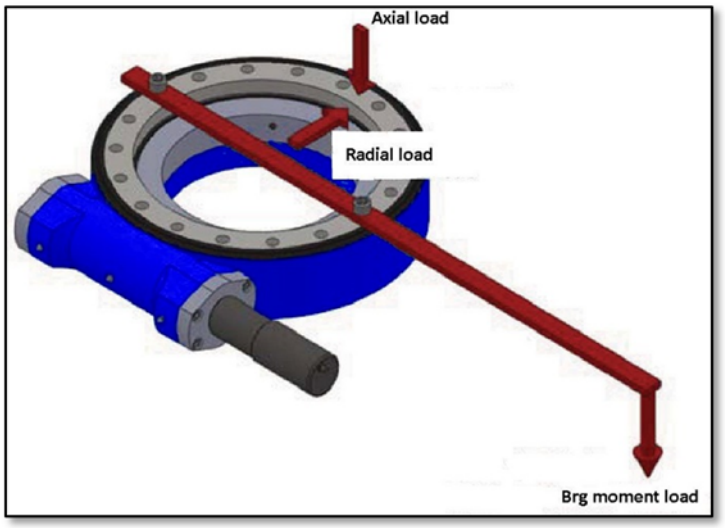
WGR 114 available with Ø60mm stub shaft

Maximum output speed 8 rpm

Available to order with Ø12, Ø14, Ø16, Ø20 or SAE 6B spline input.
UK stock usually Ø25mm input

Ask for the latest CAD drawings or 3D models as the stock range is constantly expanding

GLOSSARY OF TERMS



AXIAL LOAD	The bearing load acting perpendicular to the raceway (KN)
RADIAL LOAD	The bearing load parallel to the raceway (KN)
MOMENT LOAD	The overturning load imposed on the bearing (KNm)
SELF LOCKING	The slewing ring cannot be driven backwards by the load
HOLDBACK TORQUE	The maximum torque the gearing will resist if driven backwards by the load (KNm). Exceeding this figure will result in severe damage to the bearing. *(Not listed to avoid confusion)*
GEAR EFFICIENCY	3 -7" systems 30% efficient; 9-25" systems 40% efficient
OUTPUT TORQUE	The maximum torque available to turn the load (KNm)
STATIC AXIAL LOAD	Maximum bearing raceway axial load (KN)
STATIC RADIAL LOAD	Maximum bearing raceway radial load (KN)
DYNAMIC AXIAL LOAD	Raceway basic dynamic axial load (for life calculations) (KN)
DYNAMIC RADIAL LOAD	Raceway basic dynamic radial load (for life calculations) (KN)

QCB® Slew Drives are all painted blue (RAL 5005) by default, although other colours are available on request (in sufficient volume).

INSTALLATION DATA

TRANSPORT, HANDLING & STORAGE

QCB® Slewing drives should be transported and stored in a horizontal position. Shock loads should be avoided as this may damage the raceways.

If stacked on pallets then care must be taken not to dislodge seals or grease fittings during movement. Wooden or runner spacers would be of benefit between bearings.

Exposed gear teeth must be protected from impact damage.

As supplied, QCB® slewing drives are generally packed for storage in a dry, covered store and for a period not exceeding 6 months.

Light surface corrosion may occur in humid conditions but this can usually be removed from external surfaces – it's is more important that the raceways are well greased and rust free.

In extreme cases of long term storage the bearings may need professional dismantling and cleaning/ inspection / reassembly before use.

Bolt holes in the slewing drives can be used as lifting holes for eye-bolts to assist lifting. Check the weight of the unit to ensure the slings and/or chains are of sufficient capacity.

When unwrapping, care must be taken not to cut and damage the integral seal strips. Use of a blunt instrument to free any seal surfaces that may have become stuck to the running surface is recommended to avoid seal damage on start-up.

Standard commercial solvents (without chlorine) can be used to degrease the slewing rings if required. Use sparingly and do not let this work under the seals into the raceway area.

Check the ring for physical damage, and remove the shipping bolts before installation.

SUPPORT STRUCTURES

QCB® Slewing drives must be supported by flat, machined surfaces which are rigid enough to eliminate torsional buckling under load that would affect the smooth operation of the ring.

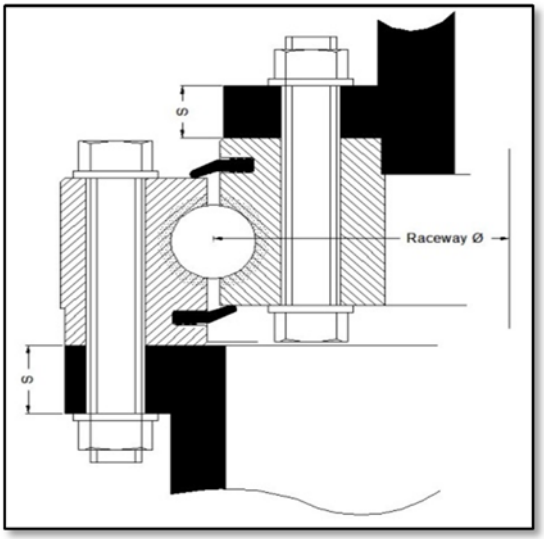


Fig 4: Support structure thickness

The suggested minimum thickness (S) of the supporting material is indicated below.

Raceway ϕ (mm)	500	750	1000	1250
Min. thickness (mm)	20	25	30	35

The width of the supporting flanges must at least equal the width of the ring it supports. Thick circular supports are preferred over thinner supports with reinforcement ribs.

With modern finite element analysis it may be possible to work with thinner materials.

Flatness defects under load must not exceed the values indicated below to avoid tight spots or seizure; both of which will reduce the life of the ring.

Size	3"	5"	7"	9"	12""""	14"	17"	21"	25"
Deviation (mm)	0.04	0.1	0.1	0.12	0.15	0.15	0.15	0.2	0.2

These values are for "long waves" around the circumference. Shorter wave defects (e.g. between 2 bolt holes) must not exceed ¼ of these values.

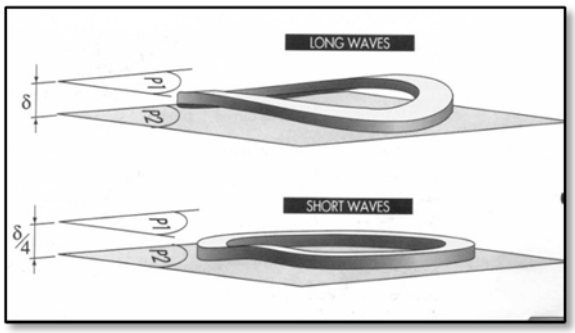


Fig 5: Support structure flatness

Defects in the radial direction (sometimes referred to as "conicity") must not exceed 0.05mm /m based on the raceway diameter.

FASTENING BOLTS

REMOVE THE SHIPPING BOLTS BEFORE INSTALLATION

Although some manufacturers specify Grade 8.8 bolts, QCB® Slewing drives are usually designed to be used with Grade 10.9 hexagon head or cap screw bolts.

The use of flat hardened washers is recommended to reduce surface pressures under the bolt head and nut. If cap screws are used the specific pressure under the bolt head should not exceed the limits of the material. The use of any elastic (spring washers or Bellville washers) or serrated washers is prohibited and will negate the warranty.

Untreated bolts should be lightly oiled and tightened progressively using either a calibrated torque wrench or a hydraulic system, moving around the periphery of the slewing ring in 120 degree steps. The recommended bolt torque figures are tabulated below.

Ensure that the slew ring rotation is tested during the tightening process (if possible) as any “tight points” will become evident and prompt immediate investigation. The bolt torque figures should be checked again before the machine enters service as a degree of “settling” may occur, then after 100 hours of operation, and thereafter at least on an annual basis.

Strength class to DIN/ISO 898			**Grade 8.8**		**Grade 10.9**		**Grade 12.9**	
Yield point Rp 0.2 (N/mm2)			640 for <= M16 660 for > M16		940 MPa		1100 MPa	
ISO thread DIN 13	Stress x-section area mm2	Core x-section area mm2	Tension force (KN)	Tightening torque (Nm)	Tension force (KN)	Tightening torque (Nm)	Tension force (KN)	Tightening torque (Nm)
M12	84.3	76.2	38.5	78	56	117	66	135
M14	115	105	53	126	77	184	90	216
M16	157	144	72	193	106	279	124	333
M18	193	175	92	270	129	387	151	459
M20	245	225	117	387	166	558	194	648
M22	303	282	146	522	208	747	243	873
M24	353	324	168	666	239	954	280	1116
M27	459	427	221	990	315	1395	370	1665
M30	561	519	270	1350	385	1890	450	2250
M33	694	547	335	To be determined by bolt elongation measurement	450	To be determined by bolt elongation measurement	560	To be determined by bolt elongation measurement
M36	817	759	395		560		660	
M39	976	913	475		670		790	
M42	1120	1045	542		772		904	
M45	1300	1224	632		905		1059	
M48	1470	1377	714		1018		1191	
M52	1760	1652	857		1221		1429	
M56	2030	1905	989		1408		1648	
M60	2360	2227	1156		1647		1927	

SEALS

QCB® Slewing drives are fitted with a nitrile or NBR rubber lip seal which rides on the surface of the adjacent ring.

TRACKING ACCURACY

The tracking accuracy is catalogued. It is best explained by way of example:

e.g. WGSE 7

Tracking accuracy (TA)	< 0.2°
Reduction ratio	73:1
Gear PCD	229.95 mm

1. With the worm shaft locked, the worm wheel (or outer ring of the slew ring) will move by < 0.2°. This will have been checked at the factory during assembly.

2. The angular backlash on the worm shaft is calculated as follows. If the measured movement = 0.2°, with the worm wheel now locked in place, the worm shaft will be able to move by 0.2°x76 or 14.6°

3. Again, with the worm wheel locked in place, the axial movement of the worm shaft can be calculated thus:

Axial play = tan(TA) x Gear PCD/2
= tan (0.2) x 229.95/2
= 0.40mm

Units with greater precision can be obtained after careful consideration of the application and will be imported to order only.

OPERATIONAL CLEARANCE AND WEAR

After assembly the clearance or total deflection of the slewing ring under known test conditions should be determined to serve as reference data for future clearance checks to determine the amount of wear in the bearing.

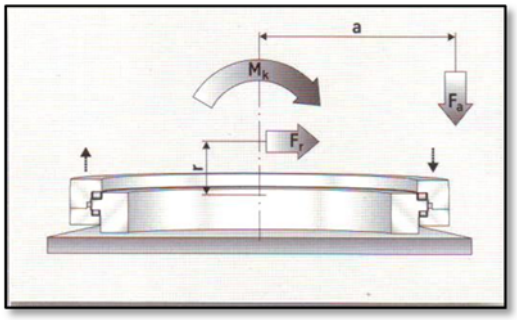


Fig 10: Wear check

The degree of “tilt” in the bearing can be measured, or the relative axial and radial movement of the rings using dial gauges. An average of at least 4 measurements around the circumference should be recorded.

Measurements should be taken as close to the raceways as possible to minimise the effects of elastic deflections in the structure. The measurement points should be marked so that the test can be recreated.

In general, slewing rings will wear at a linear rate in service. Once this rate of wear accelerates it is nearing the end of its service life.

LUBRICATION

The slewing ring raceway, worm gear and support bearings for the worm shaft will require relubrication during installation

Prior to 2015, QCB® Slewing drives used the same grease for the worm, taper roller bearings and slew ring raceway – SINOPEC 7014-1 ((equivalent to MOBILTEMP SHC 100, ISOFLEX NBU 15)

NBC Group can supply **GreaseMax®** cartridges and accessories to provide continuous and automatic lubrication in service (Grease code F239)

More recently, two slightly different greases are used:

SINOPEC	Application	Operating temps
7029D	Raceway	-40C to +180C
7408-1	Worm & taper brgs	-20C to +100C

The raceways, worm and tapered roller bearings can be successfully relubricated with any good quality standard lithium based EP2 bearing grease.

The regreasing interval is best determined by the environment, and is mandatory after a long period of storage. In aggressive environments it must be recognised that the grease acts as a barrier to contamination.

Environmental conditions	Recommended relube interval
Dry & clean workshop	~300 hours operation or 6 months
Outside and exposed	~100-200 hours operation or 4 months
Aggressive environment	~50 hours operation or 2 months
Extreme conditions	~continuous lube preferred

During regreasing it is advisable to rotate the bearing to ensure distribution of the fresh grease as well as to avoid over pressurising the seals as this may force them out of their grooves.

As slewing drives rotate slowly (<2.5 RPM), they can operate 100% full of grease. Ideally a thin smear of fresh grease should start to weep from under the lip seals.

SUITABLE HYDRAULIC DRIVE MOTORS

QCB® Slewing drives are designed to operate at low speeds – 2.5 – 3rpm maximum. *Faster operation is possible with reduced gear life.*

In conjunction with ADAN Limited we supply a matched range of hydraulic units based on maximum load/ maximum speed conditions. Smaller units can be used if the conditions allow.

	Output torque	Ratio	Max	Motor		Motor	Pressure	Flow rate
	KNm		rpm	Nm	rpm		Bar	lpm
WGSE 25 150 25 H R	18	150:1	3	300	450	**MSA 150 2 M**	140	75
WGSE 21 125 25 H R	15	125:1	3	300	375	**MSA 150 2 M**	130	64
WGSE 17 102 25 H R	10	102:1	3	245	306	**MSA 125 2 M**	140	40
WGSE 14 85 25 H R	8	85:1	3	235	255	**MSA 125 2 M**	140	34
WGSE 12 78 25 H R	7.5	78:1	3	240	234	**MSA 125 2 M**	140	32
WGSE 9 61 25 H R	6.5	61:1	3	266	183	**MSA 125 2 M**	150	26
WGSE 7 73 16 H R##1	1.5	73:1	3	44	219	**AMM 50 P**	70	12
WGSE 5A 62 16 R ##1	0.6	62:1	2	32	124	**AMM 50 P**	50	7
WGSE 3C 62 16 R ##1	0.4	62:1	2	21	124	**AMM 50 P**	32	7

##1 modification = 3 bolt fixing and 16mm input shaft for ADAN AMM Series motors

	Output torque	Ratio	Max	Motor		Motor	Pressure	Flow rate
	KNm		rpm	Nm	rpm		Bar	lpm
WGWEA 25 104 R MTAP	34.2	104:1	2.5	822	260	**MTAP 300P**	180	95
WGWEA 21 90 R MTAP	28.7	90:1	2.5	797	225	**MTAP 300P**	165	75
WGWEA 19B 94 25 H R	18.5	94:1	2.5	492	235	**MSA 300 2 M**	100	75
WGWEA 17 104 25 H R	12.96	105:1	2.5	309	262.5	**MSA 200 2 M**	110	65
WGWEA 14 86 25 H R	10.8	86:1	2.5	314	215	**MSA 150 2 M**	150	36
WGWEA 12 79 25 H R	9.5	79:1	2.5	301	197.5	**MSA 150 2 M**	140	33
WGWEA 9 62 25 H R	8	62:1	2.5	323	155	**MSA 150 2 M**	150	22

MTAP modification = 4 bolt fixing and 32mm input shaft to achieve maxiumum load torque

	Output torque	Ratio	Max	Motor		Motor	Pressure	Flow rate
	KNm		rpm	Nm	rpm		Bar	lpm
WGR 72	0.9	63:1	8	48	500	**MSA 75 2 M**	35	40
WGR 114	2.82	44:1	8	214	350	**MSA 150 2 M**	100	68

Options include **braked motors** and **over-centre valves**