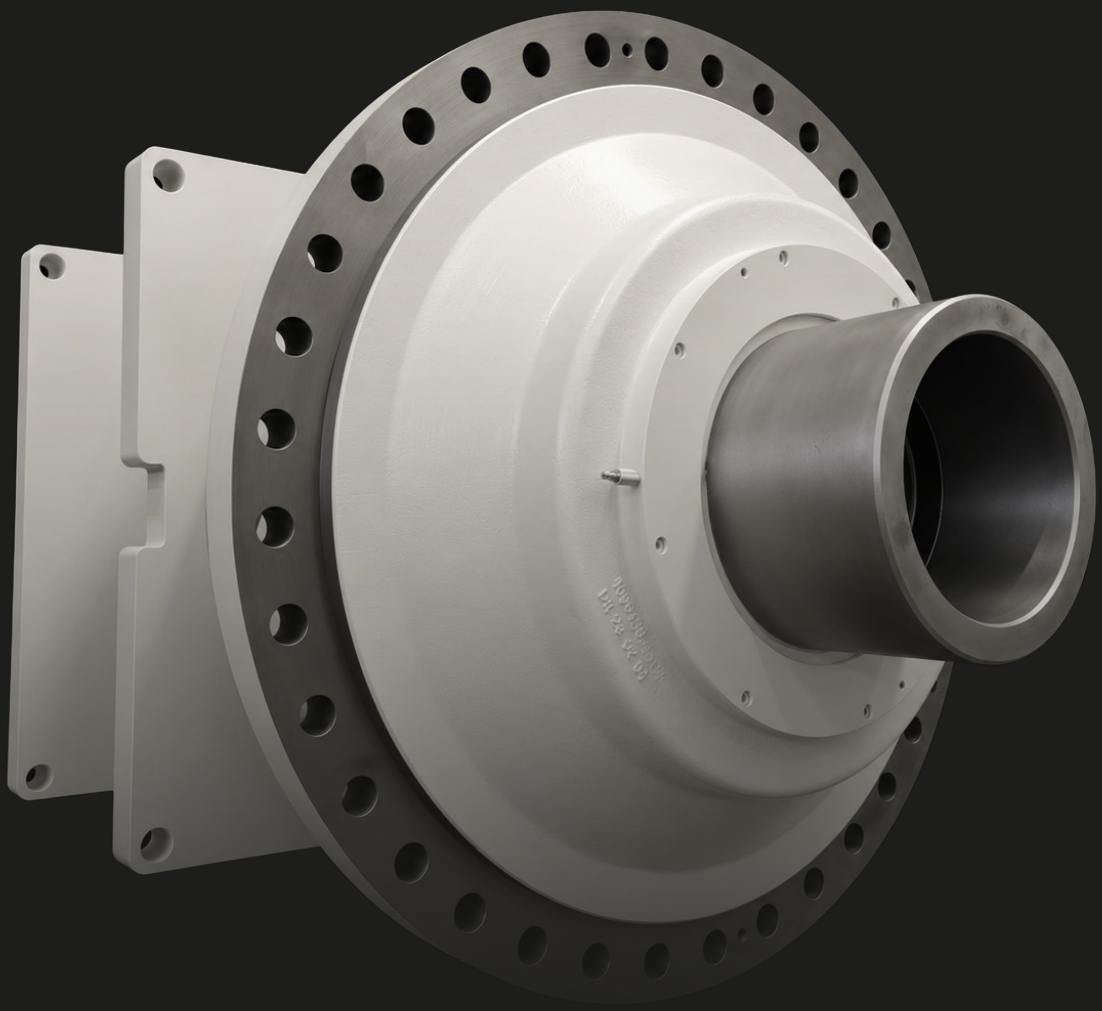
ZOLLERN

Solid metals. Fine solutions.

Drive Technology

Bucket wheel drives



The ZOLLERN-Group
With first-class products and customized solutions in the sectors drive technology, investment casting, sand casting and forging as well as steel profiles we are one of the leading manufacturers – worldwide.

As one of the oldest family-run businesses in Germany we are proud to look back on an impressive 300-year history during which we have merged tradition with innovation. Our main focus is on excellent quality and service.

Welcome to the world of ZOLLERN, where experience and progress go hand in hand to offer our customers the best solutions and products for their requirements in various industrial sectors.

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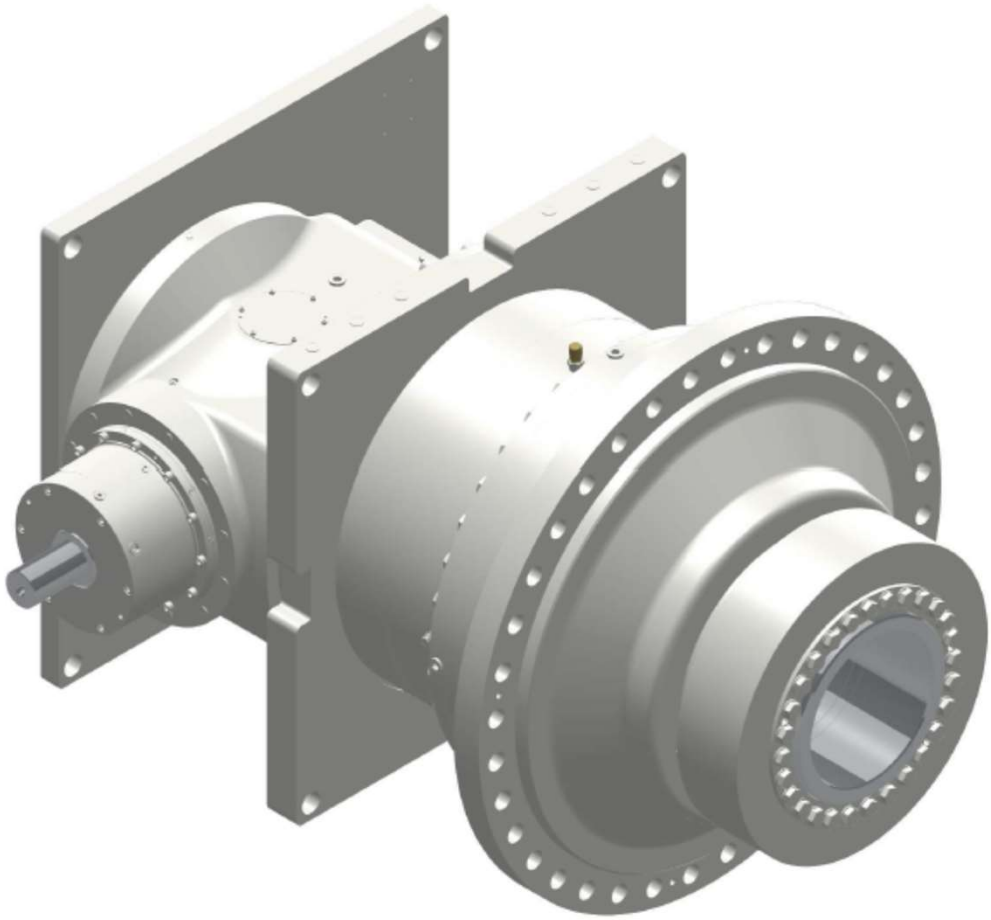


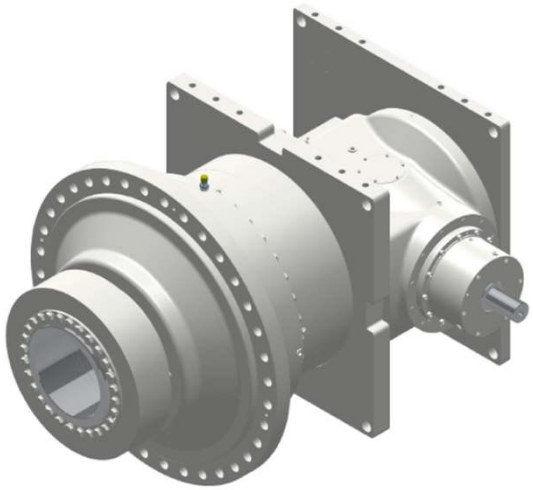
ZOLLERN Bucket Wheel Drives
have proved highly successful under extreme operating conditions. Their principal features and most significant advantages are

- Compact dimensions
- Long operation life
- Modular design of gear unit
- Ease of maintenance
- High performance
- Functional design

With these characteristics the machine designer will get a ready to install unit and will achieve economic solutions even in confined space conditions.

ZOLLERN gears use components common to our complete range (Winches, Slewing Units, Industrial Gears, Free Fall Winches, Bucket Wheel drives) giving the advantage of volume production: cost savings from standard parts, reduced lead times, tested and proven designs across the whole range and readily available spares for units in service.

Features and Designs



Bucket wheel gearboxes
Output torques from 102.000 to 1.200.000 Nm. Ratios i = 169 to 305 (other ratios available on request).
When determining the torque, the acceleration and other induced loads must be taken into consideration.

Rating
The output torques Tdyn max mentioned in the table on page 5 are designed for an infinite fatigue life.

Gear teeth design
Optimized for best possible tooth flank and root load capacity and minimum sliding speeds in accordance with ISO 6336. Calculation results in accordance with DIN 3990 or AGMA standards can also be provided upon request. Externally toothed gears case hardened and ground, internal gears heat-treated and nitrided.

Seals
The input and output are sealed by a radial shaft sealing ring with a dust lip

a) by two radial shaft sealing rings.
b) by the regrease labyrinth sealing in the output shaft cover.
c) by another radial shaft sealing ring.
so that safe protection against oil loss and against penetration of dirt and water is assured.

Input Options
ZOLLERN's modular system provides for Multiple input connection options, Free shaft with key according to DIN 6885-1 or with spline DIN 5480 are optional.

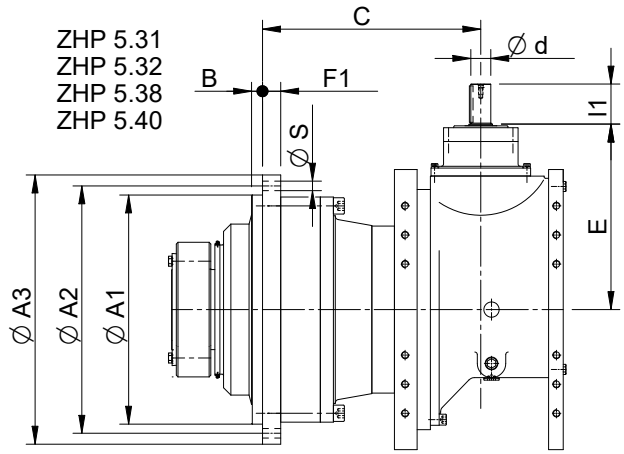
Output Options
Hollow shaft shrink disc, Hollow spline shaft and Flange are optional.

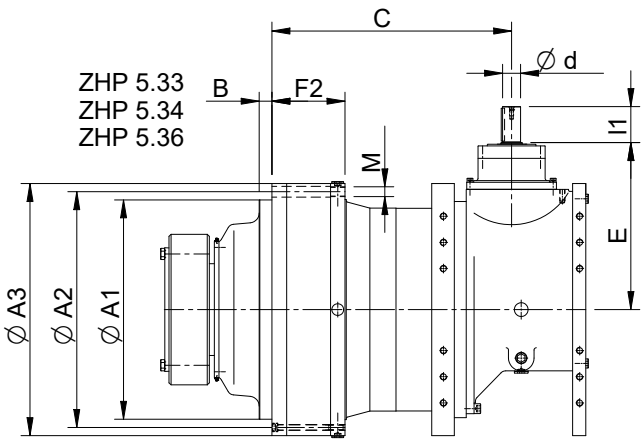
Lubrication
All gears and anti-friction bearings are splashed or forced lubrication. Service intervals and recommended lubricants are given in the table on page 8. Oil level is checked by either dip stick or sight glass.

Bearings
All rotation parts run on rotation element bearings. Tapered roller bearings are used to support the input gearing and cylindrical roller bearings for the planet wheels.

Selection of gear unit size
In order to determine the correct gear unit for a given application, the output torque Tdyn has to be multiplied with the factor K_A.
$T_{nom} = T_{dyn} \times K_A \leq T_{dynmax}$
K_A factor: required by customer or based on specific application.

Technical Data



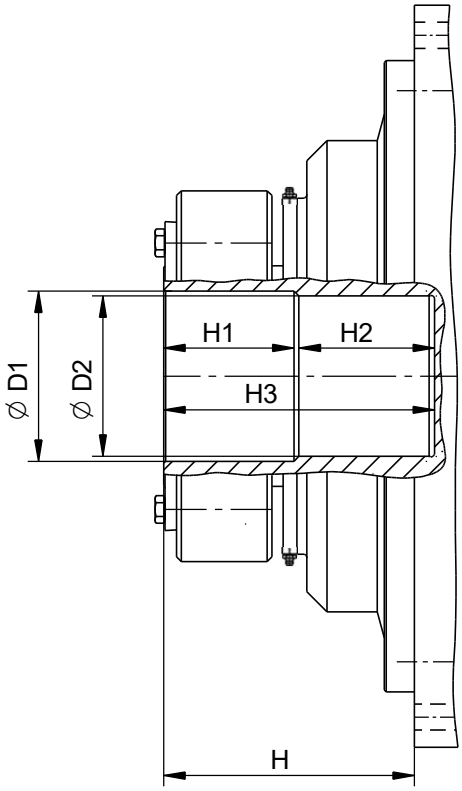


Gear size	Dimensions													
	Output torque $T_{dyn\ max}$ Nm	d mm	l1 mm	E mm	C mm	A1 h7 mm	B mm	A2 ±0.2 mm	S / M mm	Number	Screw strength rating	A3 mm	F1 / F2 mm
ZHP 5.31	102.000	55 j6	110	510	600	630	30	680	26	24	8.8	740	50
ZHP 5.32	150.000	55 j6	110	510	660	680	30	750	33	24	8.8	820	50
ZHP 5.33	203.000	55 j6	110	510	732	670	39	720	M30×44	24	8.8	770	223
ZHP 5.34	262.000	70 j6	110	460	932	720	25	780	M30×50	24	8.8	830	242
ZHP 5.36	440.000	80 j6	140	460	1086	850	30	910	M30×59	36	8.8	970	404
ZHP 5.38	838.000	100 m6	180	910	1245	1320	40	1450	52	36	8.8	1565	85
ZHP 5.40	1.200.000	100 m6	180	910	1286	1640	45	1730	52	36	8.8	1820	80
ZHP 5.42	Available on request												
ZHP 5.44													

Rating according to the conditions of n_{ab} = 5 rpm with infinite service life

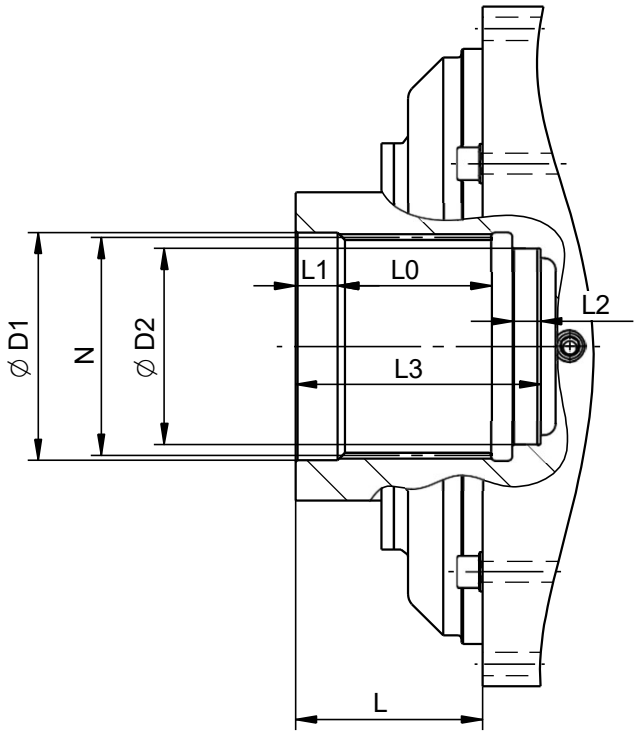
ZOLLERN has a policy of continuous product improvement, and detail may be changed without notice.

Technical Data Output Series
Output type: Shrink disc



Gear size	Dimensions						
	D1 H7 mm	D2 H7 mm	H mm	H1 mm	H2 mm	H3 mm	Shrink Disc Size mm
ZHP 5.31	210	205	300	130	125	270	280
ZHP 5.32	230	225	300	140	120	280	300
ZHP 5.33	250	245	320	135	130	280	320
ZHP 5.34	280	275	350	150	135	320	360
ZHP 5.36	330	325	360	180	150	360	420
ZHP 5.38	430	425	550	220	180	430	530
ZHP 5.40	480	470	600	255	230	515	590

Technical Data Output Series
Output type: Spline



Gear size	N (DIN 5480)	Dimensions						
		L0 mm	D1 H7 mm	D2 H7 mm	L mm	L1 mm	L2 mm	L3 mm
ZHP 5.31	N210 x 5 x 30 x 40 x 9H	125	212	195	200	45	25	210
ZHP 5.32	N240 x 8 x 30 x 28 x 9H	140	242	220	230	50	25	230
ZHP 5.33	N250 x 8 x 30 x 30 x 9H	150	252	230	260	50	30	245
ZHP 5.34	N280 x 8 x 30 x 34 x 9H	170	282	260	290	50	30	270
ZHP 5.36	N330 x 8 x 30 x 40 x 9H	200	332	305	240	60	40	320
ZHP 5.38	N440 x 8 x 30 x 54 x 9H	250	442	420	550	60	40	370
ZHP 5.40	N480 x 8 x 30 x 58 x 9H	285	482	460	455	65	45	415

Recommended Lubricants for ZOLLERN Bucket Wheel Drives

Type/ Specification	Lubricants to DIN 51502		
	Synthetic Lubricants acc. DIN 51 517 T3 CLP HC (PAO) 220	Synthetic Lubricants acc. DIN 51 517 T3 CLP PG 220	Grease acc. DIN 51 825 KP 2 K
Aral	-	Degol GS 220	Aralub HLP 2
Avia	Synthogear PE 220	-	-
	Avilub Gear PAO 220	Gear VSG 220	Avialith 2 EP
BP	-	-	Energrease LS-EP 2
Castrol	Alphasyn EP 220	Alphasyn GS 220	Longtime PD2
	Optigear Synthetic A 220	Alphasyn PG 220	Spheerol EPL 2
	Optigear Synthetic PD 220	Tribol 800/220	Tribol 4020/220-2
Fuchs	Renolin Unisyn CLP 220	Renolin PG 220	Renolit LZR 2 H
	-	-	Renolit EP 2
Mobil	Mobil SHC 630	Mobil Glygoyle 220	Mobilux EP 2
	Mobil SHC Gear 220	-	Mobilgrease XHP 222
Shell	Omala HD 220	Tivela S 220	Alvania EP (LF) 2
	Omala S4 GX 220	Omala S4 WE 220	Gadus S2 V220 2
Total	-	-	Multis EP 2
	Carter SH 220	Carter SY 220	Lical EP 2

Attention: PAO-based gearbox oils are not to be mixed with PG (polyglycol)-based synthetic oil. Greases with different soap bases are not to be mixed.

Lubrication frequency

Oil

- 1st oil change after 200 operating hours
- 2nd oil change after 1000 operating hours
- further oil change after every 3000 operating hours; but at least once every three years.

Grease

- Once a week or on recommissioning

Lubrication type only according indication in the installation drawing resp. in the maintenance manual.

Bucket Wheel Drives Application Questionnaire

Company/Address _____ Date _____

Proper department _____ Person concerned _____ Number of inquiry _____

Phone _____ Fax _____ E-mail _____

Demand _____ Used for _____

// Operating conditions – Design criteria

Power/Rating

Dynamic load

Output torque T_{dyn} _____ (Nm)
Speed on output n_{ab} (rpm)
Installed power P _____ (kW)

Alternative rating

Load conditions	T_{dyn} (Nm)	n_{ab} (rpm)	Time slice (%)
1			
2			
3			
4			
			100 %

Calculated life time _____ (hours)
Safety against _____ (–)
❑ Yield strength ❑ Breakwith
❑ T_{dyn} _____ (Nm)

// Technical data

Output design

❑ Splined hollow shaft
❑ Shrink disc
❑ Flange

Input design

❑ Splined shaft
- Spline size _____
- Length _____

❑ Free input shaft _____
- Diameter _____
- Length _____

Ratio

i _____ ± _____ %

Ambient temperature

t _____ to _____ °C

Application factor

K_A _____

// Driving unit

Electric motor

Manufacturer _____
Type _____
Power _____ (kW)
Speed _____ (rpm)
Starting torque T_A _____ (Nm)
Power-on time ED _____ (%)
Breakdown torque T_K _____ (Nm)
Starting per hour _____
Coupling _____
Manufacturer _____
Type _____
Brake _____
Manufacturer _____
Type _____
Brake torque _____

Other requirements

_____
_____
_____
_____
_____

// Scope of supply

❑ Motor
❑ Motor bracket
❑ Motor flange
❑ Hydraulic coupling
❑ Torque arm
❑ Heaters
❑ Temperature sensor
❑ Hydraulic power pack
❑ Brake for drive unit
❑ Auxiliary cooling
❑ Approval
❑ Material Certificates

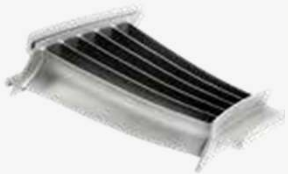
// Remark and special operation conditions

_____
_____
_____
_____
_____

ZOLLERN Group Product Areas

Metals and Shaping

// Investment casting parts



- Turbine components
  - Vanes / Blades/ Shrouds / Heat Shields
- Structural Castings
  - Gas Turbines / Aero / Engines / Defense / Medical / Industrial Components
- Automotive
  - Turbine Wheels / Waste gates / Vanes / Pins / Planet carriers
- Implants
  - Knees (Femur, Tibia) / Hips
- Alloys
  - Super alloys / Cobalt Chrome alloys

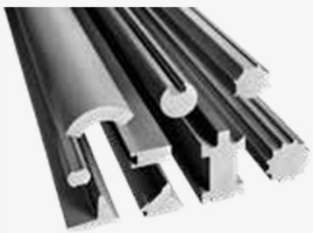
// Sand casting parts

- Sand casting
- Croningguss / Maskenguss
- Ceramic casting
- Continuous casting
- Centrifugal casting

// Forgings

- Forgings made of pure copper and copper alloys
- Semi-finished products, open die forged, flat bars, round bar
- Drop forged parts
- Rings, seamlessly rolled
- Bushings, seamlessly forged
- Individual pieces, small series, large series

// Special profiles and finished parts



- Special profiles, coils, bars
- Customer-specific finished parts
- Profile types: hot-rolled, cold-rolled, cold-drawn, induction-hardened

Drive Technology and Automation

// Gearboxes

- Travel drives
- Slewing gearboxes
- Winch gearboxes
- Industrial gear units
- Gearboxes for tunnel boring machines
- Sugar mill gearboxes
- Electric drive systems
- Condition Monitoring and Predictive Maintenance

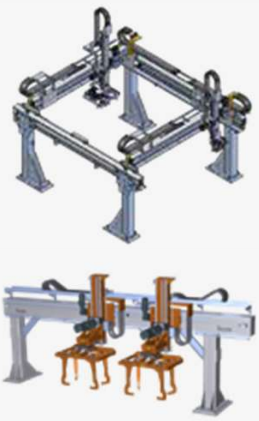
// Winches

- Hoisting winches
- Free fall winches
- Pull winches
- Rescue boat winches
- Winch systems
- Winch gearboxes

// Electric motors

- Torque motors kits
- Synchronous motor kits
- Synchronous motor modules

// Automation, special systems



- Linear units, linear modules, gantry axes, portal units
- Telescoping axes
- Rotary modules, rotary tables
- Line gantries, area gantries
- Robot traverse axes, jig axes
- Storey lifter and lifting columns
- Fast conveyor
- Framing tenter handling / overhead systems
- Storage systems
- Complete systems with steel construction and control
- Special solutions
- Gripper

// Hydrostatic systems

- Hydrostatic spindle units
- Hydrostatic rotary tables
- Aerostatic rotary tables
- Hydrostatic linear guides
- Hydrostatic center drive spindles
- Hydrostatic bearing components
- Hydrostatic special applications and test benches

// Rotary tables systems

- Roller bearing rotary tables
- Hydrostatic rotary tables
- Automatic pallet changing systems and linear axes
- Swiveling tables
- After sales service for products of ZOLLERN, Rückle and Eimeldingen

ZOLLERN

Headquarters

Germany

Subsidiaries

Italy and southern Europe
Netherlands and Northern Europe
USA
India and Southeast Asia
Taiwan, China

Factories

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Portugal
Romania
Slovenia
China

Service partner

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Brazil
Chile
Greece
Great Britain
Kuwait
Singapore
South Africa
Thailand
Dubai
USA
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